Quality of Grass Fodder Cowpea Mixtures as Influenced by Row Ratio

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Introduction

A serious drawback of sustainable livestock production system in Kerala is the inadequate seasonal distribution of fodder production. The quantity and quality of herbage available in the lean dry months from January to May is very low. Therefore it is imperative to develop a fodder production system that increases the availability and improves the quality of herbage in the dry summer months. Intensive fodder production systems based on grasses are increasingly becoming important to the dairy farmers of Kerala. Development of compatible persistent grass legume mixtures could alleviate acute seasonal livestock feed deficiency in dry seasons (Njarui *et al*., 2004). The major problem in grass fodder cowpea mixtures is the low legume plant density and shading of cowpea by grasses. To overcome this problem cropping systems using optimum cowpea densities and different crop combinations are to be standardized. Inclusion of fodder legumes in the fodder production system is the most efficient way to increase herbage production and quality (Mwangi *et al*., 2006) and the most economic feed supplement than the commercial concentrates (Njarui *et al*., 2004 The inclusion of a legume in Napier grass based diet has shown to improve animal performance in terms of milk production because of their high nutrient contents (Muinga *et al*., 1992). Hence this study was proposed to identify the performance evaluation of fodder cowpea varieties in mixtures with the popular fodder grasses of Kerala for improving the physiological aspects of fodder under open and shaded situations during the lean dry months.

Materials and Methods

A field experiment was conducted at the Instructional Farm, College of Agriculture, Vellayani, Thiruvananthapuram during January 2012 to March 2014 to find out the effect of grass-fodder cowpea mixtures and row ratio on the quality aspects of fodder grasses and fodder cowpea in open and in partial shade. The experiments were laid out in RBD with three replications, comprising of two grasses [G1 - Hybrid napier (Suguna), G2 - Guinea grass (Harithasree)], two fodder cowpea varieties (V1 - COFC-8 (open and shade), V2 - UPC-622 (open), UPC-618 (shade) and three grass legume row ratios (R1 - 1:1, R2 - 1:2, R3 - 1:3). In 1:1 row ratio, 1 row of fodder cowpea was sown in the interspaces of fodder grasses. In 1:2 and 1:3 row ratios, 2 rows and 3 rows of fodder cowpea were sown in the interspaces respectively.Crude protein content was calculated by multiplying the nitrogen content of plant by the factor 6.25 (Simpson et al., 1965). Crude fibre content was determined by A.O.A.C. method (A.O.A.C., 1975). Crude protein yield was calculated by multiplying the crude protein content in plants and dry matter production and expressed in t ha-1.

Results and Discussion

The results showed that grasses and row ratio had significant impact on crude protein content of grasses in open in both the years. Significantly higher crude protein content was recorded by hybrid napier (G1) in open (9.21 % in first year and 9.20 % in second year) (Table 1). The genetic superiority of this grass in this character has been an added advantage in this respect. Grass-legume row ratio of 1:3 (R3) recorded significantly higher crude protein content in open (8.65 %) in both the years. Grass-row ratio interaction was significant in open condition with g1r3 (hybrid napier + fodder cowpea planted at 1:3 row ratio) recording significantly higher crude protein content of 9.24 % in both the years. The results also showed that grasses and row ratio had significant impact on crude protein content of grasses in shade in both the years. Significantly higher crude protein content was recorded by hybrid napier (G1) in open (9.22 % in first year and 9.21 % in second year). Grass-legume row ratio of 1:3 (R3) recorded significantly higher crude protein content in open (8.66 %) in both the years. The triple rows of cowpea were superior to double or single row (Sima *et al*., 2010) owing to utilization of symbiotically fixed nitrogen, more enhanced interception of light and allelopathic and other effects. These factors created a micro-environment that favoured higher protein content than those obtained from sole legume or grass stands (Sengul, 2003). The interaction effects were not significant. The results also revealed that the treatments and their interactions had no significant impact on crude protein content of fodder cowpea (Table 2). The results revealed that the grasses varied significantly with respect to crude fibre content in open. Significantly lower crude fibre content (25.86 % and 24.97 %) was recorded by hybrid napier (G1) in open in first and second years respectively. This might be due to the fact that the

more the crude protein content of forage the lesser the fibre fraction. Fodder cowpea varieties, row ratio and the interactions had no significant effect on crude fibre content of grasses in open. The results also revealed that the grasses varied significantly with respect to crude fibre content in partial shade.

Table1. Crude protein content of grass and cowpea as influenced by grass, cowpea varieties and row ratios of grass-legume mixture

Treatments	Grass				Cowpea			
	Open		Shade		Open		Shade	
	I Year	II Year	I Year	II Year	I Year	II Year	I Year	II Year
Grasses (G)								
G_1-Hybrid napier	9.21	9.20	9.22	9.21	16.00	16.01	16.02	16.02
G_2-Guinea grass	8.03	8.05	8.04	8.05	16.01	16.00	16.01	16.02
SEm (±)	0.002	0.003	0.002	0.003	0.005	0.004	0.006	0.004
CD (0.05)	0.003	0.003	0.003	0.003	NS	NS	NS	NS
Fodder cowpea varieties (V)								
V_1 - COFC-8	8.63	8.62	8.64	8.63	16.02	16.01	16.01	16.03
V_2 - UPC-622	8.62	8.63			16.00	16.00		
V_2- UPC-618			8.63	8.64			16.03	16.02
SEm (±)	0.002	0.003	0.002	0.003	0.005	0.004	0.006	0.004
CD (0.05)	NS	NS	NS	NS	NS	NS	NS	NS
Grass-legume row ratio (R)								
R_1 - (1:1)	8.60	8.61	8.61	8.62	16.01	15.99	16.01	16.02
R_2 - (1:2)	8.62	8.62	8.63	8.64	16.02	16.01	16.02	16.03
R_3 - (1:3)	8.65	8.65	8.66	8.66	15.99	16.02	16.03	16.03
SEm (±)	0.003	0.004	0.003	0.004	0.006	0.005	0.007	0.005
CD (0.05)	0.004	0.004	0.004	0.004	NS	NS	NS	NS

Conclusion

Based on the results it can be concluded that hybrid napier cv. suguna intercropped with fodder cowpea varieties COFC-8 and UPC-622 in open condition and with COFC-8 and UPC-618 in partial shade (30 percent) in the row ratio of 1:3 is the best for obtaining maximum yield, quality and net returns during the dry months in the dairy homesteads of Kerala.

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