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PRODUCTION POTENTIAL OF ROW INTERCROPPING IN PALISADE GRASS (*BRACHIARIA BRIZANTHA*) WITH FODDER LEGUMES IN DIFFERENT RATIOS

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SUMMARY

The study entitled 'Production potential of row intercropping in palisade grass (*Brachiaria brizantha*) with fodder legumes in different ratios' was conducted at the Instructional Farm at College of Agriculture, Vellayani, Thiruvananthapuram during the *Kharif* 2023. The field experiment was conducted with the objective of assessing the fodder production potential of palisade grass intercropped with three fodder legumes *viz*. fodder cowpea, stylo and horse gram in two row ratios *viz*. 2:1 and 2:2. The experiments were laid out in randomized block design with 10 treatments in 4 replications. The treatments were: T_1 - palisade grass: fodder cowpea in 2:1 row ratio; T_2 - palisade grass: stylo in 2:1 row ratio; T_3 - palisade grass: horse gram in 2:1 row ratio; T_4 - palisade grass: fodder cowpea in 2:2 row ratio; T_5 - palisade grass: stylo in 2:2 row ratio; T_6 - palisade grass: horse gram in 2:2 row ratio; T_7 - sole crop of palisade grass; T_8 - sole crop of fodder cowpea; T_9 - sole crop of stylo and T_{10} - sole crop of horse gram. Fertilizer recommendation of 300:75:75 kg NPK/ha for palisade grass; 25:60:30 kg NPK/ha for sole crops of fodder cowpea and horse gram and 20:80:30 kg NPK/ha for sole crop of stylo, were followed. Row intercropping with horse gram at a ratio of 2:2 was found to be superior in terms of plant height, number of tillers, green fodder yield and dry fodder yield of palisade grass.

Key words: Palisade grass, Fodder cowpea, Stylo, Horse gram, Intercropping, Row ratio

In the 20th livestock census, the total livestock population in India is 536.76 million which is a 4.8% increase compared to the previous census (FAHD, 2019). Despite the surge in livestock population, India is experiencing a deficit of dry and green fodder by 12% and 30% respectively. Whereas, the demand for both is expected to rise to 1012 million tonnes and 631 million tonnes respectively by 2050 (IGFRI, 2020). In India, there is also a shortfall of green fodder, dry crop leftovers and concentrate feed ingredients by 35.6%, 10.5% and 44% respectively (Singh *et al*., 2022).

The ever-increasing human and livestock population, compete for land and other basic resources, for their primary necessities of food and fodder. Despite the growth in livestock population and demand for fodder, the area under fodder cultivation is declining and is limited to 4% of the cropped area in India (Patil *et al*., 2018).

Kerala, the 15th largest milk producing state in India, has only 5803.69 hectares under fodder cultivation (Sivagnanam and Pulikkamath, 2020). Unlike other states, dense population, limited land resources, rapid development and urbanization, limits the fodder production possibilities in Kerala. According to Roy *et al*. (2019), Kerala produces 3.59 million tonnes of green fodder, with a demand of 3.76 million tonnes, facing a deficit of 4.5%. Since expansion of area is nearly impossible, fodder production needs intensification through intercropping by increasing the biomass per unit area. In this scenario, fodder crops suitable to the soil and climatic conditions of Kerala and that can accommodate intercrops need to be popularized.

Palisade grass, a quick growing, high yielding, rhizomatous perennial grass used as fodder is best adapted to acid soils of humid and sub-humid tropics and survives drought better than many other tropical species of grasses. But livestock feed should contain sufficient nutrients particularly proteins, for maintaining higher rates of milk production. Crude protein content, an important quality parameter of fodder, is low in grasses which increases the dependence on protein supplements.

Nutritive value of cereal forages can be improved by supplementing them with 0.5% urea or mixing with either leguminous forages such as cowpea or berseem or with top feeds such as *Leucaena leucocephala* (Singh and Das, 2021). Since fodder legumes are a cheap and valuable source of protein, its inclusion in fodder grass-based cropping system improves the quality and thus ensures yield stability.

Fodder cowpea, stylo and horse gram are leguminous crops highly suited to the Kerala conditions, with high nutritional qualities especially crude protein content. Fodder cowpea is a rich source of proteins, amino acids, calcium, phosphorus and vitamins. Stylo is a fodder cum leguminous cover crop grown either alone or in combination with fodder grasses. Horse gram is an underutilized pulse-cum-fodder crop native to Southeast Asia and tropical Africa (Chahota *et al.*, 2013).

MATERIALS AND METHODS

The field experiment was conducted during the *Kharif* 2023 (June 2023-February 2024) at the Instructional Farm at College of Agriculture, Vellayani, Thiruvananthapuram, Kerala. The experimental site is located in the Kalliyoor Panchayat, Nemom Block of Thiruvananthapuram district in Kerala. It is located at 8.43^{0}N latitude, 76.99^{0}E longitude and 29 m above mean sea level. The meteorological parameters *viz*. rainfall (Fig. 1.), maximum temperature, minimum temperature, maximum relative humidity, minimum relative humidity, sunshine hours and evaporation (Fig. 2.) during the field experiment, are plotted in graph.

Soil in the experimental field was sandy clay loam in texture with slightly acidic pH (6.23), normal electrical conductivity (0.071 dS/m), high organic carbon (1.98%), medium available nitrogen (338.69 kg ha^{-1}), high available phosphorus (89.6 kg ha^{-1}) and medium available potassium (151.65 kg ha^{-1}).

The experiment was laid out in randomized block design with 10 treatments in 4 replications. Two factors *viz*. intercropping (3 levels) and row ratio (2 levels) were analysed for their efficacy in fodder production. The fodder legume intercrops were fodder cowpea (*Vigna unguiculata*), stylo (*Stylosanthes hamata*) and horse gram (*Macrotyloma uniflorum*). The treatments were: T_1 - palisade grass:

Fodder cowpea in 2:1 row ratio; T_2 - palisade grass: stylo in 2:1 row ratio; T_3 - palisade grass: horse gram in 2:1 row ratio; T_4 - palisade grass: fodder cowpea in 2:2 row ratio; T_5 - palisade grass: stylo in 2:2 row ratio; T_6 - palisade grass: horse gram in 2:2 row ratio; T_7 - sole crop of palisade grass; T_8 - sole crop of fodder cowpea; T_9 -sole crop of stylo and T_{10} - sole crop of horse gram.

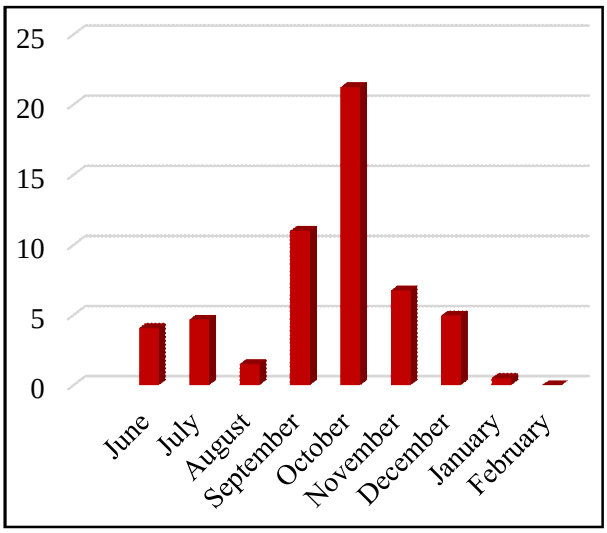

Fig. 1. Rainfall during the experiment (June 2023 - February 2024).

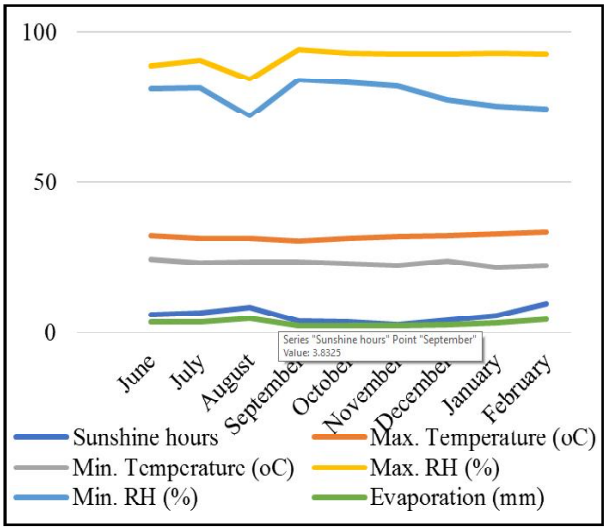

Fig. 2. Temperature, Relative Humidity, Sunshine hours and Evaporation during the experiment (June 2023 - February 2024).

The slips of palisade grass *var*. Mulato, was planted at a spacing of 60cm x 60cm. The intercrops were sown in definite row ratios at the time of planting and after the third harvest of the main crop at a spacing of 30cm x 15cm. Farmyard manure at the rate of 10 t ha^{-1} was uniformly applied to all the plots. Nutrient doses of 300:75:75 kg NPK/ha was followed for palisade grass (Sharu, 2016); 25:60:30 kg NPK ha^{-1} for sole crops of fodder cowpea and horse gram and 20:80:30 kg NPK/ha for sole crop of stylo as per the *Package of Practices* of Kerala Agricultural University (KAU POP, 2016).

First harvest of the main crop was taken at 90 days after planting (DAP) and subsequent harvests at 45 days interval (135 DAP, 180 DAP and 225 DAP). The intercrops were harvested at 45 days after sowing (DAS).

Five plants, each of main crop and intercrops from each plot were tagged for taking the biometric observations on plant height, number of tillers and number of branches. The net plot area was harvested for recording the green fodder yield of palisade grass and fodder legume intercrops in kg/plot and converted to t/ha. After recording the fresh weight of sample plants from each plot, the sample plants were sun-dried followed by oven drying at 70± 5°C to a constant weight for obtaining the dry fodder yield in t/ha.

Data requiring transformation were appropriately transformed and subjected to analysis of variance (ANOVA) applicable to randomized block design and the least significant difference (LSD) values at 5% level of significance were calculated to test the significant difference between treatment means.

RESULTS AND DISCUSSION

Growth attributes

Growth attributes refer to the quantitative or measurable characteristics of plants that defines the progress in growth. With respect to fodder crops, plant height, number of tillers or branches, Leaf: Stem Ratio (LSR) and Leaf Area Index (LAI) are important parameters that determine the quality and quantity of fodder production. The growth attributes of palisade grass and fodder legume intercrops *viz*. plant height, number of tillers and number of branches were as follows:

Plant height and number of tillers of palisade grass

Intercropping palisade grass with horse gram resulted in significantly higher plant height and number of tillers compared to intercropping with fodder cowpea and stylo. Palisade grass attained the maximum height of 1.25m with horse gram as the intercrop. Nasreen (2018) reported plant height of palisade grass as 1.24m when intercropped with fodder rice bean. On the contrary, Guarnieri *et al*. (2019) observed monocropping of palisade grass cv. BRS Paiaguas (1.27m) as superior compared to intercropping with maize (1.07m), in terms of plant height.

Among the different row ratios, the 2:2 ratio of palisade grass and fodder legumes was superior in terms of plant height and number of tillers. Grass-legume intercropping in the ratio 2:2 was found to be

TABLE 1A

Effect of intercropping and row ratio of fodder legumes and their interaction on the plant height (cm) and number of tillers of palisade grass

Treatment	Plant height					Number of tillers				
	H_1	H_2	H_3	H_4	Mean	H_1	H_2	H_3	H_4	Mean
Intercrops (I)										
Fodder cowpea (i_1)	112.60^{b}	83.77^{b}	82.95	32.20	77.88^{b}	55.68^{c}	48.28^{b}	66.84^{b}	27.81^{b}	49.65^{c}
Stylo (i_2)	113.48^{b}	84.09^{b}	82.62	33.69	78.47^{b}	58.57^{b}	50.96^{a}	67.54^{b}	28.27^{b}	51.34^{b}
Horse gram (i_3)	125.09^{a}	88.15^{a}	81.22	33.42	81.97^{a}	62.37^{a}	51.94^{a}	71.21^{a}	31.31^{a}	54.21^{a}
SE(m)	2.79	1.169	1.609	0.499	0.911	0.929	0.568	0.986	0.658	0.457
CD	8.41	3.525	NS	NS	2.745	2.799	1.713	2.973	1.983	1.378
Row ratio (R)										
2:1 (r_1)	111.57^{b}	87.29^{a}	83.27	32.36^{b}	78.62	61.10^{a}	49.35^{b}	68.22	29.09	51.94
2:2 (r_2)	122.55^{a}	83.38^{b}	81.26	33.84^{a}	80.26	56.65^{b}	51.43^{a}	68.84	29.16	51.52
SE(m)	2.278	0.955	1.314	0.407	0.744	0.758	0.464	0.805	0.537	0.373
CD	6.867	2.878	NS	1.228	NS	2.286	1.399	NS	NS	NS
Treatment combinations (I x R)										
i_1r_1	103.45	88.27^{a}	83.87	33.06^{bc}	77.16	54.70	46.33	65.62	27.80	49.69
i_1r_2	121.76	79.27^{c}	82.03	31.33^{c}	78.60	55.40	50.23	68.05	27.83	49.62
i_2r_1	105.81	85.45^{ab}	83.27	32.60^{c}	76.78	55.45	51.10	67.89	27.66	51.77
i_2r_2	121.16	82.73^{bc}	81.98	34.77^{ab}	80.16	56.55	50.82	67.19	28.88	50.90
i_3r_1	125.45	88.16^{a}	82.68	31.41^{c}	81.93	56.60	50.61	71.15	31.83	54.37
i_3r_2	124.73	88.14^{a}	79.77	35.43^{a}	82.02	58.40	53.26	71.28	30.79	54.04
SE(m)	3.946	1.654	2.276	0.705	1.288	1.313	1.137	1.395	0.93	0.647
CD	NS	4.985	NS	2.126	NS	NS	NS	NS	NS	NS

more effective in terms of growth attributes *viz*. plant height, tiller number, leaf: stem ratio and dry matter yield (Mohammed *et al*., 2015). The influence of fodder legume intercropping on the growth attributes of palisade grass are presented in Table 1a.

Contrast analysis of these parameters (Treatment *vs* Control) of palisade grass showed significant variation compared to the control (T_7) of sole crop of palisade grass, on all harvests except the first (Table 1b).

Plant height and number of branches of fodder legume intercrops

The maximum plant height (1.16m) attained by the first crop of fodder cowpea with row intercropping with palisade grass in 2:1 row ratio was comparable with the control (T_8) of sole crop of fodder cowpea. The mean plant height of fodder cowpea also followed the same trend. However, the sole crop produced the significantly higher number of branches in both crops. The reduction in plant height and branching of fodder cowpea under row intercropping at higher row ratios may be attributed to the closer plant spacing adopted in the system. Nengparmoi *et al*. (2025) reported that plant height of fodder cowpea and rice bean intercropped with maize at 1:1 row ratio (3.06m and 2.14m, respectively) were higher compared to that grown in 2:1 row ratio.

The mean plant height and the mean number of branches of stylo were at par with the control (T_9) of sole crop of stylo. The maximum height attained by the first and second crops of stylo were 70.28cm and 67.78cm, respectively. Ram (2010) also reported that highest plant height and number of branches was attained with the sole cropping of stylo than its row intercropping with guinea grass. According to Patra and Paul (2018), depending on the species, stylo can grow to a height ranging from 75cm to 2m. Kumar *et al*. (2025) reported that on an average, *Stylosanthes hamata* produce 6.25 branches.

First crop of horse gram recorded a maximum plant height (59.13cm) in the control (T_{10}) of sole crop of horse gram and the lowest was with row intercropping at 2:2 row ratio. In both crops, the highest number of branches (5.10 and 3.92, respectively) were obtained with the sole cropping and lowest with row intercropping in both ratios. This significant influence of row ratios in the number of branches per plant in horse gram may be attributed to the to the closer spacing contrary to the improved availability of moisture, sunlight, nutrients and growing space under wider spacing. Sudhagar *et al*. (2022) reported that plant height and number of branches of horse gram ranges from 42.67cm to 193.47cm and 3 to 10.67, respectively. Kumari *et al*. (2025) also reported similar range for plant height (29.63cm to 88.33cm) and number of branches (2.79 to 8.19). The influence of intercropping systems and row ratios on the plant height and number of branches of fodder legumes is presented in Table 1c and Table 1d.

Yield attributes

Green Fodder Yield of Palisade grass

The highest total green fodder yield of palisade grass (147.44 t/ha) was recorded with row intercropping with horse gram at 2:2 row ratio. According to Epifanio *et al*. (2019) row intercropping promotes a higher proportion of legumes within the system, thereby enhancing forage yield and quality.

TABLE 1B
Effect of intercropping and row ratio of fodder legumes on the plant height (cm) and number of tillers of palisade grass compared to control 1 (sole crop of palisade grass), contrast analysis

Treatment	Plant height					No. of tillers				
	H_1	H_2	H_3	H_4	Mean	H_1	H_2	H_3	H_4	Mean
Treatment vs Control 1										
i_1r_1	NS	NS	NS	NS	0.0072**	0.00661**	0***	8e-05***	0***	0***
i_1r_2	NS	1e-05***	NS	0.00145**	0.03292*	0.00068***	0.00584**	0.033*	0.00038***	0***
i_2r_1	NS	0.00489**	NS	0.02467*	0.00471**	NS	0.02374*	0.02733*	0.00031***	0.00016***
i_2r_2	NS	0.00057***	NS	NS	NS	NS	0.01529*	0.01224*	0.00192**	2e-05***
i_3r_1	NS	NS	NS	0.00183**	NS	NS	0.0108*	NS	NS	NS
i_3r_2	NS	0.04961*	0.01537*	NS	NS	NS	NS	NS	0.04108*	0.04654*
p-value	0.991	0.000	0.003	0.003	0.003	0.014	0.000	0.001	0.000	0.000
SE (Contrast T vs C_1)	29.38	11.317	14.521	4.465	9.065	9.155	6.120	8.27	6.186	3.903

***Since the p-value is <0.05, there is a significant difference between the control and treatment means.

TABLE 1C
Effect of intercropping and row ratio of fodder legumes and their interaction on the plant height (cm) and number of branches of fodder legumes *viz*. fodder cowpea, stylo and horse gram

Treatment	Plant height			No. of branches		
	H_1	H_2	Mean	H_1	H_2	Mean
T_1: i_1r_1	116.08[a]	93.25[b]	104.66[a]	6.50[b]	2.79[ab]	4.65[b]
T_4: i_1r_2	85.06[b]	64.56[c]	74.81[b]	4.42[c]	1.83[b]	3.13[c]
C_2	113.50[a]	98.83[a]	106.16[a]	7.67[a]	3.79[a]	5.73[a]
SE(m)	1.374	0.935	0.657	0.311	0.356	0.248
CD	4.756	3.236	2.274	1.076	1.233	0.857
T_2: i_2r_1	70.28[a]	61.04[b]	66.73[a]	4.83	4.68[a]	4.75[a]
T_5: i_2r_2	61.47[c]	63.17[b]	61.26[b]	4.25	3.58[b]	3.92[b]
C_3	67.00[b]	67.76[a]	67.39[a]	5.43	4.75[a]	5.09[a]
SE(m)	0.633	0.937	0.522	0.295	0.210	0.159
CD	2.190	3.243	1.806	NS	0.727	0.551
T_3: i_3r_1	57.13[b]	59.54	58.39[a]	3.54[b]	2.35[b]	2.94[b]
T_{10}: i_3r_2	50.24[c]	58.31	54.57[b]	3.84[b]	1.92[b]	2.88[b]
C_4	59.13[a]	53.97	56.55[ab]	5.10[a]	3.92[a]	4.51[a]
SE(m)	0.544	1.301	0.776	0.351	0.217	0.273
CD	1.882	NS	2.684	1.214	0.751	0.946

Forage yield, a function of plant population, plant height and Leaf Area Index was higher for the row intercropping system with horse gram.

Dry Fodder Yield of palisade grass

The total dry fodder yield of palisade grass also was significantly superior with row intercropping with horse gram at 2:2 row ratio. This could be related to the higher green fodder yield obtained. Choubey *et al*. (1997) reported higher dry fodder yield of palisade grass intercropped with rice bean compared to the sole crop. Ibrahim *et al*. (2006) observed the production of maximum dry fodder yield by the row intercropping system of fodder maize and cowpea in the ratio 3:1. Similar observation was made by Baba *et al*. (2011) in Guinea and *Centrosema* mixtures intercropped in the ratios 2:2 and 3:1. The influence of intercropping systems and row ratios on the green fodder yield and dry fodder yield of palisade grass is presented (Table 2a).

The contrast analysis for comparing the green fodder yield and dry fodder yield of palisade with the control is tabulated (Table 2b).

Green Fodder Yield of intercrops

Total green fodder yield of fodder cowpea was the highest with the row ratio 2:2. In stylo, the total green fodder yield at the row ratio 2:2 and control were at par. The total green fodder yield of horse gram in the control was significantly superior to row intercropping at both the row ratios.

Dry Fodder Yield of intercrops

The total dry fodder yield of fodder cowpea, stylo and horse gram were highest with the row ratio 2:2. Reddy *et al*. (2022) reported the green fodder yield and dry fodder yield of horse gram as 15.2 t/ha

TABLE 1D
Effect of intercropping and row ratio of fodder legumes and their interaction on the plant height (cm) and number of branches of fodder legumes *viz*. fodder cowpea, stylo and horse gram compared to control, C_2 (sole crop of fodder cowpea), C_3 (sole crop of stylo) and C_4 (sole crop of horse gram)

Treatment	Plant height			No. of branches		
	H_1	H_2	Mean	H_1	H_2	Mean
T_1: i_1r_1	NS	0.00999**	NS	NS	NS	0.03734*
T_4: i_1r_2	1e-05***	0***	0***	0.00057***	0.01433*	0.00055***
p-value	0.000	0.000	0.000	0.001	0.015	0.001
SE	3.366	2.291	1.610	0.762	0.872	0.607
T_2: i_2r_1	NS	0.02377*	NS	NS	NS	NS
T_5: i_2r_2	NS	0.0041**	3e-04***	NS	NS	0.00359**
p-value	0.195	0.003	0.002	0.050	0.051	0.008
SE	1.550	2.295	1.279	0.723	0.515	0.390
T_3: i_3r_1	NS	0.04037*	NS	0.03502*	0.00398**	0.01209*
T_{10}: i_3r_2	7e-05***	NS	NS	NS	0.00111**	0.00993**
p-value	0.000	0.021	0.945	0.017	0.001	0.003
SE	1.332	3.186	1.900	0.859	0.307	0.670

***Since the p-value is <0.05, there is a significant difference between the control and treatment means.

TABLE 2A
Effect of intercropping and row ratio of fodder legumes and their interaction on the fodder yield of palisade grass

Treatments	Green Fodder Yield (t/ha)					Dry Fodder Yield (t/ha)				
	H_1	H_2	H_3	H_4	Total GFY	H_1	H_2	H_3	H_4	Total DFY
Factor 1: Intercropping (I)										
Fodder cowpea (i_1)	48.34[b]	32.83[a]	42.85[b]	6.94	130.96[b]	9.67[b]	6.57[a]	8.57[b]	1.39	26.19[b]
Stylo (i_2)	50.40[b]	30.64[b]	41.17[c]	6.84	129.05[b]	10.08[b]	6.13[b]	8.24[c]	1.46	25.81[b]
Horse gram (i_3)	52.80[a]	32.86[a]	44.94[a]	7.28	137.88[a]	10.56[a]	6.57[a]	8.99[a]	1.37	27.58[a]
SE(m)	0.764	0.440	0.261	0.315	0.862	0.153	0.088	0.052	0.063	0.172
CD	2.302	1.326	0.788	NS	2.597	0.462	0.266	0.157	NS	0.519
Factor 2: Row ratio (R)										
2:1 (r_1)	46.96[b]	28.91[b]	39.99[b]	6.68	122.54[b]	9.39[b]	5.78[b]	8.00[b]	1.34	24.51[b]
2:2 (r_2)	54.07[a]	35.30[a]	45.98[a]	7.37	142.72[a]	10.81[a]	7.06[a]	9.20[a]	1.47	28.54[a]
SE(m)	0.623	0.359	0.213	0.257	0.704	0.125	0.072	0.043	0.052	0.141
CD	1.879	1.082	0.643	NS	2.121	0.377	0.217	0.128	NS	0.424
Treatment combinations (I x R)										
i_1r_1	43.80[c]	30.07	39.74[e]	6.79	120.40	8.76[c]	6.01	7.95[e]	1.36	24.08
i_1r_2	52.88[ab]	35.58	45.95[b]	7.10	141.51	10.58[ab]	7.12	9.19[b]	1.42	28.30
i_2r_1	45.96[c]	27.09	39.26[e]	6.59	118.89	9.19[c]	5.42	7.86[e]	1.32	23.78
i_2r_2	54.85[a]	34.19	43.08[c]	7.09	139.20	10.97[a]	6.84	8.62[c]	1.42	27.84
i_3r_1	51.13[b]	29.57	40.97[d]	6.66	128.32	10.23[b]	5.91	8.19[d]	1.33	25.66
i_3r_2	54.48[a]	36.14	48.92[a]	7.91	147.44	10.90[a]	7.23	9.78[a]	1.58	29.49
SE(m)	1.081	0.622	0.369	0.445	1.219	0.217	0.125	0.074	0.090	0.244
CD	3.255	NS	1.114	NS	NS	0.653	NS	0.222	NS	NS

TABLE 2B
Effect of intercropping and row ratio of fodder legumes on the Green Fodder Yield and Dry Fodder Yield of palisade grass (t/ha) compared to control 1 (sole crop of palisade grass), contrast analysis

Treatments	Green Fodder Yield					Dry Fodder Yield				
	H_1	H_2	H_3	H_4	Total	H_1	H_2	H_3	H_4	Total
Treatment vs Control 1										
i_1r_1	0***	0***	0***	0.00056***	0***	0***	0***	0***	0.00061***	0***
i_1r_2	0***	0.00362**	0***	0.00185**	0***	0***	0.00393**	0***	0.00183**	0***
i_2r_1	0***	0***	0***	0.00032***	0***	0***	0***	0***	3e-04***	0***
i_2r_2	0***	1e-04***	0***	0.0018**	0***	0***	0.00018***	0***	0.00201**	0***
i_3r_1	0***	0***	0***	0.00043***	0***	0***	0***	0***	0.00035***	0***
i_3r_2	0***	0.01422*	0.31235	0.03446*	0***	0***	0.01412*	0.31436	0.0356*	0***
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
SE (Contrast T vs C1)	6.531	4.256	2.365	2.718	7.376	1.31	0.853	0.474	0.546	1.473

***Since the p-value is <0.05, there is a significant difference between the control and treatment means.

and 7.1 t/ha, respectively. The influence of intercropping systems and row ratios on the green fodder yield and dry fodder yield of fodder legumes are presented (Table 2c).

The contrast analysis for comparing the green fodder yield and dry fodder yield of fodder legume intercrops is tabulated (Table 2d).

CONCLUSION

Among intercrops, horse gram was significantly superior in growth attributes. Among the row ratios adopted, 2:2 was superior in terms of yield attributes. Row intercropping of palisade grass with fodder cowpea at the ratio of 2:2 is efficient in terms

TABLE 2C
Effect of intercropping and row ratio of fodder legumes and their interaction on the Green Fodder Yield and Dry Fodder Yield of fodder legumes (t ha^{-1}) *viz*, fodder cowpea, stylo and horse gram

Treatment	Green Fodder Yield			Dry Fodder Yield		
	H_1	H_2	Mean	H_1	H_2	Mean
T_1: i_1r_1	25.50^c	6.68^b	33.02^c	5.10^c	1.34^b	6.44^c
T_4: i_1r_2	35.33^a	10.29^a	45.63^a	7.07^a	2.06^a	9.13^a
C_2	32.23^b	10.91^a	43.14^b	6.45^b	2.18^a	8.63^b
SE(m)	0.375	0.264	0.650	0.075	0.053	0.079
CD	1.297	0.914	2.249	0.259	0.182	0.275
T_2: i_2r_1	20.43	7.97^b	28.40^b	4.09^b	1.59^c	5.68^c
T_5: i_2r_2	21.01	10.37^a	31.37^a	4.87^a	2.45^a	7.32^a
C_3	20.43	10.52^a	30.93^a	4.08^b	2.10^b	6.19^b
SE(m)	0.398	0.157	0.449	0.111	0.036	0.102
CD	NS	0.543	1.554	0.383	0.123	0.352
T_3: i_3r_1	19.05^c	12.51	31.56^b	2.31^b	2.50	4.81^b
T_{10}: i_3r_2	20.07^b	12.75	32.82^b	2.77^a	2.68	5.45^a
C_4	21.81^a	13.28	35.09^a	2.36^b	2.52	4.88^b
SE(m)	0.243	0.336	0.418	0.065	0.067	0.031
CD	0.840	NS	1.446	0.224	NS	0.109

of fodder production *viz*. green fodder yield (187.14 t ha^{-1}) and dry fodder yield (37.43 t ha^{-1}) of the grass-fodder legume intercropping system.

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TABLE 2D
Effect of intercropping and row ratio of fodder legumes on the Green Fodder Yield and Dry Fodder Yield of fodder legumes (t/ha) compared to the control, C_2 (sole crop of fodder cowpea), C_3 (sole crop of stylo) and C_4 (sole crop of horse gram), contrast analysis

Treatment	Green Fodder Yield			Dry Fodder Yield		
	H_1	H_2	Mean	H_1	H_2	Mean
T_1: i_1r_1	3e-05***	5e-05***	6e-05***	3e-05***	5e-05***	0***
T_4: i_1r_2	0.00199**	NS	NS	0.00199**	NS	0.00812**
p-value	0.008	0.000	0.003	0.007	0.000	0.000
SE	0.918	0.647	1.592	0.184	0.129	0.195
T_2: i_2r_1	NS	5e-05***	NS	NS	NS	0.02212*
T_5: i_2r_2	NS	NS	NS	0.00432**	NS	0.00041***
p-value	0.552	0.000	0.106	0.027	0.109	0.046
SE	0.956	0.384	1.100	0.271	0.087	0.249
T_3: i_3r_1	0.00036***	NS	0.00179**	NS	NS	NS
T_{10}: i_3r_2	0.00415**	NS	0.01532*	NS	NS	3e-05***
p-value	0.000	0.168	0.001	0.062	0.439	0.001
SE	0.595	0.823	1.024	0.158	0.163	0.077

***Since the p-value is <0.05, there is a significant difference between the control and treatment means.

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