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SHORT COMMUNICATION

EFFECT OF INTERCROPPING AND PLANTING METHODS ON PERENNIAL GRASSES

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SUMMARY

A field experiment was conducted from October, 2016 to December, 2017 at the Instructional-cum Research Farm of Assam Agricultural University, Jorhat to evaluate the performance of three perennial grasses under sole and intercropping systems adopting two planting methods. Results revealed that sole cropping of setaria and intercropping of hybrid napier + setaria recorded the highest green forage yield. Alternate row and column method also produced higher green forage yield. On the contrary hybrid napier as sole cropping and intercropping of setaria + guinea recorded the highest dry mater and crude protein yield. The net profit and benefit-cost ratio were recorded highest with sole cropping of setaria and intercropping of hybrid napier with setaria in alternate row and column method.

Key words : Intercropping, planting methods, perennial grass

Supply of adequate quality green forage throughout the year is necessary for maintenance of health, efficiency and productivity of livestock. It can be achieved by proper combination of perennial and seasonal annual fodder crops or through perennial forages. Intercropping of grass with fodder legume is a prospective way to get high quality fodder in appreciable quantity with saving of plant nutrients by nitrogen fixation. However, inclusion of annual legume fodder as intercrop in perennial grass becomes problematic after two or three years due to heavy root proliferation of perennial grass in the interspace and dominant nature of the grass.

Different perennial grasses behave differently in respect to growth and productivity during the growing period within a year. Their requirements for nutrients and space are also different. Interspecies competiton between the perennial grasses under mixed or intercropping system might have certain influence on their individual and combined forage yield. With this view, the present study was undertaken with three perennial grasses to evaluate their performance under sole and intercropping systems with two planting methods.

A field investigation was carried out under rainfed condition from October, 2016 to December, 2017 at the Instruction-cum Research Farm of Assam Agricultural University, Jorhat with the treatments consisted of three sole croppings of perennial grasses *viz.,* Hybrid napier, Setaria and Guinea and combinations of their intercroppings (Hybrid napier + Setaria, Hybrid napier + Guinea and Setaria + Guinea) with two planting methods (Alternate row and alternate row and column). Altogether 9 treatments were allotted in randomized block design with four replications. The soil of the experimental site was sandy-loam in texture with acidc in soil reaction (pH 5.1), medium in organic carbon (0.61%), available P_2O_5 (22.94 kg/ha) and available K_2O (143.54 kg/ha) but low in available N (164.30 kg/ha). A uniform dose of 5 t FYM/ha along with a dose of 40-40-20 kg N, P_2O_5, K_2O/ha was applied as basal one day ahead of planting of perennial grasses and subsequently 30 kg N/ha was applied after each cutting. Rooted slips of setaria and guinea @ three slips/pit and three budded stem cuttings in case of hybrid napier @ one cutting/ pit were planted on 3 October, 2016 as per treatment by making pits of 6-8 cm diameter and 10-12 cm deep in well prepared land. During the year of establishment (2016) only one cut was taken and four cuts were taken in 2017. The total rainfall received during the growing period of grasses in 2016 and 2017 was 138.5 mm and 2290.8 mm in 10 and 126 rainy days, respectively.

The effect of sole cropping of all the three perennial grasses in respect of green forage yield was significant at all cuts and average of 5 cuts excepting the cut taken during the establishment year (2016). Setaria grass recorded significantly higher green forage

TABLE 1
Yield of green fodder, dry matter and crude protein at individual and average over five cuts with economics as influenced by intercropping and planting methods

Treatment	Green fodder yield (q/ha)						Dry matter yield (q/ha)						Crude protein yield (kg/ha) (Average of 5 cuts)	Net profit (Rs./ha) (Average of 5 cuts)	Benefit-cost ratio
	2016	2017				Average of 5 cuts	2016	2017				Average of 5 cuts			
	1st cut	1st cut	2nd cut	3rd cut	4th cut		1st cut	1st cut	2nd cut	3rd cut	4th cut				
Sole cropping															
HN	122.4	240.2	243.5	102.2	15.6	362.0	26.6	56.3	51.0	33.0	5.0	86.0	615.7	59601	4.66
S	89.1	273.4	298.2	172.9	72.9	433.2	11.5	49.5	50.2	35.0	17.5	81.8	637.3	77861	6.09
G	102.3	167.3	197.9	80.7	57.9	303.1	27.4	49.6	48.8	25.9	19.5	85.6	640.0	47831	3.74
S. Em±	8.29	9.56	15.15	9.42	5.35	17.80	2.41	2.18	2.79	2.83	1.37	3.75	25.9	-	-
C. D. (P=0.05)	NS	27.9	44.2	27.5	15.6	51.9	7.0	NS	NS	NS	4.0	NS	NS	-	-
Intercropping															
NH+S*	126.2	243.3	262.6	142.3	50.6	412.5 (59.5)*	23.0	47.9	48.8	34.5	12.4	83.3 (46.1)*	604.0	69711	5.45
HN+G*	116.3	203.4	220.7	100.2	44.6	342.6 (47.5)*	25.7	55.7	51.5	34.0	15.7	91.3 (54.5)*	656.7	55741	4.36
S+G*	107.2	222.0	257.0	147.9	70.6	402.3 (31.3)*	22.6	53.4	51.9	36.5	19.0	91.7 (51.5)*	666.1	67681	5.29
S. Em±	8.29	9.56	15.15	9.42	5.35	17.80	2.41	2.18	2.79	2.83	1.37	3.75	25.9	-	-
C. D. (P=0.05)	NS	NS	NS	27.5	15.6	NS	NS	NS	NS	NS	4.0	NS	NS	-	-
Planting methods															
AR	111.8	222.6	239.8	126.4	53.2	376.9	24.4	52.6	48.3	34.1	15.5	87.5	631.7	62591	4.89
AR & C	121.3	223.2	253.7	133.9	57.4	394.7	23.1	52.0	53.2	35.9	15.9	90.0	652.8	66161	5.17
S. Em±	6.77	7.81	12.37	7.69	4.37	14.53	1.97	1.78	2.28	2.31	1.12	3.06	21.2	-	-
C. D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	-	-
Sole vs others															
Sole	104.6	227.0	246.5	118.6	48.8	372.8	21.8	51.8	50.0	31.3	14.0	84.5	614.3	61761	4.83
Others	116.5	222.9	246.7	130.2	55.3	385.8	23.8	52.3	50.7	35.0	15.7	88.8	642.3	64371	5.03
S. Em±	6.77	7.81	12.37	7.69	4.37	14.53	1.97	1.78	2.28	2.31	1.12	3.06	21.2	-	-
C. D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	-	-

HN- Hybrid napier, S- Setaria, G- Guinea, AR- Alternate row, AR&C- Alternate row and column, *- Per cent contribution, NS- Non-signifcant

yield over the other grasses in all the individual cuts and average of 5 cuts (Table 1). Higher forage production of setaria might be due to beter establishment and more number of stalks per tussock in the second year of establishment. Generally, setaria grass takes some time for establishment and once the grass established, it can produce satisfactory yield upto 6 to 7 years as reported by Islam (1998) and Thakuria and Gogoi (1999). However, in the establishment year (2016), hybrid napier produced the highest green forage yield though the effect was non-significant. The increase in average green forage yield of setaria over hybrid napier and guinea was 16.44 and 30.03 per cent, respectively. On the contrary, the average dry matter yield was not significant owing to sole cropping of perennial grasses. however, hybrid napier recorded higher by matter yield over the other two grasses. The increase in average dry mater yield due to sole cropping of hybrid napier over guinea and setaria was 0.47 and 4.88 per cent, respectively. It may happen due to more succulency of setaria grass.

Intercropping of perennial grasses could not influence the green forage and dry matter yield significantly at all the individual cuts and average of 5 cuts though the effect was significant at 3rd and 4th cuts during 2017 when setaria + guinea recorded significantly higher green forage yield. The contribution of average green forage yield of setaria and guinea in different intercropping systems was 59.5, 47.5 and 31.3 per cent (Table 1) indicating higher contribution of setaria over the associated grass species. This might be due to the complementary effect of both the associated grasses under intercropping system. The results are in agreement with the findings of Deak *et al.* (2009).

None of the planting methods could influence the green forage and dry matter yield at all the individual and average over 5 cuts (Table 1). However,

slightly higher green forage as well as dry mater yield was obtained when planting of perennial grasses was done following aolternate row and column method. The zig-zug planting of the grass species in intercropping might have facilitated more sunlight to penetrate below the crop canopy for their growth and development.

The crude protein yield was not affected significantly due to sole cropping, intercropping and planting methods followed in three perennial grasses. However, sole cropping of guinea grass, intercropping of setaria + guinea and alternate row and column method recorded the highest crude protein yield.

The highest net profit and benefit-cost ratio were recorded with sole cropping of setaria and intercropping of hybrid napier + setaria. The alternate row and column planting method recorded higher net profit and benefit-cost ratio over the alternate row method.

On the basis of findings, it can be concluded that setaria grass can be grown either as sole or in intercropping system with other perennial grasses adopting alternate row and column method for higher forage production and economic benefit.

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