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INTERCROPPING OF OILSEED CROPS WITH OAT FODDER IN RICE FALLOWS UNDER RAINFED CONDITION

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SUMMARY

A field experiment was carried out in rice fallows at Assam Agricultural University, Jorhat during **rabi** season of 2011-12 under rainfed condition. The treatment consisted of sole crop of oat, linseed and toria along with intercropping with linseed and toria in 1 : 1, 2 : 1, 2 : 2 and 3 : 1 row proportions. Altogether 11 treatments were arranged in randomized block design with three replications. Intercropping treatments proved superior in terms of different growth characters and yield of oat. The highest dry matter and oat green fodder equivalent yields were recorded in oat+linseed intercropping system though the effects were non-significant. Among different row proportions, the highest green fodder equivalent yield was accorded in 2 : 1 row ratio. The dry matter and crude protein contents as well as net return and benefit-cost ratio were recorded highest in oat+linseed intercropping.

Key words : Intercropping, oat, linseed, toria, rainfed

Uniform supply of green fodder throughout the year is necessary to increase the productivity of livestock. To meet the shortfall in quantity and quality of forage required for the vast livestock population in the state, it is necessary to evolve agro-techniques by which the animal feed units could be increased along with supply of quality fodder for balanced nutrition.

Rice (*Oryza sativa* L.) being the predominant crop of Assam during **kharif** season and after harvest of the crop lands remain fallow. Inclusion of fodder crops in the existing cropping system is an alternative means to increase the availability of fodder and there is acute scarcity of green fodder in dry season of winter. Oat (*Avena sativa* L.) is the most important and ideal **rabi** annual cereal fodder crop due to its wide adaptability, excellent growth habit, more palatability and digestibility (Mehra, 1978). Intercropping has been recognized as a potentially beneficial system of crop production and evidence suggests that intercropping can provide substantial yield advantages compared to sole cropping (Willey, 1979). Keeping in view all the above, the present investigation on fodder based intercropping system with various spatial arrangements of oat with linseed and toria has been initiated.

To study the performance of intercropping linseed and toria with oat fodder in four row proportions (1 : 1, 2 : 1 2 : 2 and 3 : 1) along with their sole croppings, a field experiment was conducted after harvesting *Sali* rice under rainfed condition, during **rabi** 2011-12 in the Instructional-cum-Research Farm of Assam Agricultural University, Jorhat. The farm is situated at $24^0$47'N latitude, $94^0$12′ E longitude and at an altitude of 86.60 m above mean sea level. Total rainfall received during the crop season was 88.7 mm distributed in 28 days. The treatments were laid out in randomized block design with three replications. The soil of the experimental site was sandy loam in texture, low in organic carbon, available N and K contents but medium in P content with pH 5.1. Application of 20 kg/ha each of N, P_2O_5 and K_2O was applied as basal and an additional dose of 20 kg N/ha was top dressed uniformly after 25 days of sowing. Sowing of both sole and intercrops was done as per row proportional on 15 November, 2011. Harvesting of oat was done at 50 per cent flowering and intercrops at full maturity stage. Oat green fodder equivalent yield was worked out by converting the field of intercrops to the yield of oat fodder on the basis of prevailing market price of each crop.

Yield Attributes and Fodder Yield

Sole cropping of oat was recorded significantly higher in green fodder and dry matter yields and crude protein content over the other intercropping treatment (Table

TABLE 1
Influence of intercropping on oat yield and quality parameters

Treatment	Plant height (cm)	Leaves/ plant	Leaf : stem ratio	Dry matter content (%)	Crude protein content (%)	Green fodder yield (t/ha)	Dry matter yield (t/ha)
Intercropping							
Oat+linseed	71.78	5.51	0.310	49.18	6.66	9.75	4.68
Oat+toria	70.66	5.71	0.247	44.66	6.60	9.77	4.50
S. Em±	0.606	0.120	0.020	8.823	0.52	0.541	0.368
C. D. (P=0.05)	NS	NS	0.060	NS	NS	NS	NS
Row proportion							
1 : 1	71.10	5.30	0.288	50.05	6.60	8.43	4.25
2 : 1	71.93	5.83	0.390	46.53	6.69	10.93	4.96
2 : 2	71.86	5.60	0.277	47.23	6.63	8.76	4.03
3 : 1	70.00	5.73	0.258	43.88	6.59	10.91	5.13
S. Em±	0.858	0.170	0.0282	3.992	0.073	0.765	0.521
C. D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS
Sole vs rest							
Sole (Oat)	68.93	5.40	0.237	45.10	6.93	14.37	6.53
Rest	71.22	5.61	0.278	46.92	6.63	9.76	4.59
S. Em±	1.213	0.240	0.040	5.645	0.104	1.082	0.736
C. D. (P=0.05)	NS	NS	NS	NS	0.31	3.24	2.21

NS–Not Significant.

TABLE 2
Oat green fodder economics influenced by different intercroppings

Treatment	Equivalent yield of intercrops (t/ha)	Oat green fodder equivalent yield (t/ha)	Net return (Rs./ha)	Benefit-cost ratio
Sole crop				
Oat	-	14.36	18,835	1.90
Linseed	7.12	7.12	4,019	0.39
Toria	5.58	5.58	217	0.05
	-	0.911	-	-
	-	2.68	-	-
Intercropping				
Oat+linseed	2.47	12.22	10,987	0.82
Oat+toria	2.05	11.82	10,112	0.76
S. Em±	-	0.455	-	-
C. D. (P=0.05)	-	NS	-	-
Row proportion				
1 : 1	2.64	11.07	11,154	1.01
2 : 1	2.32	13.25	11,140	0.76
2 : 2	2.63	11.39	11,423	1.03
3 : 1	1.45	12.36	-	0.52
S. Em±	-	0.644	-	-
C. D. (P=0.05)	-	NS		-
Sole vs intercropping				
Sole	6.35	9.02	7,790	0.76
Intercropping	2.26	12.02	10,549	0.79
S. Em±	-	0.911	-	-
C. D. (P=0.05)	-	2.68	-	-

NS–Not Significant.

1). Intercropping of oat with linseed and toria as well as different row proportions could not influence the growth and yield of oat significantly except of leaf : stem ratio of oat, when oat+linseed recorded higher value over oat+toria intercropping system. This may be due to erect and less branching nature of linseed as compared to toria which did not create much competition with oat. In terms of oat green fodder equivalent yield, oat recorded the highest yield (Table 2). None of the intercrops and their row proportions could influence the oat green fodder equivalent yield significantly, however, intercropping as a whole recorded significantly higher yield over the sole cropping. The results are in conformity with the findings of Tuti *et al*. (2012) in wheat-based intercropping system. The increase in green fodder equivalent yield in intercropping system over sole cropping was 24.95 per cent. However, among the intercropping systems increase in green fodder equivalent yield of sole oat over sole linseed and toria was 50.41 and 61.14 per cent, respectively. Different row proportions did not show any significant effect, however, 2 : 1 row ratio recorded the highest green fodder equivalent yield (13.25 t/ha).

Economics

Economic returns worked out for all the intercropping systems indicated that among the sole crops, oat recorded the highest net return (Rs. 18,835/ ha) and benefit-cost ratio (1.90) (Table 2). Intercropping of oat+linseed recorded higher net return and benefit-cost ratio of 0.82 over oat+toria intercropping system (0.76). Among the row proportions, 2 : 2 row ratio recorded the highest net return and benefit-cost ratio. The net return was higher from intercropping treatment (Rs. 10,549) as compared to sole cropping (Rs. 7,790).

It can be concluded that intercropping of oat+ linseed proved to be the best over oat+toria intercropping in respect of yield, net return and benefit-cost ratio. Out of four row proportions, 2 : 2 row proportion may be followed for getting higher yield with economic return.

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