

Effect of rainfed green-manure crops on succeeding rice (*Oryza sativa*)

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In rice (*Oryza sativa* L.) cultivation, low fertilizer-use efficiency warrants the application of higher doses of fertilizer for desirable results. But judicious and balanced application of organic manures along with inorganic fertilizers increases the fertilizer-use efficiency. The use of green-manures along with fertilizer nitrogen can aid for N economy in lowland rice (Khind *et al.*, 1982). In a single crop wetlands of the Periyar-Vaigai command area, prior to rice crop, there is possibility of receiving 100 mm rainfall during July–September. Under such a situation various green-manure crops can be grown for soil enrichment and rice production.

A field experiment was conducted during the rainy (*kharif*) and winter seasons (*rabi*) of 1992–93 at Agricultural College and Research Institute, Madurai, to evaluate the potential of rainfed green-manure crops during the season preceding rice in the single crop wetlands. Seven green-manure crops, viz. *Sesbania cannabina* (Retz.) Pers.; syn *S. aculeata* L., *S. speciosa* Taub., *S. rostrata*, *Crotalaria juncea* L., *Vigna trilobata* L. Verd.; syn *Phaseolus trilobus* sensu Ait. & auct. non, *Tephrosia purpurea* Pers.; Baker in part and *Vigna unguiculata* (L.) Walp., were compared with pre-season fallow, in randomized block design with 3 replications. The experimental site was sandy loam having pH 7.8 with low available nitrogen

(242 kg/ha), medium phosphorus (16.8 kg/ha) and high potassium (292 kg/ha). The seeds of green-manure crops were treated with rhizobial culture and sown adopting the seed rate of 50 kg/ha using the initial rains during July 1992.

During the growth period, about 101 mm rainfall was received. After 60 days, biomass production, nodule number and nitrogen content were recorded.

Rice ('IR 20') was transplanted in September 1992 after incorporation of the green-manures. The other cultivation practices were followed uniformly to all treatment plots. Among the several green-manures, *S. cannabina*, *S. speciosa* and *S. rostrata* recorded significantly higher biomass than the other green-manures. (Table 1). The data on growth and yield parameters revealed that green-manure-incorporated plots recorded higher values than the control. The grain yield of single crop rice, planted after the green-manure increased substantially compared with rice planted after fallow (Table 1).

The yield increase due to pre-season rainfed green-manure crops was 4.7 q/ha with *S. rostrata*, 3.8 q/ha with *S. cannabina*, 3.6 q/ha with *S. speciosa* and 2 q/ha with *Crotalaria juncea*. The yield increase might be due to addition of organic matter and plant nutrients through green-manures. Kalidurai and Kannaiyan (1990) also

Table 1. Effect of pre-season rainfed green-manure crops on succeeding rice

Treatment	Green-manure crop				Succeeding rice				
	Biomass (q/ha)	Nodules/ plant	N content (%)	Plant height (cm)	Effective tillers	Grains/ panicle	100- grain weight (g)	Grain yield (q/ha)	Straw yield (q/ha)
Pre-season fallow				92.2	9.0	143.0	21.9	47.8	90.8
<i>Sesbania cannabina</i>	159.6	358	3.43	98.4	13.3	160.0	22.0	51.6	101.8
<i>Sesbania speciosa</i>	158.3	517	2.72	97.3	13.3	159.0	22.0	51.4	102.5
<i>Sesbania rostrata</i>	156.7	48 (780)	3.78	98.6	13.7	162.0	22.0	52.5	109.7
<i>Crotalaria juncea</i>	135.4	295	3.41	97.0	13.0	159.6	21.0	50.7	100.4
<i>Vigna trilobata</i>	45.8	53	2.82	94.4	11.3	156.0	22.0	49.0	95.2
<i>Tephrosia purpurea</i>	42.5	79	3.56	94.4	11.0	154.3	21.9	49.9	95.8
<i>Vigna unguiculata</i>	47.9	98	1.89	93.6	10.7	153.7	21.9	48.9	96.8
CD (P = 0.05)	3.8	15	0.62	2.0	1.2	14.7	NS	1.5	11.5

observed that *S. rostrata* and *S. cannabina* with 60 kg N/ha significantly increased the yield of rice.

Thus green-manure crops like *S. rostrata*, *S. cannabina* and *S. speciosa* can be raised as single crop in wetlands of Periyar Vaigai Command area, utilizing the pre-season rainfall for increased production

in the succeeding rice.

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Influence of seeding date and level of green-manures during winter season on performance of summer rice (*Oryza sativa*)

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A field experiment was conducted during winter and summer seasons of 1991–92 and 1992–93 to study the effectiveness of green-manure species [*Sesbania cannabina* (Retz.) Pers.; syn. *S. aculeata* L., *Sesbania rostrata* and *Crotalaria juncea* L.] with varying seeding dates (15 and 30 November) and levels (50, 75 and 100 kg/ha) on the performance of summer rice (*Oryza sativa* L.). Two additional control treatments were also included. The soil was clayey (Vertisol) with pH 8.0, containing N 240 kg/ha, available P₂O₅ 36 kg/ha and available K₂O 280 kg/ha in 0–20 cm depth. The experiment was laid out in randomized block design with 3 replications. Green-manures received 25 kg N/ha and 50 kg P₂O₅/ha and were irrigated at weekly

Table 1. Effect of seeding date and rate of green-manure species on biomass and N accumulation

Treatment	Biomass (tonnes/ha)		N accumulation (kg/ha)	
	1991– 92	1992– 93	1991– 92	1992– 93
<i>Green-manure</i>				
<i>S. aculeata</i>	5.20	4.55	95.57	74.10
<i>S. rostrata</i>	2.89	3.83	39.65	59.06
<i>C. juncea</i>	4.51	4.66	75.04	67.73
<i>Seeding date</i>				
15 November	5.63	6.01	88.16	86.52
30 November	2.77	2.69	51.35	47.41
<i>Seeding rate</i>				
50 kg/ha	3.68	3.90	62.50	60.46
75 kg/ha	4.27	4.32	68.54	67.09
100 kg/ha	4.65	4.82	78.22	73.34

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