

Effect of dual cropping of green manure on performance of semi-dry rice

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ABSTRACT

The effect of dual cropping of green manure on productivity of semi-dry rice was studied during 2003 and 2004. The yield attributing parameters viz, productive tillers, panicle length, filled grains and 100 grain weight were significantly superior under paired row sowing (PRS) of rice with *Sesbania aculeata* under weed free condition. The highest yield (3.53 t ha^{-1}) was recorded with paired row sowing (PRS) of rice with *Sesbania aculeata* under weed free condition and comparable with normal sowing of rice with herbicide application + hand weeding twice.

Key words: Direct sown rice, yield attributes, *Sesbania aculeata*, dual cropping

Water, for agriculture, especially for irrigated rice is becoming increasingly scarce due to greater urban and industrial demand. More efficient use of water in rice ecosystem is of critical importance in view of the projected increase in rice production. One such method to meet the increasing demand is direct sown rice, which holds special significance in the present day production systems with regard to saving in water consumption, time, labour, energy required for nursery and planting.

In direct sown rice, the land is prepared by utilizing the summer showers during April – May to get a fine tilth. Rice seeds are sown by opening 5 cm deep furrows using sowing hooks after monsoon during middle of June. After receipt of sufficient monsoon rain, the crop remains in non puddle lowland condition. It is prevalent in twenty per cent of rice area of India with low productivity of one t ha^{-1} , (TNAU Annual report, 2000). In Tamil Nadu, it is practiced in about one lakh hectares with a mean productivity of one t ha^{-1} . Thus there is an imminent need to raise the level of productivity. In this context, this study on the influence of green manure intercropping on direct sown semidry rice was undertaken.

A field experiment was conducted during wet seasons 2003 and 2004 at Bhavanisagar, Tamil Nadu. The soil of the experimental field was sandy clay loam in texture having pH of 8.80, available nitrogen 218 kg ha^{-1} , available phosphorus 8 kg ha^{-1} and available

potassium (304 kg ha^{-1}). The experiment was laid out in randomized block design with four replications. The treatments were paired row sowing (PRS) of rice at $15 \text{ cm} \times 30 \text{ cm}$ (unweeded), paired row sowing (PRS) of rice with *Sesbania aculeata* (incorporation with 2,4,D at 30 days after sowing), Paired row sowing (PRS) of rice + weed free by hand weeding (HW), Paired row sowing (PRS) of rice with *Sesbania aculeata* (manual incorporation at 30 days after sowing) + weed free (HW), Normal sowing at 20 cm spacing + pendimethalin 1 kg ha^{-1} + one HW on 30DAS and Normal sowing at 20 cm spacing + HW twice on 30 and 60 DAS. Rice seeds cv ADT 43 (110 days) were sown at 20 cm apart rows. Paired row sowing of rice was taken at $15/30 \text{ cm}$ row spacing in furrow and covered with soil. In rice and *Sesbania* (local) dual cropped plots, *Sesbania* was sown in between the paired rows of rice at 30 cm spacing.

Paired row sowing of rice + *Sesbania* under weed free condition recorded higher values of panicle length (22.6 cm), panicles (259 m^2), filled grains ($88.90\% \text{ panicle}^{-1}$) and yield (3.53 t ha^{-1}) which was followed by paired row sowing of rice under free condition (Table 1). This might be due to weed free condition during critical periods of crop growth and additional nutrient supply of the incorporated dual crop. Substantial release of N at critical periods of crop growth increased the number of productive tillers as reported by Singh and Bhattacharya (1988) and Ishizuka

Table 1. Effect of dual cropping (rice- *Sesbania*) on yield attributes and yield direct-sown rice

Treatments	Yield attributes				
	Panicle length (cm)	Panicles (no m ⁻²)	Filled grains (no. panicle ⁻¹)	1000 grain weight (g)	Grain Yield (t ha ⁻¹)
PRS of rice (unweeded)	19.8	212	74.00	14.85	2.88
PRS of rice + <i>Sesbania</i> (incorp. with 2,4-D)	20.0	224	78.30	14.90	3.11
PRS of rice- weed free	21.6	241	85.00	15.10	3.35
PRS of rice + <i>Sesbania</i> (manual incorp.)	22.6	259	88.90	15.42	3.53
Normal sowing of rice herbicide +1 HW on 30 DAS	20.5	240	84.40	15.00	3.26
Normal sowing of rice + 2 HW on 30 and 60 DAS	20.2	224	82.20	14.92	3.22
CD (P=0.05)	1.91	15.57	4.10	NS	0.16

Table 2. Dual cropping of green manure on total weed density (No m⁻²) and nutrient uptake (kg ha⁻¹) of semidry rice

Treatments	Total weed density (No m ⁻²)		Nutrient uptake (kg ha ⁻¹)		
	45DAS	90DAS	N	P	K
PRS of rice (unweeded)	2.42(264.9)	2.63(430.8)	73.2	17.0	105.5
PRS of rice + daincha (incorp. with 2,4-D)	2.40(254.3)	2.57(373.4)	94.5	18.0	123.9
PRS of rice- weed free	2.37(234.2)	2.45(281.5)	111.6	19.0	134.7
PRS of rice + <i>sesbania</i> (manual incorp.)	2.29(196.2)	2.38(238.6)	120.6	20.7	142.1
Normal sowing of rice- herbicide +1 HW on 30 DAS	2.37(233.1)	2.53(336.9)	110.6	18.3	129.6
Normal sowing of rice + 2 HW on 30 and 60 DAS	2.38(237.8)	2.55(360.9)	108.4	17.3	126.6
CD (P=0.05)	0.11	0.15	7.54	1.47	8.95

(1973). The gradual release of N during flowering stage increased number of filled grains. The thousand grain weight was not influenced by the treatments, since it is a genetically governed factor (Yoshida, 1981).

Increase in rice grain yield (3.5 t ha⁻¹) was obtained in paired row sowing + *sesbania* under weed free condition (Table 1). Mineralisation of nutrients from incorporated dual crop might have resulted in higher grain yield (Matiwade and Sheelavantar, 1994).

The study revealed that paired row sowing of rice + *Sesbania* under weed free condition ensured higher yield attributing components and yield.

REFERENCES

Biswas JC and Sattar SA 1992. Weed control in wet seeded rice in Bangladesh. IRRN. 17(5): 8

Ishizuka Y 1973. Physiology of rice plant ASPAC. Food and fertilizer Technology Center- Technical Bulletin. No.13

Matiwade PS and Sheelavantar MN 1994. Growth analysis of rice as influenced by green manuring (*Sesbania rostrata*). *Oryza*, 31: 196-198.

Singh KN and Bhattacharya HC 1988. Effect of water logging on yield and yield attributes in late high yielding rice varieties. *Oryza*, 25: 315-318.

TNAU, 2000. Annual report. Tamil Nadu Agricultural University, Coimbatore.

Yoshida S 1981. Fundamentals of Rice Crop Science. The International Rice Research Institute, Los Banos, Laguna, Philippines. pp.130