

Weed management through dual cropping of green manure in semi-dry rice

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ABSTRACT

Field experiments were conducted to study the effect of dual cropping of green manure on weed management in semi-dry rice. The maximum reduction in weed density and dry matter was achieved under paired row sowing (PRS) of rice with *Sesbania aculeata* under weed free conditions. PRS of rice with *Sesbania aculeata* under weed free condition recorded the lesser weed index, higher weed control and weed smothering efficiencies. The higher yield (3528 kg/ha) was achieved with PRS of rice with *Sesbania aculeata* under weed free condition but it was comparable with normal sowing of rice with pendimethalin 1.0 kg/ha at 3 days after sowing (DAS) + two hand weeding on 30 and 60 DAS.

Key words : Dual cropping, Green manure, Semi-dry rice, Weed management.

Semi-dry rice cultivation is prevalent in 20% rice area of our country with low productivity of 1 t/ha, when compared with the normal productivity of transplanted rice of about 5 t/ha. In Tamil Nadu, semi-dry rice system is practiced in about 10 million hectares. Crop and weed seeds germinate simultaneously in semi-dry rice and weed competition during critical period of crop growth is more severe. Cultural method such as growing intercrop also provides greater scope to control weeds. The scope of introducing legume crop as dual crop in rice is more because of its efficiency to control weeds by way of smothering during the early period of weed emergence and increasing crop yield. The present investigation was carried out to study the influence of green manure intercropping on direct seeded semi-dry rice.

MATERIALS AND METHODS

Field experiments were conducted during *kharif* season of 2003 and 2004 at Agriculture Research Station, Bhavanisagar, Tamil Nadu. The soil of the experimental field was sandy clay loam in texture with pH of 8.80. The nutrient status of the soil was low in available nitrogen (218.4 kg/ha), low in available phosphorus (7.5 kg/ha) and high in available potassium (303.5 kg/ha) content. The experiments were laid out in randomized block design with four replications. Rice variety ADT 43 and dhaincha (*Sesbania aculeata*) local variety was taken for the experiment. The treatments were paired row sowing (PRS) of rice 15/30 cm (unweeded), PRS of rice with *Sesbania aculeata* (incorporation with 2,4-D 1.0 kg/ha), PRS of rice - weed free, PRS of rice with *Sesbania aculeata* (manual incorporation), normal sowing at 20cm spacing + pendimethalin 1 kg/ha + one HW on 30 DAS and normal

sowing at 20cm spacing + two HW on 30 and 60 DAS. Rice seeds were sown at 20 cm spacing in solid rows. In rice and dhaincha dual cropped plots, dhaincha was sown in between the paired rows of rice at 30 cm spacing. The *in situ* dual cropped green manure was incorporated either manually or was killed chemically as per the treatment. Chemical killing of green manure was done by post emergence spray of 2, 4-D (1.0 kg/ha) on the foliage of green manure crops. Observations on weed density, weed control efficiency, weed smothering efficiency and grain yield were recorded.

RESULTS AND DISCUSSION

The experimental crop was infested with composite weed flora with higher relative density of grasses (49.1 %) followed by sedges (33.3 %) and broad leaved weeds (17.6 %) (Fig.1). The predominant graminaceous weeds were *Echinochloa colona* and *Cynodon dactylon* under sedges and *Trianthema portulacastrum* and *Portulaca oleracea* under broad leaved weeds. The maximum density was observed during the initial stage of

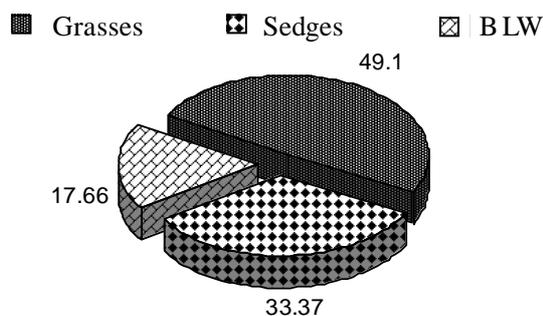


Fig. 1. Relative density of grasses, sedges and broad leaved weeds (BLW) in the experimental field

Table 1. Dual cropping of green manure on weed control efficiency and productivity of semi-dry rice

Treatments	Weed density (No/m ²)	Weed dry matter (kg/ha)	Weed control efficiency (%)	Grain Yield (kg/ha)
PRS of rice (unweeded)	6.07 (430.8)	394.7	-	2875
PRS of rice + dhaincha (incorporation with 2,4-D)	5.93 (373.4)	279.9	29.1	3106
PRS of rice- weed free	5.65 (281.5)	253.6	35.7	3345
PRS of rice + dhaincha (manual incorporation)	5.48 (238.6)	239.7	39.4	3528
Normal sowing of rice- herbicide + 1 HW on 30 DAS	5.83 (336.9)	269.2	31.8	3260
Normal sowing of rice + 2 HW on 30 and 60 DAS	5.89 (360.9)	272.6	31.0	3216
LSD (P=0.05)	0.2	14.2	-	161

Figures in parenthesis are original values

the crop growth. Among the weed control methods, paired row sowing of rice with dhaincha recorded lesser density of weed at all the stages of observation, since dhaincha intercropping suppressed the weed infestation due to faster canopy cover. Similar results were reported by Ramamoorthy *et al.* (1997) in rice + black gram intercropping system.

As the crop growth stage advanced, the weed dry weight gradually increased. This corroborates with the findings of Rajkhowa *et al.* (2001). Paired row sowing of rice + dhaincha under weed free condition registered lower weed dry weight as a result of reduction in weed density by smothering effect of green manure (Table 1). These results were in line with the findings of Mathew and Alexander (1995) who reported that intercropping with *Sesbania aculeata* and manual incorporation of the same at 35 DAS in semi-dry rice recorded the lowest weed dry matter compared with sole paddy crop.

Weed control efficiency was higher in paired row sowing of rice + dhaincha under weed free condition, which was comparable with paired row sowing of rice under weed free condition and normal sowing of rice with pre-emergence application of pendimethalin 1.0 kg/ha + hand weeding (Table 2). Due to the reduced weed density, the dry weight was very much reduced in the treatments. This might be due to the smothering effect of green manure crop (Mathew and Alexander 1995). Growing green manure crop in semi-dry rice suppressed weeds because of its rapid ground cover. Intercropping not only suppress weeds but also reduce weeding cost. Dual crop reduced the weed density compared to sole rice. Intercrop produced an average fresh biomass of 10.5 t/ha. The vigorous growth and better canopy coverage of intercrop, biologically suppressed the growth of grasses and broadleaved weeds. Similar findings were reported by Bayan (2000).

Among the weed control methods, paired row sowing of rice with dhaincha under weed free condition recorded lesser density of weeds, registered lower weed dry matter and higher weed control efficiency as a result of reduction in weed density by smothering effect of green manure. Dhaincha intercropping suppressed the weed infestation due to faster canopy cover.

Higher rice grain yield (3528 kg/ha) was obtained in paired row sowing + dhaincha under weed free condition. This was due to effective suppression of weeds, restricting the nutrient drain by weeds and nutrient addition due to incorporation of dual crop. Apart from better weed control, mineralisation of nutrients from incorporated dual crop might have resulted in higher grain yield (Matiwade and Sheelavantar 1994).

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