Oryza Vol. 44. No.2, 2007 (166-168)

Integrated weed management for transplanted rice

C.P. Rao*, P. Venkateswara Rao and P.V.N. Prasad

Department of Agronomy, Acharya NG Ranga Agricultural University, Agricultural College, Bapatla-522 101, Andhra Pradesh, India

ABSTRACT

Studies on the effect of integrated weed management on transplanted rice indicated significant differences by tillage, plant density and weed control methods but not their interactions. Summer ploughing significantly reduced the weed drymatter, increased productive tillers m^{-2}, panicle weight, grain and straw yields. Hand weeding twice was found to be superior which was followed by herbicide application combined with hand weeding in suppressing weed density, drymatter and also significantly increased the productive tillers m^{-2}, panicle weight and grain yield.

Key words: *Summer ploughing, plant density, weed population, grain yield, transplanted rice*

Rice is the most important crop of India and is cultivated in 45 per cent of total cultivated area under irrigated transplanted situation. Improper management of nutrients and severe weed competition are the major causes for low productivity of rice. Weeds alone are reported to cause 50 to 60 per cent reduction in rice yield. Proper tillage operation can effectively control the weeds. (when there is scarcity of labour). Use of chemical methods for weed control is necessary. Integration of different methods of weed control may result in effective control of weed and result in increasing the productivity of transplanted rice (Brar and Walia, 2001).

A field experiment was undertaken during the wet seasons of 2002 and 2003 on clay loam soil of the Agricultural College Farm, Bapatla to study the effect of different weed management options on growth and yield of transplanted rice. The soil was very low in available N (188 kg N ha^{-1}), medium in available P (21 kg P_2O_5 ha^{-1}) and high in available K (560 K_2O ha^{-1}) and slightly alkaline in reaction (pH 8.13). Sixteen treatments were evaluated in strip-split plot design with three replications. The treatments consisted of two tillage methods (with and without summer ploughing) as horizontal strips, combination of two plant densities (33 and 25 plants m^{-2}) and four weed control methods (no weeding, hand weeding (HW) twice at 20 and 40 days after transplanting (DAT), oxadiargyl at 100 g ha^{-1} and oxadiargyl at 100 g ha^{-1} + HW once at 30 DAT) as vertical strips.

A common fertilizer dose of 80 : 60 : 40 kg N, P_2O_5 and K_2O ha^{-1} was applied. N was applied in 3 equal splits *i.e.*, at basal, maximum tillering and panicle initiation stages. Entire P and K were applied as basal. The rice Cv. Sambamashuri was transplanted on 31.8.2002 and 16.8.2003 during 2002 and 2003 respectively at 20 cm x 15 cm (33 plants m^{-2}) and 20 cm x 20 cm (25 plants m^{-2}). The data on weed density at 60 DAT along with the yield attributes and yield at harvest were analyzed statistically.

The total weed population constituted of 21, 31 and 37 per cent of sedges, grasses and dicots, respectively. The major weed flora in the experimental field were *Cyperus rotundus*,*C. difformis*,*C.iria*, *Echinocloa colonum*,*E. crusgalli*, *Eclipta alba* and *Ammania baccifera*. The experimental results revealed that significant differences were exhibited by tillage, plant density and weed control methods but not their interactions (Table 1). Optimum plant density of 33 plants m^2 significantly reduced the weed density and weed drymatter over lower plant density of 25 plants m^{-2} (Table 1). Lower weed density and drymatter

Table. Plant height, yield attributes, grain and straw yield, harvest index, total weed density and weed dry weight as influenced by tillage, plant density and weed control methods

Treatments	Pooled data over two years						
	Total weed density at 60 DAT	Weed dry weight(g m^{-2})	Plant height at maturity (cm)	Panicle Number m^{-2}	Panicle weight (g)	Grain yield (t ha^{-1})	Straw yield (t ha^{-1})
Horizontal strips:							
Tillage (T)							
Summer ploughing (T_1)	3.7 (14.3)	3.7 (15.6)	91.3	364.5	1.84	5.01	6.64
No-summer ploughing (T_2)	4.0 (17.4)	4.4 (21.4)	90.3	293.6	1.71	4.52	6.07
S.E.m ±	0.06	0.04	0.22	4.36	0.01	55.6	29.6
CD (P=0.05)	NS	0.2	NS	26.5	0.03	339	180
Vertical strips							
***Plant density* (D)**							
33 plants m^{-2} (D_1)	3.6(13.6)	3.9(16.1)	95.1	365.5	1.73	5.04	6.43
25 plants m^{-2} (D_2)	4.1 (18.2)	4.3 (21.0)	90.5	293.0	1.81	4.50	6.28
S.E.m ±	0.04	0.05	0.1	3.29	0.01	69.1	17.9
CD (P=0.05)	0.1	0.3	NS	20.0	0.05	421	109
Weed control methods (M)							
No weeding (M_1)	5.7 (31.4)	6.1 (37.1)	86.3	290.3	1.62	3.91	6.24
Hand weeding twice (M_2) (at 20 & 40 DAT)	2.3 (4.7)	2.4 (5.0)	93.3	354.8	1.87	5.36	6.47
Oxadiargyl + HW (M_3)	4.6 (20.5)	5.1 (25.6)	91.5	333.9	1.80	4.87	6.32
Oxadiargyl + HW (M_4) at 30 DAT	2.3 (6.9)	2.7 (6.4)	92.1	336.0	1.79	4.95	6.39
S.E.m ±	0.09	0.06	0.53	4.91	0.03	79.5	114.1
CD (P=0.05)	0.3	0.2	1.5	14.9	0.09	232	333
CV (%)	8.34	5.49	2.0	5.2	5.93	5.77	6.22

The data are transformed to $\sqrt{x}+1$. The figures in paranthesis are original values.

production at closer spacing was also reported by Gogoi (1998) and Patel (1999).

It was observed that hand weeding at 20 and 40 DAT treatment significantly reduced the weed density and drymatter (irrespective of summer ploughing) over the rest of the weed control treatments followed by integration of herbicide combined with one hand weeding at 30 DAT similar observations were reported by Jacob and Elizabeth (2005).

The number of productive tillers, panicle weight, grain and straw yield were significantly increased with summer ploughing. This might be due to reduction in weed density and drymatter production (Table 1) as the exposure of vegetative parts of pereminal weeds during summer ploughing results in reduction of weed population in final crop field (Pandey, 1991). The optimum plant density (33 plants m^{-2}) recorded significantly higher grain yield *i.e.,* 12 per cent increase over lower plant density (25 plants m^{-2}). This indicated that the farmer's practice of adopting lesser plant density than normal density (25 plants m^{-2}) could be compensated to a tune of yield loss of 12 per cent by adopting rcommended optimum plant density of 33 plants m^{-2}. The results are in conformity with the findings of Jacob and Elizabeth (2005).

The per cent increase in grain yield due to

weed control treatments *viz.*, hand weeding twice, oxadiargyl alone and oxadiargyl + hand weeding over unweeded control were 37, 25 and 27 per cent respectively.

All the yield attributes and grain yield were improved with HW twice at 20 and 40 DAT which was closely followed by oxadiargyl at 100 g ha^{-1} combined with HW once at 30 DAT and found to be significantly superior to herbicide alone and weedy check.

Thus, it may be concluded that integration of herbicide (oxadiargyl at 100 g ha^{-1}) followed by one hand weeding at 30 DAT would be more beneficial in weed management and equally effective than that of hand weeding twice for increasing grain yield of transplanted rice by reducing the weed dry weight.

REFERENCES

Brar LS and Walia US 2001. Influence of nitrogen levels and plant densities on the growth and development of weeds in transplanted rice (*Oryza sativa*). Indian J Weed Sci 33 (3 & 4): 127-131

Gogoi AK 1998. Weed control in late transplanted low land rice (*Oryza sativa* L.). Indian J Agron 43 (2): 298-301

Jacob D and Elizabeth K Syriac 2005. Relative efficacy of different spacing and weed control methods in scented rice. Oryza 42 (1): 75-77

Patel JR 1999. Response of rice (*Oryza sativa*) to time of transplanting, spacing and age of seedlings. Indian J Agron 44 (2): 344-346

Pandey J 1991. Effect of weed management, soil manipulation and micronutrients on weed and yield of rice. Indian J Weed Sci 23 (1 & 2): 72-73