Indian Journal of Weed Science **45**(1): 16–18, 2013

Sowing time - a tool for weed control in direct-seeded upland rice

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Received: 13 January 2013; Revised: 7 March 2013

ABSTRACT

A field experiment was conducted to find out the effect of time of sowing and weed control practices on yield and dry weight of weeds during *Kharif* season of 2010 and 2011 at AICRP on weed management, VNMKV, Parbhani. Sowing of direct-seeded rice (DSR) before onset of monsoon produced higher grain yields as compared to sowing after onset of monsoon. Among the different weed control methods, pre-emergence application of butachlor followed by one hand weeding recorded grain yields at par with weed free treatment.

Key words: Direct-seeded rice, Sowing time, Upland rice, Weed control,Yield

Rice is one of the major staples crop grown in India. Transplanting seedlings in puddled and flooded field is the traditional method of rice growing. High losses of water through puddling, surface evaporation and percolation are some of the disadvantages of this method. Growing rice under aerobic environment can reduce water losses to greater extent. Hence, direct seeding instead of conventional transplanting is gaining momentum in India. The productivity of direct-seeded rice is often reported low which has been considered due to increased weed infestation. Aerobic soil condition and dry tillage practices besides alternate wetting and drying conditions are conductive for germination and growth of highly competitive weeds. According to Mamun *et al.* (1993), weed growth reduced the grain yield by 68-100% for DSR, 22-36% for modern *'boro'* rice and 16-48% for transplanted *'aman'* rice. Herbicidal weed control methods offer an advantage to save labour and money (Ahmed *et al.* 2000). The time of sowing have noticeable impact on weed intensity and probably on yield also. Delay in sowing results in slow growth of crop and increased infestation of competing weeds. In light of above, the experiment was conducted to test the effect of time of sowing weed control methods on weed intensity and yield of direct-seeded rice.

MATERIALS AND METHODS

A field experiment was conducted at All India Coordinated Research Project on Weed Control, Parbhani during *Kharif* season of 2010 and 2011 in split plot design with three replications. The main plot treatments were two different times of sowing *i.e.* before onset of monsoon and after onset of monsoon, while subplot treatments were for six different weed control methods, *viz.* pretilachlor-S 0.5 kg/ha pre-emergence, butachlor 1.5 kg/ha pre-emergence + 1 hand weeding, post-emergence Almix 4 g/ha, *Sesbania* (broadcast) + 2, 4-D 0.5 kg/ha at 30 DAS, weedy and weed free. The gross and net plot size were 4.5 x 4.5 m and 3.6 x 3.6 m, respectively. The sowing (direct seeding) before onset of monsoon was done on 15 June 2010 and 6 July 2011 during first and second year of experiment, respectively. Sowing after onset of monsoon was done on 1 July 2010 and 18 July 2011 during first and second year of experiment, respectively. The recommended dose of NPK and plant protection schedule was followed as per general recoomodations.

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RESULTS AND DISCUSSION

Crop-weed association

Among broad-leaved weeds, *Ipomoea maxima, Digera arvensis, Parthenium hysterophorus, Euphorbia geniculata, Convolvulus arvensis, Acalypha indica* were found to be dominant species. The dominant grassy weeds were: *Brachiaria eruciformis, Dinebra retraflexa, Cynodon dactylon, Amischophacelus cuculata* and *Heteropogon contortus.*

Significantly lower dry matter of grassy weeds at 30 and 60 DAS was recorded in DSR sown before onset of monsoon than dry weed weight in DSR sown after onset of monsoon during both the years of experimentation. A similar trend was observed in dry weed weight of broad-leaved weeds wherein the significantly lower dry weed weight of broad-leaved weeds at 30 and 60 DAS was observed in paddy crop sown before onset of monsoon than the dry weed weight of weeds in DSR sown after onset of monsoon.

Table 1. Dry weed weight (g/m^2) at 30 and 60 DAS as influenced by different treatments

Treatment	Grassy weeds				Broad-leaved weeds			
	2010		2011		2010		2011	
	30 DAS	60 DAS	30 DAS	60 DAS	30 DAS	60 DAS	30 DAS	60 DAS
Time of sowing								
D_1 - Before onset of monsoon	4.95	7.87	5.40	8.10	11.67	15.06	12.20	16.05
D_2 - After onset of monsoon	6.92	10.66	6.80	9.80	13.61	19.39	14.30	18.40
LSD (P=0.05)	1.92	1.77	1.81	1.30	1.89	4.50	1.61	4.30
Weed control								
M_1 - Pretilachlor 0.5 kg/ha PE	6.80	10.00	5.90	9.80	16.11	20.3	15.14	21.14
M_2 - Butachlor 1.5 kg/ha PE + 1 HW	5.13	8.43	3.87	6.34	7.52	11.7	8.25	12.22
M_3 - Fenoxaprop 60 kg/ha POE	6.09	9.37	7.90	8.73	12.05	17.1	12.10	18.10
M_4 - *Sesbnia* (broadcast) + 2,4- D 0.5 kg/ha at 30 DAS	5.87	8.81	6.20	7.18	11.03	15.3	9.30	16.24
M_5 - Weedy check	8.04	12.44	8.40	13.3	23.55	28.5	21.14	25.27
M_6 - Weed free	3.53	6.62	3.40	5.26	6.59	10.3	8.14	8.14
LSD (P=0.05)	1.65	1.81	1.35	1.62	3.38	3.65	3.60	4.10

PE - Pre-emergence, POE - Post-emergence

Dry weed weight

Significant effect of different treatments on dry weed weight of grassy as well as broad-leaved weeds was observed (Table 1). At 30 and 60 DAS, significantly lowest dry weed weight of broad-leaved weeds was recorded in weed free situation which was found at par with the pre-emergence application of butachlor 1.5 kg/ha followed by one hand weeding during 2010 and 2011. Similar trend was observed in case of dry weed weight of grassy weeds.The interaction effect was found to be non significant for grassy and broad-leaved weeds for their dry weed weight at 30 and 60 DAS. Bari (2010) reported lower weed count with butachlor.

Weed control efficiency

The maximum weed control efficiency was observed in crop sown before onset of monsoon as regards grassy and broad-leaved weeds than paddy crop sown after onset of monsoon at both the stages of observations *i.e.* at 30 and at 60 DAS during 2010 as well as 2011.

The maximum weed control efficiency of grassy weeds was observed in weed free situation followed by pre-emergence appliction of butachlor 1.5 kg/ha + 1 HW at 30 and 60 DAS, respectively. Whereas in case of broad-leaved weeds also, maximum weed control efficiency was observed in weed free situation followed by PE- butachlor 1.5 kg/ha + 1 HW at both the stages of observations *i.e.* at 30 and 60 DAS respectively.

Grain yield

Sowing of paddy crop after onset of monsoon reduced the paddy grain yield to the tune of 12% and 15% as compared with paddy crop sown before onset of monsoon during first and second year of the experiment, respectively. The grain yield in crop before onset of monsoon was significantly more than grain yield in the crop sown after onset of monsoon during both the years.

Table 2. Grain yield of direct-seeded rice as influenced by different treatments

Treatment	Grain yield (t/ha)		
	2010	2011	Mean
Time of sowing			
D_1 -	2.26	2.38	2.37
D_2 -	2.12	2.12	2.12
LSD (P=0.05)	NS	0.17	
Weed control			
M_1	1.74	1.66	1.70
M_2	2.68	2.59	2.64
M_3	1.97	2.40	2.18
M_4	2.29	2.30	2.30
M_5	1.56	1.73	1.65
M_6	2.90	2.83	2.87
LSD (P=0.05)	0.30	0.24	

Treatment details are given in Table 1.

The grain yield of direct-seeded rice was found to be influenced significantly due to various weed control treatments. During 2010, highest grain yield (2.83 t/ha) was recorded with weed free situation, which was found at par with PE-butachlor 1.5 kg/ha followed by one hand weeding and was further at par with *Sesbania* (broadcast) + 2,4-D 0.5 kg/ha at 30 DAS. During 2011, highest grain yield pf rice was recorded with weed free situation (2.53 t/ha) which was found at par with grain yield of paddy with PE-butachlor 1.5 kg/ha (2.36 t/ha) followed by one hand weeding and found significantly superior over rest of all the treatments (Table 2). Bari (2010) also reported that highest rice yield was obtained with butachlor as compared to other weed control practices. The interaction effect of time of sowing and weed control methods was found to be non-significant.

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