

Weed Management in Direct-seeded Semi Dry Rice

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ABSTRACT

An experiment was conducted consecutively during **kharif** 2005, 2006 and 2007 at Regional Agricultural Research Station, Lam Farm, Guntur, Andhra Pradesh to evolve suitable integrated weed management technique for direct-seeded semi dry rice. Results indicated that all the treatments with hand weeding and herbicide integration were found to be superior to alone application of herbicides in reducing weed growth and increasing rice grain yields. Among the integrated treatments, pre-emergence application of pendimethalin at 1.0 kg/ha integrated with one hand weeding at 30 days after sowing (DAS) recorded the lowest weed growth and highest grain yield and was at par with all other treatments with hand weeding and herbicide integration. Pretilachlor 750 g/ha followed by one hand weeding at 30 DAS and pendimethalin 1.0 kg/ha followed by one hand weeding were the cheapest integrated weed management treatments that recorded highest grain yield of semi dry-seeded rice.

Key words : Herbicide efficacy, hand weeding, direct seeded rice

INTRODUCTION

The water availability and cropping pattern in Krishna delta of Andhra Pradesh is completely dependent on monsoon rains; due to frequent failure/delay of monsoons, irrigation water release to crop fields delayed, ultimately resulted in delay of transplantation of rice and subsequently delayed sowing of pulses in rice-pulse cropping system. In order to overcome this problem, the farmers of this region are switching over to dry-seeding of rice initially and later converted to irrigated rice as and when canal water is released. Axiomatically, the weed growth in direct-seeded rice is severe and is one of the serious limiting factors in realising the yield potential of direct-seeded rice (Rao *et al.*, 2007; Rao and Nagamani, 2007). Weed infestation during early period of crop growth caused yield reduction to the tune of 33-74 % or some times more depending upon the type of the weeds and their infestation (Tosh and Jena, 1984; IRRI, 1997; Rao *et al.*, 2007). The information available on weed management in semi dry-seeded rice in Krishna Delta situation is meagre. Hence, the present investigation was conducted to find out most suitable integrated weed management package for the control of weed flora in direct-seeded semi dry rice.

MATERIALS AND METHODS

A field experiment was conducted

consecutively for three years during **kharif** 2005, 2006 and 2007 at Regional Agricultural Research Station, Lam farm, Guntur, Andhra Pradesh. The soil of the experimental field was clay loam in texture with medium in available nitrogen and available phosphorus and high in available potassium and with a pH of 7.7. The experiment consisting of 10 treatments was laid out in a randomized block design with three replications. The details of treatments alongwith the time of application and observations recorded are given in Table 1.

Herbicides were sprayed using knapsack sprayer fitted with flood jet nozzle using a spray volume of 500 l/ha. The rice variety of BPT-5204 (Samba mashuri) was sown with tractor drawn seed drill by adopting a spacing of 25 x 10 cm. The rice was raised as rainfed for first one month and later converted as wet/irrigated rice. All the recommended package of practices except weed control were adopted during the three years of experimentation. However, during the third year of the experimentation the rice crop was slightly damaged due to heavy rains (Ogni floods) and rice yield levels were low. Weed density and dry matter were recorded at various stages with the help of quadrat and then converted in per square meter. The data on weed density and dry weight were subjected to square root transformation $\sqrt{x+0.5}$ before statistical analysis to normalise their distribution (Panse and Sukhatme, 1978).

Table 1. Effect of different treatments on density and dry weight of weeds in direct-seeded semi dry rice (Pooled data of three years)

Treatment	Herbicide dose (g/ha)	Time of application (DAS)	Weed density (No./m ²) at		Weed dry weight (g/m ²) at		Weed control efficiency (%) at		
			30 DAS	60 DAS	Harvest	60 DAS	Harvest	60 DAS	Harvest
Unweeded check	-	-	16.5 (331.1)	16.9 (321.8)	13.9 (210.7)	26.1 (734.9)	27.7 (789.9)	-	-
Hand weeding	-	15 & 30	4.1 (17.7)	5.5 (33.8)	4.3 (19.1)	6.7 (48.0)	4.8 (79.7)	74.3	82.7
Pendimethalin	1000	3	4.9 (31.1)	7.4 (58.6)	6.3 (42.2)	6.9 (64.2)	8.6 (85.4)	73.6	68.9
Oxadiargyl	100	3	6.9 (63.1)	8.1 (74.5)	6.9 (49.5)	9.1 (88.0)	11.5 (146.9)	65.0	58.5
Pretilachlor	750	3	7.2 (69.7)	7.9 (72.4)	6.9 (56.4)	8.5 (74.2)	8.1 (68.9)	67.4	70.8
Cyhalofop butyl	125	15	8.4 (99.5)	8.6 (95.9)	8.2 (79.5)	7.7 (84.4)	8.7 (79.9)	70.4	68.6
Pendimethalin fb HW	1000	3 fb 30	4.7 (27.6)	4.8 (29.1)	3.9 (19.6)	4.5 (29.3)	3.6 (15.1)	82.8	79.8
Oxadiargyl fb HW	100	3 fb 30	5.9 (51.1)	5.4 (39.1)	4.4 (25.3)	5.2 (42.3)	5.2 (28.1)	80.1	81.2
Pretilachlor fb HW	75	3 fb 30	6.7 (71.0)	5.6 (42.2)	4.9 (29.9)	5.5 (42.2)	5.1 (32.5)	78.9	81.6
Cyhalofop butyl fb HW	125	15 fb 30	8.1 (90.7)	6.2 (49.3)	6.7 (45.1)	5.6 (36.1)	5.9 (36.6)	78.5	78.7
LSD (P=0.05)	-	-	4.20	2.49	2.47	7.54	4.67	-	-

HW—Hand weeding, DAS—Days after seeding.

RESULTS AND DISCUSSION

Effect on Weeds

The experimental field was predominantly infested with *Echinochloa colona* (L.) Link (36%), *Dinebra retroflexa* (6%), *Panicum repens* L. (3%) and *Cynodon dactylon* (L.) Pers. (5%), sedges : *Cyperus rotundus* L. (5%) and broad-leaved weeds : *Corchorus acutangulus* (10%), *Eclipta alba* (10%), *Cleome viscoa* L. (6%), *Phyllanthus niruri* (7%), *Celosia argenticola* L. (5%), *Digera arvensis* (4%) and *Trianthema portulacastrum* L. (3%).

All the weed control treatments significantly

reduced the weed density and dry weight over unweeded check at both the stages of observations (Table 1). Among the treatments, pre-emergence application of pendimethalin 1.0 kg/ha followed by (fb) hand weeding at 30 DAS recorded higher weed control efficiency (WCE) of 82.8% at 60 DAS and was on par with all other treatments with hand weeding and herbicide integration. Among the alone applications, pre-emergence application of pendimethalin 1.0 kg/ha recorded higher WCE of 73.6% at 60 DAS. Similar trend was observed at harvest also. Unweeded check recorded the highest weed growth. In general, treatments with hand weeding and herbicide integration were found to be superior to alone application of herbicides.

Table 2. Effect of different treatments on yield and yield attributes of direct-seeded semi dry rice (Pooled data of three years)

Treatments	Herbicide dose (g/ha)	Time of application (DAS)	Crop dry weight (g/m ²) at		No. of panicles/m ²	No. of filled grains/panicle	1000-grain weight (g)	Grain yield (kg/ha)	Cost of treatment (Rs./ha)
			60 DAS	Harvest					
Unweeded check	-	-	262.7	497.6	169.0	71.2	13.1	1925	-
Hand weeding	-	15 & 30	456.6	949.1	338.7	105.1	14.4	4744	2500
Pendimethalin	1000	3	362.2	738.4	256.3	93.9	13.9	2860	1482
Oxadiargyl	100	3	356.1	665.9	226.7	89.6	14.0	2887	793
Pretilachlor	750	3	363.4	626.0	225.7	92.9	13.4	3044	720
Cyhalofop butyl	125	15	387.6	682.9	223.7	90.8	13.5	2987	1900
Pendimethalin fb HW	1000	3 fb 30	420.0	938.6	313.7	119.9	14.6	4225	2732
Oxadiargyl fb HW	100	3 fb 30	383.3	892.4	297.3	99.8	13.9	3904	2043
Pretilachlor fb HW	75	3 fb 30	385.7	878.3	293.7	95.4	13.7	3845	1970
Cyhalofop butyl fb HW	125	15 fb 30	396.0	906.3	279.0	99.7	13.8	4079	3150
LSD (P=0.05)	-	-	85.57	244.20	61.99	21.09	0.63	856.5	-

HW—Hand weeding, DAS—Days after seeding.

Effect on Crop

Application of pre- and post-emergence herbicides under test did not show any phytotoxic symptoms on rice plant. Weedy check recorded lowest yield (1925 kg/ha) with a yield reduction of 59.4% due to severe weed competition (Table 2). All the herbicidal treatments either applied alone or in combination increased the crop dry weight, yield attributes and yield of direct-seeded semi dry rice over weedy check. Pre-emergence application of pendimethalin 1.0 kg/ha fb hand weeding at 30 DAS recorded higher grain yield (4225 kg/ha) which was at par with hand weeding at 15 and 30 DAS which recorded highest yield (4744 kg/ha) and cyhalofop fb HW (4079 kg/ha). The increased yield in these treatments might be due to

effective control of weeds in early stage by pre-emergence herbicides and late emerged weeds by hand weeding which resulted in reduced weed growth and increased crop growth and yield components. The results are corroborating with those reported by Singh and Singh (2006) under rainfed low land rice conditions. From the results, it can be concluded that pre-emergence application of pendimethalin 1.0 kg/ha super imposed with one hand weeding at 30 DAS was effective in reducing weed growth and increased grain yield of direct-seeded semi dry rice.

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