

FIELD PREPARATION, IRRIGATION AND WEED MANAGEMENT IN DIRECT SEEDED LOW LAND RICE

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ABSTRACT

During 1989-90 and 1990-91 field trials were carried out to study the field preparation, irrigation and weed management practices for direct seeded rice at the Agricultural College and Research Institute, Killikulam. Sprouted seeds of ADT 36 rice were sown in the puddled soil. Farmers practices of four puddling with continuous submergence (5 cm) or submergence to disappearance recorded significantly higher rice yield and lesser weed drymatter compared to paraquat spray (0.625 kg/ha) plus two puddling with continuous submergence (5 cm) or submergence to disappearance. Pre- emergence application of thiobencarb (1.25 kg/ha) either on 6 or 8 DAS or post emergence application of propanil (1.5 kg/ha) on 15 DAS each followed by one hand weeding on 35 DAS or hand weeding twice on 20 and 35 DAS were statistically on par in terms of grain yield. The cost of weeding was lower when thiobencarb was applied on 6 and 8 DAS with one hand weeding on 35 DAS.

KEY WORDS : Rice, direct seeding, puddling, irrigation, weed control, yield, economics

Direct seeding of rice in puddled soil is practiced in several places especially when water release in canal is delayed due to late monsoon. The major problems in direct seeded rice are inadequate water supply to the crop and severe weed infestation. Hence water and weed management in direct seeded rice are of paramount importance. The present experiment was, therefore, conducted to determine the number of puddlings, irrigation and weed management aspects for direct seeded lowland rice.

MATERIALS AND METHODS

Field experiment were conducted at Agricultural College and Research Institute, Killikulam during 1989-90 and 1990-91. The soil was red sandy loam with pH 8.0. It was laid out in split plot design replicated three times. The experiment was imposed with four treatments of puddling and irrigation practices and six treatments of weed control (Table 1). Sprouted seeds of ADT 36 rice were sown in puddled soil. All other cultivation practices were followed similar to transplanted crop. Weed count was taken on 20 and 30 days after sowing (DAS) but before hand weeding using 0.5 m x 0.5 m quadrat. Seed count was converted to logarithmic ($\log x+2$) transformations. Yield parameters were recorded

and statistically analysed. Economics was also worked out for different weed control treatments.

RESULTS AND DISCUSSION

The major weed flora found in the experimental field were *Echinochloa colonum* (L.) Link, *E. crusgalli* (L.) Beauv, *Marselia quadrifoliata*, *Sphenocloea zeylanica* (L.) Gaertn, *Cyperus difformis* and *C. iria*.

Farmers practice of puddling (4 times) and continuous submergence (5 cm) reduced weed population significantly both on 20 and 30 DAS. It was followed by four puddling and submergence to disappearance (Table 1). Application of paraquat at 0.625 kg/ha plus two puddling and both irrigation practices were not very effective on weed control.

Number of productive tillers (PT) per hill was higher in four puddling coupled with continuous submergence (5 cm). It was on par with four puddling plus submergence to disappearance. Grain and straw yield were maximum in the above treatments which might be due to the lower weed population and more number of PT. Saikia and Datta (1989), Nayak *et al.* (1981) and Prasad and Sharma (1984) registered highest yield under continuous submergence. Application of paraquat

Table 1. Effect of field preparation, irrigation and weed management of rice

Treatment	Weed Count (No/M ²)*				Productive tiller/hill		Grain yield (kg/ha)		Straw yield (kg/ha)	
	20 DAS		30 DAS		1989-90	90-91	1989-90	90-91	1989-90	90-91
	1989-90	90-91	1989-90	90-91						
Main Plot - Puddling and Irrigation										
Farmers practice of 4 puddling + Submergence (5cm)	24.27 (1.33)	16.22 (1.15)	19.99 (1.25)	19.73 (1.24)	7.80	6.95	5230	4910	5780	5412
Farmers practice of 4 puddling + Submergence to disappearance	28.94 (1.40)	24.61 (1.36)	21.83 (1.30)	22.50 (1.29)	7.78	6.68	5193	4875	5714	5370
Paraquat 0.625 kg/ha + 2 Puddling + submergence (5 cm)	34.43 (1.50)	26.95 (1.36)	22.66 (1.31)	25.72 (1.37)	7.60	6.65	4232	3915	4660	4305
Paraquat 0.625 kg/ha + 2 puddling + submergence to disappearance	38.17 (1.53)	29.17 (1.41)	24.44 (1.34)	32.50 (1.47)	7.58	6.55	4230	3908	4653	4308
SED	0.01	0.03	0.02	0.03	0.06	0.11	24.3	14.38	28.6	17.1
CD (P=0.05)	0.03	0.08	0.05	0.07	0.15	0.28	59.6	35.20	70.0	42.2
Sub Plot - Weed Management										
Thiobencarb 1.25 kg/ha at the last puddling + HW on 35 DAS	25.60 (1.39)	20.33 (1.26)	26.49 (1.42)	27.75 (1.44)	7.60	6.80	3679	3290	4090	3625
Thiobencarb 1.25 kg/ha at 6 DAS + HW on 35 DAS	19.92 (1.29)	16.77 (1.22)	20.40 (1.31)	21.92 (1.33)	7.95	7.08	5248	4938	5773	5440
Thiobencarb 1.25 kg/ha at 8 DAS + HW on 35 DAS	17.99 (1.24)	14.41 (1.13)	19.90 (1.28)	18.42 (1.26)	7.97	7.18	5253	4961	5780	5468
Post emergence propanil 1.5 kg/ha on 15 DAS + HW on 35 DAS	20.74 (1.30)	15.58 (1.18)	15.25 (1.18)	20.17 (1.30)	8.15	7.10	5200	4919	5774	5404
Hand Weeding twice on 20 and 35 DAS	50.08 (1.71)	37.17 (1.55)	9.67 (0.98)	12.75 (1.06)	9.38	7.92	5255	4958	5774	5465
Unweeded check	53.50 (1.72)	41.17 (1.60)	42.58 (1.62)	69.83 (1.68)	5.03	4.18	3649	3351	4023	3691
SED	0.12	0.03	0.01	0.03	0.74	0.63	51.9	30.92	34.13	33.40
CD (P=0.05)	0.26	0.08	0.03	0.07	1.50	1.27	105.0	62.50	68.19	67.52

* Values in paranthesis are logarithmic transformed values ($\log(x+2)$) and other are original values for weed count.

DAS : Days after sowing

plus two puddling in both irrigation practices reduced productive tillers and yield of rice.

Application of thiobencarb (1.25 kg/ha) 6 DAS or 8 DAS or propanil (1.5 kg/ha) on 15 DAS each followed by one hand weeding on 35 DAS reduced weeds considerably both on 20 and 30 DAS (Table 1). Mishra and Singh (1989) reported that propanil as post emergence was effective and at par with pre-emergence treatments. Thiobencarb application

at the time of last puddling though controlled weeds effectively it affected the germination and establishment of rice crop.

The number of PT was maximum when hand weeding was given twice (20 and 35 DAS). However, it was on par with chemical weed control treatments. The grain and straw yield were found to be on par with hand weeding twice and chemical weed control followed by one hand weeding on 35

Table 2. Economics of chemical weed control

Treatment	Grain yield (kg/ha)		Value of rice (Rs.)		Cost of weeding (Rs.)		Value of paddy less weeding (Rs.)		Profit over hand weeding (Rs.)	
	1989-90	90-91	1989-90	90-91	1989-90	90-91	1989-90	90-91	1989-90	90-91
Thiobencarb 1 kg/ha at last puddling + HW on 35 DAS	3679	3290	8278	7403	670	670	7608	6733	-3376	-3582
Thiobencarb 1.25 kg/ha at 6 DAS + H W on 35 DAS	5248	4938	11808	11110	600	600	11208	10510	+224	+195
Thiobencarb 1.25 kg/ha at 8 DAS + H W on 35 DAS	5253	4961	11820	11162	600	600	11220	10562	+236	+247
Propanil 1.5 kg on 15 DAS + HW on 35 DAS	5200	4919	11700	11068	950	950	10750	10118	+234	+197
Hand Weeding twice on 20 and 35 DAS	5255	4958	11824	11155	840	840	10894	10315	--	--
Unweeded check	3649	3351	82104	75405	--	--	8210	7540	--	--

Prices adopted : rice grain : Rs. 2.25/kg p ; Thiobencarb : Rs. 145/l per l ; Propanil : Rs. 157/l per litre ; Labour : Rs. 20/day p.

DAS. More PT and higher yield in hand weeding twice and herbicide treatments were due to the greater weed control. Similar findings on thiobencarb application to direct seeded rice was reported by Kandasamy and Palaniappan (1990). Thiobencarb applied on last puddling and unweeded control recorded very poor grain yield.

The cost of weeding was lower when thiobencarb was applied 6 or 8 DAS followed by one hand weeding 35 DAS (Table 2). In view of labour scarcity for hand weeding and to reduce the cost of production, use of thiobencarb either on 6 or 8 DAS was found to be better. The profit over hand weeding was maximum in thiobencarb application on 8 DAS (Rs.236/- and Rs.247/- during 1989-90 and 1990-91 respectively). It was followed by thiobencarb applied on 6 DAS (Rs.224/- and Rs.195/- during 1989-90 and 1990-91 respectively).

Considering the water economy and cost of weed control, farmers method of puddling (4 times)

plus submergence to disappearance and pre-emergence application of thiobencarb at 1.25 kg/ha on 6 and 8 DAS followed by one hand weeding on 35 DAS were found to be optimum weed management practices for direct seeded low land rice.

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(Received : October 1996 Revised : March 1997)