

## Cultural and Chemical Methods of Weed Control in Transplanted Rice

By

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### ABSTRACT

There was no significant difference between the preplant application of paraquat at 0.8 kg a.i./ha and puddling six times. Hand weeding and working rotary weeder recorded the maximum yield when compared to the herbicides rogua, butachlor, propanil and 2,4-D, which were in turn better than unweeded check. The combination of post emergence application of propanil and paraquat was also not effective. But propanil combined with thorough land preparation and paraquat combined with hand weeding recorded the same yield as good land preparation and cultural methods of weed control.

### INTRODUCTION

Hidayatullah and Sen (1942) reported that in India the loss in yield of rice due to weeds ranged from 5 per cent to total failure of crop. The present strategy of multiple cropping, application of heavy doses of fertilizers, introduction of short statured or low tillering types also necessitate effective chemical measures to control weeds. Since the utility of herbicides depends upon their effectiveness and safety and upon their cost relative to hand labour, more studies are necessary to screen new herbicides for use in the transplanted rice. Thorough seed bed preparation helps to control all weeds that infest rice fields and increase the effectiveness of herbicide and as such a combination of different methods of land preparation and chemicals for weed control may be more effective and economic than either of them alone. This paper reports the results of differential response of trans-

planted rice to different methods of land preparation and cultural and chemical methods of weed control.

### MATERIALS AND METHODS

The experiments were conducted in sandy soil low in available N and  $P_2O_5$ . Experiment I was conducted during the first crop season July to October 1971, and Experiment II in the second crop season, October 1971 to February 1972. In the first experiment IR. 8 rice was planted in plots measuring 5x3 m with a spacing of 20 x 10 cm. IR. 20 was used in Experiment II. Split plot design with four replications was used. Experiment I consisted of six main plot treatments and three sub-plot treatments. In the main plots, methods of land preparation *viz.* chemical tillage by paraquat 0.8 kg a. i. /ha applied on sod five days before planting, working krishi tiller once, two puddlings, four puddlings, six puddlings and eight puddlings

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TABLE I. Effect of herbicides on the weeds and yield of rice I R-20

Treatments	No. of weeds/ 5000 sq. cm	Dry weight of weeds at harvest gm/10 sq.m.				Yield kg/ha.
		Grasses	Sedges	Broad leaves	Total	
Control	137	72.00	111.81	98.50	282.31	2820
Hand weeding	27	4.20	4.23	1.45	9.88	3428
Rotary weeder	16	13.31	14.72	2.85	30.88	3421
Propanil at 3 kg a.i./ha	62	30.38	31.30	17.63	79.31	3171
Rogue at 3 kg a.i./ha	54	28.36	31.53	20.31	70.40	3216
Butachlor at 3 kg a.i./ha	25	19.13	34.06	11.56	64.75	3210
2,4-D at 1 kg a.i./ha	65	45.25	34.00	27.50	105.75	2970
C. D. at 5%	19.83	—	—	—	91.88	135

TABLE II. Effect of seed bed preparation and weed control on rice yield kg/ha

Treatments (Main plot)	Hand weeding	Yield kg/ha working rotary weeder	Propanil 3 kg/ha	Mean
Paraquat 0.8 kg a.i./ha	5084	3980	3125	4063
Krishi tillers once	4975	4480	3980	4478
Two puddlings	4521	4680	4493	4565
Four puddlings	4700	4871	4575	4715
Six puddlings	4938	5546	4838	5107
Eight puddlings	5305	4659	5021	4995
Mean	4920	4702	4339	4654
C. D. at 5%				
Between Weedings:	208.5			
Interaction :		590		

were compared. The three sub-plots consisted of hand weeding thrice, working rotary weeder thrice and spraying propanil at 3 kg a. i./ha. Experiment II consisted of four main plot treatments viz. two puddlings, four puddlings, six puddlings and eight puddlings and seven sub-plot treatments as outlined in Table II. Data pertaining to the total number of weed species, weed

count, dry weight of weed at harvest and grain yield were recorded and statistically analysed.

## RESULTS AND DISCUSSION

The total number of weed species recorded in the experimental area were 49 in both the seasons. Of these 23 were broad leaved weeds, 9 sedges and 17 grasses. The predominant weed species were : Grasses : *Echinochloa crusgalli*, *E. colona*, *Panicum purpurascens*, *Eleusine indica*, *Eragrostis megastachyta*, *Ischaemum rugosum* and *Cynodon dactylon*; Sedges : *Cyperus rotundus*, *C. bulbosus*, *C. iria*, *C. umbilis*, *Fimbristylis miliacea* and *Scripus articulatus*; and Broad leaved weeds : *Marsilia quadrifoliata*, *Eclipta alba*, *Ludwigia paryiflora*, *Ammania bacifera*, *Sphaeranthus indicus*, *Stemodia viscosa*, *Lippia nodiflora* and *Centella asiatica*. The weed count in the unweeded check plots 45 days after planting indicated that on an average 137 weeds occurred per 0.5 m<sup>2</sup>.

**Weed count and weight :** A significant reduction in the number of weeds and dry matter production was noticed in all the plots where the weed control measures were adopted 45 days after planting (Table I). The cultural methods were more effective than the herbicides in general. This was due to the regeneration of perennial weeds like *Cyperus* sp. and *Marsilia* sp. in plots where herbicides were sprayed. At harvest the percentage composition of broad leaved weeds, sedges and grasses in the unweeded check plot was 34.9, 39.6 and 25.5 respectively.

**Grain yield :** There was no significant difference in yield between the different methods of seedbed preparation. Among the three methods of weed control, hand weeding and working rotary weeder were on par and gave significantly more yield than the chemical control with propanil (Table II). The interaction between weed control methods and land preparation was significant. In the plot where paraquat was used followed by propanil the yield was very low. The above results show that minimal cultivation technique of seed bed preparation with paraquat, working krishi tiller once and puddling twice only were as efficient as 4, 6 and 8 puddlings, provided the weeds are effectively controlled subsequently by cultural methods. Paraquat at 0.8 kg a.i./ha controlled all categories of weeds, as indicated by Mukhopadhyay and Rooj (1971). But pre-plant application of paraquat is effective only

when followed by cultural methods. Paraquat and post emergence application of propanil were not effective. This indicates that combination of cultural and chemical methods is more effective.

The yield data from the Experiment II also show the same trend as in Experiment I. There was no significant difference between 2, 4, 6 and puddlings of land preparation. Hand weeding and working rotary weeder gave significantly higher yield than the herbicides and unweeded check. The herbicides rogue, butachlor and propanil recorded significantly more yield than 2, 4-D which in turn recorded significantly more yield over unweeded check. The low yield of 2, 4-D when compared to other herbicides might be due to its phyto-toxic effect on rice plants.

When the economics of cultural and herbicides treatments was compared there was only a marginal net profit due to the application of herbicides. The herbicides alone were not very effective and economical to control the weeds. Herbicides followed by cultural methods gave better results.

#### REFERENCES

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