

Effect of Propanil on Weed Growth and Yield of IR 20 Rice Under Different Seeding Methods and Rates

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ABSTRACT

Propanil spray once (3.5 kg a.i./ha) or twice (7.0 kg ai/ha) were compared with hand weeding and no weeding for their herbicidal efficiency with IR-20 rice raised under different seeding methods and rates. Double sprays of propanil reduced the weeds by 76 per cent and was close to two hand weedings. The weeding methods had significant influence on the number of productive tillers per unit area and the filled grains per panicle. Both for grain and straw yield two sprays of propanil were as effective as two hand weedings. Transplanting contributed to greater tillering and higher grain yield while dibbling was on par with transplanting when adequate check of weeds was provided.

INTRODUCTION

The methods of raising the rice crop like direct seeding or transplanting as well as the seed rates followed have differential influence on the weed population (Subbiah Pillai, 1958 and Craufurd and Carpenter, 1968). Therefore chemical control of weeds is a preferable alternative but has to be suitably modified depending upon the seeding methods and rates. Propanil (Stam F-34) herbicide has been hitherto tested under particular seeding methods i. e. either under direct seeded or transplanted conditions (Gopalakrishnan *et al.*, 1967 and Subramaniam *et al.*, 1970). In an attempt to evaluate the efficacy of propanil under different seeding methods for rice culture, stu-

dies were taken up with a high yielding strain of IR 20 by observing the effect on weed growth, yield attributes and grain and straw yield.

MATERIALS AND METHODS

The experiment was conducted in the Central Farm, Agricultural College and Research Institute, Madurai during August 1971 to December 1971. A total of 24 treatment combinations with seeding methods and rates as main plot and methods of weed control as subplot treatments were laid out in a split plot design with three replications. The main plot treatments were, transplanting, dibbling and under broadcasting there were four seed rates viz. 40, 60, 80 and 100 kg of seeds per

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ha. The subplot treatments consisted of no weeding (control), hand weeding twice, spraying propanil at 3.5 a.i.kg/ha (Stam F-34) either once or twice. Hand weeding was done at 20 and 40 days after planting. Single application of propanil was done at 20 days while double application was done at 20 and 40 days and for each spray 3.5 kg ai/ha of herbicide applied. For transplanting and dibbling the spacing adopted was 20 × 10 cm in plots measuring 4 × 3 metres net. The crop received the recommended manurial, cultural and pesticidal treatments.

The efficiency of weed control methods was assessed by sampling for the dry weight of weeds at 60 and 90 days after sowing in the different plots. The estimation was done by placing a bamboo quadrat of 0.5 × 0.5 metre size at random in each plot, and the weeds enclosed being collected by clipping close to the ground and dry weight determined after oven drying. The number of productive tillers per unit area, number of filled grains per panicle and 1000 - grain weight were the yield attributes studied. The grain and straw yields of individual plots were also recorded.

RESULTS AND DISCUSSION

The weed flora commonly found in the experimental plots consisted of grasses like *Echinochloa crus-galli* (L) Beauv., *E. colonum* (L) Link., sedges like *Cyperus rotundus* (L), *cynodon dactylon* (L) Pers., *Fimbristylis miliacea* and broad leaved weeds like *Eclipta alba*, Hassk., *Ludwigia parviflora*, Roxb., *Marsilea quadrifoliata*, Linn., *Sphaerun-*

thus indicus, Linn and *Stemodia viscosa*, Roxb.

1. **Effect on weeds:** The effect of the treatments on weed growth (Table 1) was significant for the methods of sowing and the methods of weeding both at 60 and 90 days after sowing. Transplanting recorded the least weed weight followed by dibbling, both being on par at 60 as well as 90 days after planting. The relatively efficient check in weed growth by these two methods in comparison with broadcasting may be attributed to the regulation of spacing between individual hills under the former two methods. In transplanting, a relatively grown up stage of the plant is established, which might have contributed to efficient check of weeds. Pradhan (1966) has also observed that compared to other methods of seeding, broadcasted rice was more prone to weed infestation.

Among the rates of seeding, the least growth of weeds was observed in plots receiving 80 kg seeds/ha followed by those receiving 100 kg/ha both being on par. Among the lower seed rates the maximum weed growth was at 40 kg/ha. Higher seeding rates resulted in greater population of plants in unit area thus reducing the space available for weed growth. Verma and Bharadwaj (1957) have also indicated that increase in seed rate contributes to reduction in weed growth in wheat.

Repeated application of herbicide was on par with hand weeding and significantly superior to single application of herbicide. When compared to

TABLE 1. Effect of propanil on the weed growth, yield attributes and yield of IR 20 rice under different methods and rates of seedin .

Treatments	Dry weight of weeds in g/ sq. m. at 90 days	Yield attributes			Yield (kg/ha)	
		Productive tillers/ sq. m.	Filled grains/ panicle	1000-grain weight (g)	Grain	Straw
Main plots (Seeding methods)						
Transplanting	4.7	344.2	104.9		4736	4681
Dibbling	33.7	265.2	101.4	20.3	3721	4461
Broadcasting 40 kg/ha	90.8	205.2	104.1	20.4	2526	2229
.. 60 kg/ha	59.3	247.0	99.7	20.4	2991	3048
.. 80 kg/ha	29.8	275.3	94.7	20.1	2895	2882
.. 100 kg/ha	40.1	268.7	89.1	20.3	3191	3139
S E	10.4	9.9	5.8	0.4	253	409
C D 5%	32.8	31.2	N S	N S	798	1288
Subplots (Weeding methods)						
No Weeding	91.9	230.7	92.4	20.3	2623	2905
Hand weeding twice	17.5	310.6	99.6	20.3	3941	3680
Spraying propanil once (3.5 kg a. i./ha)	41.3	252.3	95.8	20.6	3221	3419
Spraying propanil twice (7.0 kg a. i./ha)	21.5	272.8	108.1	20.3	3587	3623
S E	7.3	11.7	3.6	0.3	125	141
C D	21.0	33.4	10.3	N S	358	405

hand weeding, plots receiving herbicidal application had marginally greater weight of weeds and this might be due to the inability of Stam F-34 to

control broad leaved weeds and sedges which formed a considerable proportion of the weed flora in the field. Gosh and Pande (1967) have indica-

ted that propanil may not be very effective against some of the broad leaved weeds and sedges.

2 Effect on yield attributes :

The number of productive tillers per square metre was significantly influenced by both methods of sowing and methods of weeding. Transplanting resulted in significantly greater number of productive tillers. Dibbling and broadcasting with higher seed rates were on par and significantly superior to the lowest seed rate of 40 kg/ha. Stimulation of tiller production as a result of transplanting has been reported by Craigmiles *et al.* (1968) while Have (1959) observed that the productive tillers per unit area increased with increase in seed rate. Hand weeding was significantly superior to double application of propanil. The latter was on par with single application. The unweeded plots as well as those receiving single application of propanil had earlier been found to be more infested by weeds and the greater amount of weeds in these plots might have led to fewer number of effective tillers as suggested by Takekawa and Masakazu (1968).

The number of filled grains per panicle was not markedly influenced by the sowing methods, while the methods of weeding had a distinct influence. Two rounds of herbicide application resulted in maximum number of filled grains per panicle followed by hand weeding which was on par. The beneficial effect of propanil in increasing the number of grains per panicle have earlier been reported by Sahu and Jenna (1968).

The 1000-grain weight was not significantly altered either by sowing methods or weeding methods

3. Effect on yield :

Transplanted crop yielded significantly more grains than all the other methods of sowing. A perusal of the yield components revealed that methods of sowing did not have significant influence on the number of filled grains per panicle as well as 1000-grain weight. Thus, the enhanced yield could be more specifically attributed to the increased number of productive tillers per unit area, the weed free condition and consequently the minimum loss of nutrients in the transplanted crop. Sheik Dawood *et al.* (1971) found rice varieties IR 20 and Co 32 yielding more when transplanted than when direct seeded. The grain yield of dibbled plots was higher than those of broadcasting with 40 and 80 kg seeds per ha. Mahapatra and Parasuram (1964) have also obtained higher grain yield by dibbling sprouted seeds in comparison with broadcasting.

Two hand weeding and double application of propanil were on par but significantly superior to single application of propanil or unweeded control. The increase in yield over unweeded control was by 50.2, 36.7 and 23.0 per cent for hand weeding, double and single applications respectively. Reported applications of herbicide was as efficient as hand weeding in terms of the reduction in weed growth as evidenced at 90 days after sowing, the number of filled grains per panicle as well as in reducing the nutrient depletion through weeds. In spite of the

inferiority of double application to hand weeding in terms of productive tillers per unit area, the grain yields of both the treatments were on par. The lapse in terms of marginal reduction in yield for repeated applications of herbicide might be attributed to the presence of weed species resistant to propanil as pointed out earlier.

Both sowing methods and weeding methods were found to be significant for straw yield. Transplanting and dibbling were on par and significantly superior to broadcasting with different seed rates. Increased plant height as well as total tillers were evident in plots under transplanting and dibbling which might have contributed to greater yield of straw. Dibbling has been reported by Pawar *et al.* (1956) to enhance the straw yield of rice. Hand weeding and herbicide application were on par with each other and significantly superior to unweeded control in terms of straw yield. Increased number of tillers per square metre was observed under the different treatments in comparison with unweeded control and this has reflected in greater straw yield.

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