

COMPARATIVE EFFICIENCY OF NEW HERBICIDES FOR WEED CONTROL IN DIRECT SEEDED RICE FIELDS

R. R. NAIR, K. K. VIDYADHARAN, P. N. PISHARODY and R. GOPALAKRISHNAN
Rice Research Station, Pattambi

Weed control in direct seeded rice involves high cost. Effective combinations of chemical and cultural methods of weed control, however, have made direct seeding highly practical and profitable in developed countries. Research data on the chemical control of weeds in direct seeded rice are meagre in Kerala. Therefore, an experiment was conducted at the Rice Research Station, Pattambi during the *mundakan* (September—January) season of 1972-73 to screen new herbicides for broadcast seeded flooded rice fields.

Materials and Methods

The experiment was laid out in randomised block design replicated five times (Table I). The test variety was Jaya, sown broadcast at 100 Kg/ha. A mixture of weed seeds comprising of *Echinochloa crusgalli*, *Fimbristylis miliacea* and *Cyperus* sp was also sown along with rice seeds in order to ensure uniform weed population in all the plots.

The soil of the experimental plot was a laterite sandy loam of moderate fertility. At the time of final puddling, N, P₂O₅ and K₂O were applied at 40, 80 and 50 Kg respectively per ha. At the tillering and panicle initiation stages of the crop, nitrogen was top dressed at 40 Kg per ha each time.

Granulated pre-emergent herbicides Saturn (Benthiocarb) Machete (Batachlor), C-288, Ronstar and C. 19490 were applied 6 days after sowing and Tavron G on the 10th day after sowing. The post-emergent herbicide, propanil (Stam F. 34) was sprayed on the 20th day after sowing, which coincided with the 2 to 3 leaf stage of weeds. Treatment 8 received 2 hand weedings.

The effectiveness of the herbicides on weed control and their toxicity to rice were rated based on the arbitrary visual scale of 1 to 5, with scale denoting either excellent weed control or no toxicity to rice and scale 5, no control of weeds or complete kill of rice plants (Chang and De Datta, 1972).

Table

Ratings on initial weed control and toxicity to rice seedlings, yield of grain and yield attributes and dry matter of weeds at harvest as affected by different treatments

Treatments	Rate of application (kg ai/ha)	Initial rating on toxicity to rice seedlings	Initial height on weed control (cm)	Proportion of tillers per m ²	Panicum weight (g)	Dry matter harvested (kg/ha)	ON yield (kg/ha)	Percentage increase in grain yield over unweeded control
1. Satin	1.5	1.5	1.6	396	1.25	414	5013	14.8
2. Machete	1.0	1.0	1.1	358	1.33	17	5220	19.5
3. Machete	1.5	1.4	1.3	374	1.53	569	5358	22.7
4. Taron-O	0.6/0.4	2.2	1.5	419	1.28	69	4910	12.4
5. C-288	1.0	2.2	1.0	409	1.02	128	4986	14.2
6. C-19490	1.0	2.5	2.1	381	1.25	06	4779	19.5
7. RotStar	1.0	2.7	1.0	463	1.18	-40	4931	2.9
8. Hand weeding	-	-	1.0	405	1.24	14	5475	25.4
9. Unweeded control	-	-	5.0	367	1.08	1560	4365	1
10. Pre-pani	3.0	1.5	1.5	421	1.24	28	5213	-9.4
SD (P=0.05)				59	0.21	22	154	

Results and Discussion

Toxicity to rice

The first visual rating on toxicity to rice seedlings was carried out on the 7th day after the application of herbicides. Machete (at 1.0 Kg ai/ha) caused practically no injury to the young rice plants but at 1.5 kg ai/ha, it caused mild leaf injury. Saturn also caused leaf injury and twisting of the shoot at the 1.5 Kg level. Ronstar and C. 19490 also caused leaf injury, the intensity of toxicity being comparatively more than that caused by Saturn and Machete. Tavron G and C-288 were more drastic in their action on rice seedlings causing stunting of growth, distortion of main shoot and even death of plants. Propanil caused mild scorching on the young leaves of the crop. It, however, did not persist long. Toxicity rating done on the 20th day after application of herbicides revealed that recovery of the affected plants was relatively faster in Ronstar, Machete, Saturn and C. 19490. Mortality of plants was more in C-288 and Tavron G which was estimated by visual observation as 20 and 15 per cent, respectively. Practically no trace of injury was visible on the crop in all the treatments on the 45th day after sowing when the plants were on the active tillering stage.

Weed Control

The initial rating on weed control recorded on the 30th day after sowing revealed that C. 288 and Ronstar were the most effective, although the magnitude of difference in weed population between them and Machete, Saturn, and Propanil were not significant. C-19490 was relatively less effective compared to the rest of the herbicides. Weeds reappeared in patches in all the treatments after the maximum tillering stage of the crop, but the amount of dry matter produced by these weeds at harvest was quite negligible when compared to that of the unweeded control. Moreover, re-emergence of weeds at this later stage of crop growth did not seem to bring about marked reduction in grain yield. An examination of the unweeded control plots at harvest showed the following weed flora in the order of their predominance in the population. *Echinochloa crusgalli*, *Cyperus sp.*, *Fimbristylis miliacea*, *Monochoria vaginalis*. It could be assumed that all the herbicides tried were capable of controlling a wide spectrum of weeds in direct-seeded flooded rice fields.

Grain yield

Hand weeding turned out to be the best treatment producing a mean grain yield of 5475 Kg/ha. It was however, on par with Machete at 1.5 Kg ai/ha which yielded 5358 Kg/ha. These treatments registered 25.4 and 22% increase in yield over the unweeded control. The difference in yield between both the levels of Machete and propanil also did not touch the level of statistical significance. The remaining herbicides also proved to be significantly

superior to the unweeded control. The reduction in yield in some of the herbicides inspite of adequate weed control, may be attributed but to initial seedling toxicity caused by them.

Economics

Hand weeding turned out to be the *costliest* of all the treatments requiring 997 women hours at a total cost of Rs. 436.10 per hectare for two weedings. The cost of application of Machete at 30 Kg per hectare. (1.5 Kg ai/ha) and propanil at 8.1 litres/ha (3.0 Ka ai/ha) amounted, respectively, to Rs. 110.50 and Rs. 180 10 indicating that they were relatively more profitable than hand weeding. Judged from the ratings on weed control, toxicity to rice seedlings and grain yields, it is concluded that Machete (N-Butoxymethyl - 2 Chloro-2' 6' - diethyl acetanilide) and propanil (3, 4 dichloro-propionilide) could be safely and profitably used for weed control in direct seeded rice fields.

Summary

In an investigation conducted at the Rice Research Station, Pattambi to study the relative efficacy of new herbicides, it was found that Machete and Propanil could be safely used for weed control in direct seeded flooded rice fields. Chemical weed control was cheaper than hand weeding. The cost of hand weeding amounted to Rs. 436.10 per hectare, while that of Machete at 1.5 Kg ai/ha and propanil at 3.0 Kg ai/ha came, respectively, to Rs. 110.50 and Rs. 180.10 per ha only.

Acknowledgement

The authors are grateful to the Project Co-ordinator, All India Co-ordinated Rice Improvement Project, Rajendranagar, for help and guidance.

സംഗ്രഹം

ചേരിൽ വിതച്ച നെല്ലിലെ കളകളെ നിയന്ത്രിക്കുവാൻ ആധുനിക കളനാശിനികൾ എത്രത്തോളം ഫലപ്രദമാണെന്നു പഠിക്കുവാൻ പട്ടാമ്പിയിലെ നെല്ലു ഗവേഷണകേന്ദ്രത്തിൽ 1972-73 ലെ മുണ്ടകൻ വിളകാലത്ത് സാരോൺ (ബന്തിയോ കാർബ്), മാഷറോ (ബ്യൂട്ടാക്ലോർ), ടാവറോൺ, സി. 288, സി. 19490, റോൺസ്റ്റാർ, പ്രൊപ്പാനിൽ ഇവയുപയോഗിച്ചു നടത്തിയ ഒരു പഠനത്തിൽ ഗുളികരൂപത്തിലുള്ള മാഷറോ (ഹെക്റ്ററിന് 1.5 കി. ഗ്രാം ഉത്തേജിത അംശം) യും ദ്രാവകരൂപത്തിലുള്ള പ്രൊപ്പാനിലും (ഹെക്റ്ററിന് 3.0 കി. ഗ്രാം ഉത്തേജിത അംശം) ഏറ്റവും മെച്ചമാണെന്നു കണ്ടു. ഇവ ഉപയോഗിച്ചുള്ള കളനിയന്ത്രണം കളകൾ പഠിച്ചുനീക്കുന്നതിനേക്കാൾ വളരെ ലാഭകരമാണെന്നു കണ്ടു.

REFERENCE

Ghang, W. L. and De Datta, S. K. 1972. Control of Weeds in transplanted rice in Taiwan as affected by various rates and times of applying granular Benthocarb and Butachlor. *International Rice Commission Newsal.* 21 (1) : 8-16.

(M. S. received: 28-8-1974)