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# Efficacy of Certain Low Doses Herbicides in Medium Land Transplanted Rice (*Oryza sativa* L.)

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## ABSTRACT

A field experiment was conducted during two monsoon seasons to find out the efficacy of certain low doses herbicides in transplanted rice. *Echinochloa colona, Echinochloa crusgalli, Cyperus rotundus, Cyperus difformis, Fimbristylis milliacea* and *Ludwigia parviflora* were the major weeds. Almix+2, 4-DEE at 15+500 g $ha^{-1}$ applied eight days after transplanting was found most effective in controlling weeds and maximizing rice grain yield (5837 kg $ha^{-1}$). This was on par with hand weeding done thrice at 20, 40 and 60 days stage. The weed competition in weedy check caused 46% reduction in grain yield.

## INTRODUCTION

Infestation of heterogeneous weed flora in rice fields is one of the serious limitations in the rice production. Since parts of associated weeds in the rice field are $C_4$ plants, which are most vigorous and aggressive to compete for nutrients, moisture, space and sunlight, etc. with crop plants and thus create an extremely adverse environment which results in poor rice yields. Major transplanted rice in the country is in medium land where weeds are the major constraints and reduce rice yield from 28 to 48% (Singh and Bhan, 1986). Alternate wetting and drying condition during rainy season encourages more weed growth.

The rising labour cost and lack of availability of labour during critical period warrant for alternate effective and economical weed control practices. In India, widely used rice herbicides are butachlor, thiobencarb, anilofos and acetachlor. Weed control spectrum of the above herbicides is quite narrow. Recently, a number of low doses herbicides have been developed which can control wide range of weeds. The present study was, therefore, made to study the efficacy of low doses herbicides under medium low land transplanted rice.

## MATERIALS AND METHODS

A field experiemnt was conducted during the rainly seasons of 2001 and 2002 at the Research Farm of Institute of Agricultural Sciences, Banaras Hindu University, Varanasi to find out the efficacy of high potency herbicides in transplanted rice. The soil was sandy clay loam having pH 7.3, organic carbon 0.44% and available N, $P_2O_5$ and $K_2O$ 205, 14.9 and 232.8 kg $ha^{-1}$, respectively. The experiment comprised various doses of metsulfuron-methyl (MSM), chlorimuron ethyl (CME), Almix, MSM+2, 4-DEE, CME+2, 4-DEE, Almix+2, 4-DEE, anilofos and anilofos+2, 4-DEE alongwith hand weeding and weedy check (Table 1). The experiment was laid out in randomised block design with three replications. Twenty-five days old seedlings of rice variety Sarju 52 were transplanted on July 22 and 24, 2001 and 2002, respectively. One third of the recommended dose of N (40 kg $ha^{-1}$) and full dose of $P_2O_5$ and $K_2O$ (60 kg $ha^{-1}$ each) were applied before transplanting and remaining amount of N was top dressed in two equal splits, half at active tillering and half at panicle initiation stages. Herbicides were sprayed eight days after transplanting (DAT) using 600 l water $ha^{-1}$ with the help of knapsack sprayer, fitted with flat fan nozzle.

Table 1. Effect of treatments on weed population and weed dry weight

| Treatment | Dose | Weed population (No. $m^{-2}$) | | | | Weed dry weight (g $m^{-2}$) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | (g $ha^{-1}$) | 30 DAT | | 60 DAT | | 30 DAT | | 60 DAT | |
| | | 2001 | 2002 | 2001 | 2002 | 2001 | 2002 | 2001 | 2002 |
| Unweeded | - | 12.95 | 13.56 | 15.19 | 15.85 | 8.96 | 9.02 | 9.02 | 11.13 |
| | | (167) | (183) | (230) | (250) | (79.7) | (80.8) | (80.8) | (123.8) |
| Hand weeding (20, | - | 0.71 | 3.23 | 0.71 | 0.71 | 0.71 | 1.17 | 1.17 | 0.71 |
| 40 & 60 DAT) | | (0.0) | (10) | (0.0) | (0.0) | (0.0) | (0.8) | (0.8) | (0.0) |
| MSM | 4 | 8.17 | 8.88 | 12.06 | 12.20 | 6.24 | 6.90 | 6.90 | 7.93 |
| | | (66) | (78) | (145) | (148) | (38.4) | (47.1) | (47.1) | (62.5) |
| MSM | 6 | 7.49 | 8.17 | 11.26 | 11.39 | 5.63 | 6.38 | 6.38 | 7.40 |
| | | (55) | (66) | (126) | (129) | (31.2) | (41.2) | (41.2) | (54.4) |
| MSM | 8 | 6.84 | 7.36 | 10.75 | 10.87 | 5.25 | 5.37 | 5.37 | 6.73 |
| | | (46) | (53) | (115) | (117) | (27.1) | (28.4) | (28.4) | (47.5) |
| CME | 10 | 7.90 | 8.71 | 11.30 | 11.89 | 5.77 | 6.03 | 6.03 | 7.58 |
| | | (62) | (75) | (127) | (141) | (32.9) | (36.0) | (36.0) | (57.0) |
| CME | 15 | 7.15 | 8.19 | 10.57 | 10.70 | 5.43 | 5.58 | 5.58 | 7.00 |
| | | (50) | (66) | (111) | (114) | (29.0) | (30.7) | (30.7) | (48.6) |
| CME | 20 | 5.08 | 5.70 | 10.07 | 10.14 | 3.91 | 3.89 | 3.89 | 6.44 |
| | | (25) | (32) | (101) | (102) | (14.8) | (14.6) | (14.6) | (41.1) |
| Almix | 15 | 7.28 | 8.01 | 11.08 | 11.68 | 5.57 | 5.85 | 5.85 | 7.10 |
| | | (52) | (63) | (122) | (136) | (30.5) | (33.7) | (33.7) | (50.0) |
| Almix | 20 | 5.55 | 6.98 | 8.84 | 9.99 | 4.15 | 4.46 | 4.46 | 5.79 |
| | | (30) | (48) | (77) | (99) | (16.8) | (19.4) | (19.4) | (33.1) |
| Almix | 25 | 4.64 | 5.02 | 7.36 | 7.51 | 2.90 | 3.89 | 3.89 | 5.25 |
| | | (21) | (24) | (53) | (56) | (7.9) | (14.7) | (14.7) | (27.1) |
| MSM+2, 4-DEE | 4+500 | 7.38 | 7.05 | 10.53 | 11.27 | 4.91 | 5.07 | 5.07 | 7.06 |
| | | (54) | (49) | (110) | (126) | (23.6) | (25.2) | (25.2) | (49.4) |
| CME+2, 4-DEE | 10+500 | 6.38 | 5.49 | 10.00 | 10.51 | 4.86 | 5.00 | 5.00 | 6.39 |
| | | (40) | (29) | (99) | (110) | (23.2) | (24.6) | (24.6) | (40.3) |
| Almix+2, 4-DEE | 15+500 | 1.87 | 2.86 | 6.72 | 7.45 | 1.90 | 2.20 | 2.20 | 5.24 |
| | | (3) | (7) | (44) | (55) | (3.1) | (4.3) | (4.3) | 27.0 |
| Anilofos | 500 | 6.54 | 7.69 | 10.45 | 10.67 | 5.34 | 5.48 | 5.48 | 6.86 |
| | | (42) | (58) | (108) | (117) | (28.1) | (29.6) | (29.6) | (46.7) |
| Anilofos+ | 400+ | 5.81 | 6.15 | 9.31 | 9.92 | 4.37 | 4.47 | 4.47 | 6.06 |
| 2, 4-DEE | 500 | (33) | (37) | (86) | (98) | (18.6) | (19.5) | (19.5) | (36.3) |
| LSD (P=0.05) | | 0.35 | 0.38 | 0.27 | 0.42 | 0.25 | 0.35 | 0.35 | 0.29 |

MSM–Metsulfuron-methyl, CME–Chlorimuron-ethyl, Almix–Combination of MSM+CME.
Original data given in parentheses were subjected to square root transformation before analysis.

## RESULTS AND DISCUSSION

### Effect on Weeds

The weed flora recorded in the experimental field were : *Echinochloa colona* (L.) Link (16.7%), *Echinochoa crusgalli* (L.) Baeuv (6%), *Cyperus rotundus* (L.) (24.9%), *Cyperus difformis* (L.) (8.7%), *Fimbristylis milliacea* Vahl (4.3%), *Ammenia baccifera* (L.) (14.6%) and *Ludwigia parviflora* (L.) (9.8%).

Weed density and their dry weight were significantly influenced due to weed control treatments (Table 1). Almix+2, 4-DEE (15+500 g $ha^{-1}$) was more effective in arresting weed population and their growth as compared to all other treatments. This was followed by alone application of Almix at 25 and 20 g $ha^{-1}$. The highest weed density and dry matter were recorded with metsulfuron-methyl at 4 g $ha^{-1}$, which was at par with chlorimuron-ethyl at 10 g $ha^{-1}$.

Table 2. Effect of treatments on grain and straw yield of rice

| Treatment | Dose (g ha$^{-1}$) | Grain yield (kg ha$^{-1}$) | | Straw yield (kg ha$^{-1}$) | |
|---|---|---|---|---|---|
| | | 2001 | 2002 | 2001 | 2002 |
| Unweeded | - | 3241 | 3052 | 4269 | 4110 |
| Hand weeding (20, 40 & 60 DAT) | - | 6029 | 5831 | 7290 | 7130 |
| MSM | 4 | 3629 | 3476 | 4802 | 4550 |
| MSM | 6 | 4264 | 4065 | 5486 | 5414 |
| MSM | 8 | 4629 | 4451 | 6213 | 5989 |
| CME | 10 | 3860 | 3750 | 5377 | 5277 |
| CME | 15 | 4310 | 4169 | 5714 | 5586 |
| CME | 20 | 4785 | 4714 | 6153 | 5994 |
| Almix | 15 | 4055 | 3869 | 5615 | 5505 |
| Almix | 20 | 5362 | 5320 | 6640 | 6537 |
| Almix | 25 | 5632 | 5502 | 6846 | 6660 |
| MSM+2, 4-DEE | 4+500 | 5090 | 4925 | 6420 | 6258 |
| CME+2, 4-DEE | 10+500 | 5173 | 5120 | 6463 | 6349 |
| Almix+2, 4-DEE | 15+500 | 5934 | 5740 | 7220 | 7045 |
| Anilofos | 500 | 4556 | 4319 | 5794 | 5643 |
| Anilofos+2, 4-DEE | 400+500 | 5339 | 5174 | 6521 | 6381 |
| LSD (P=0.05) | - | 94 | 118 | 192 | 268 |

**Effect on Crop**

Maximum grain yield of 5930 kg ha$^{-1}$ and minimum 3146 kg ha$^{-1}$ were obtained in season long weed-free and unweeded situation (Table 2). This increase in grain yield was 85.5% over unweeded check. Among herbicidal treatments, maximum grain yield (5837 kg ha$^{-1}$) was obtained with tank mixture of Almix+2, 4-DEE (15+500 g ha$^{-1}$), which was on par with hand weeding thrice. The minimum grain yield was obtained with metsulfuron-methyl at 4 g ha$^{-1}$. These results are in close conformity with the results reported by Bhattacharya *et al.* (2002). However, all the weed control treatments produced significantly higher grain yield than weedy check. A higher straw yield of 73% was registered with hand weeding thrice over the unweeded control. Almix+2, 4-DEE (15+500 g ha$^{-1}$) registered higher straw yield (7132 kg ha$^{-1}$) and significantly superior to rest other herbicidal treatments and was on par with hand weeding.

## REFERENCES


Battacharya, S. P., Sitangshu Sarkar, A. J. Kumakar and P. Bera, 2002. Weed management through sulfonyl urea herbicide and its effect on yield in transplanted rice. *Environ. and Ecol.* **20** : 426-428.

Singh, O. P. and V. M. Bhan, 1986. Effect of herbicides and water submergence level on control of weeds in transplanted rice. *Indian J. Weed Sci.* **18** : 226-230.