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# Effect of Almix and Butachlor Alone and in Combinations on Transplanted Rice and Associated Weeds

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## ABSTRACT

Almix alone at 4 g $ha^{-1}$ was effective in reducing the density of non-grasses and sedges in transplanted rice. Butachlor alone at 1250 g $ha^{-1}$ was effective against annual grasses. Almix at 4 g $ha^{-1}$ was compatible with butachlor as tank mixed application. Almix at 4 g $ha^{-1}$ as tank mixed or follow up application over pre-emergence application of butachlor increased weed control spectrum and efficacy and produced grain yields at par with weed-free and higher than alone application of butachlor or Almix.

## INTRODUCTION

Rice is predominant crop of India contributing 45% of the total food grain production. Weed management is one of the major factors which affects rice yield. Uncontrolled weeds cause a reduction of 35 to 55% of grain yield under transplanted conditions (Gautam and Mishra, 1995; Saikia and Purshothamam, 1996). Therefore, timely weed control is imperative for realizing desired level of productivity. Weed shift from grasses to non-grasses and annual sedges is being observed in transplanted rice fields due to continuous use of butachlor, anilofos and pretilachlor in major rice growing areas of the country. This undesirable ecological change in weed species and density is to be checked to avoid crop losses due to weeds. Such changes beyond a certain level may become unmanageable. Therefore, there is necessity that butachlor, which is being used as pre-emergence in transplanted rice on large scale, is supplemented with other herbicides as tank mixture or follow up application to widen weed control spectrum particularly with respect to non-grasses and annual sedges. Almix, ready mix formulation of metsulfuron-methyl and chlorimuron-ethyl may be one choice which has been found to be effective against non-grasses and sedges in transplanted rice and also having some effect of annual grasses. In the light of these facts, the present investigation was proposed to assess the effect of Almix and butachlor alone and in combinations on transplanted rice and associated weeds.

## MATERIALS AND METHODS

Field trial during rainy seasons of 2000 and 2001 at the Crop Research Centre of G. B. Pant University of Agriculture & Technology, Pantnagar, was conducted to evaluate the weed control efficacy of Almix and butachlor applied alone and in combinations as tank mixture and follow up application and their effect on transplanted rice. The soil of experimental field was clay loam in texture, medium in organic carbon (0.7%), available phosphorus (18 kg P $ha^{-1}$) and potassium (266 kg K $ha^{-1}$). The experiment with 11 treatments and three replications was laid out in randomized block design. The treatments consisted doses of Almix at 4 g a. i. $ha^{-1}$, butachlor at two doses applied alone, in combination with Almix as tank mixture and follow up application. All the herbicide treatments were applied as spray three days after rice transplanting (DAT) except that the follow up

application of Almix was done 21 DAT (Table 1). Anilofos and pretilachlor were included as standard checks alongwith weedy and weed-free treatments. The formulations used were Almix 20 WP and butachlor 50 EC. All the herbicides were applied as spray using 500 l of water per hectare. Rice variety Narendra 359 at spacing of 20 x 15 cm was transplanted on July 7, 2000 and July 8, 2001. All the recommended package of practices other than weed control was adopted to raise the experimental crop.

## RESULTS AND DISCUSSION

### Effect on Weeds

Weed flora in the experimental field consisted of *Echinochloa colona* (34.8%), *Cyperus* spp. (31.3%), *Caesulia axillaris* (21.6%) and *Commelina benghalensis* (12.3%). All the treatments caused reduction in the density of diferent weed species. in comparison to weedy check (Table 1). Almix at 4 g a. i. $ha^{-1}$ applied alone had more population of grassy weeds in comparison to butachlor alone or its tank mix application with Almix. The density of sedges and non-grassy weeds in Almix treated plots was less as compared to application of butachlor alone, anilofos and pretilachlor. Butachlor alone at 938 g $ha^{-1}$ was less effective on weeds than at 1250 g $ha^{-1}$. Tank mixed applications of Almix and butachlor were compatible and were more effective than application of butachlor or Almix alone. Total weed dry matter production (Table 2) was also reduced due to various treatments. Weed control efficacy was significantly higher in treatments of Almix+butachlor (4+1250 g a. i. $ha^{-1}$) and butachlor at 938 g $ha^{-1}$ superimposed with one weeding at 30 DAT than all other treatments. Almix+butachlor (4+938 g a. i. $ha^{-1}$), butachlor at 938 g $ha^{-1}$ followed by post-emergence application of Almix at 4 g $ha^{-1}$ 21 DAT had less weed dry matter production than butachlor alone at 1250 g $ha^{-1}$, anilofos at 375 g $ha^{-1}$ and pretilachlor at 625 g $ha^{-1}$. Weed control efficacy of Almix+butachlor at 4 g+938 g a. i. $ha^{-1}$ was significantly higher than butachlor alone at 1250 g $ha^{-1}$ (Table 2).

### Effect on Crop

None of the treatments had any toxicity on the rice crop in terms of crop stand, crop growth, yellowing, necrosis, scorching, epinasty and hyponasty. The differences in the number of crop shoots recorded at 60 DAT were non-significant due to various treatments (Table 2). Crop dry matter production was significantly affected due to

Table 1. Effect of treatments on weeds in transplanted rice (Mean of two crop seasons)

| Treatment | Dose (g $ha^{-1}$) | Stage of application (DAT) | Weed density (No. $m^{-2}$) 60 DAT | | | |
|---|---|---|---|---|---|---|
| | | | *E. colona* | *Cyperus* spp. | *C. axillaris* | *C. benghalensis* |
| Almix | 4 | 3 | 22 | 4 | 7 | 2 |
| Butachlor+Almix | 4+938 | 3 | 2 | 3 | 4 | 1 |
| Butachlor+Almix | 4+1250 | 3 | 1 | 3 | 6 | 2 |
| Butachlor | 938 | 3 | 8 | 38 | 23 | 12 |
| Butachlor | 1250 | 3 | 3 | 33 | 25 | 12 |
| Butachlor fb HW | 938 | 3 fb 30 | 2 | 7 | 21 | 9 |
| Butachlor fb Almix | 938 fb 4+Surf. | 3 fb 21 | 4 | 3 | 3 | 2 |
| Anilofos | 375 | 3 | 3 | 32 | 25 | 13 |
| Pretilachlor | 625 | 3 | 4 | 25 | 23 | 9 |
| Weed-free | - | - | 0 | 0 | 0 | 6 |
| Weedy | - | - | 47 | 42 | 29 | 17 |

Surf.–Surfactant Triton at 0.2%, fb–followed by, HW–Hand weeding.

Table 2. Effect of treatments on weed dry matter, crop growth and yield of rice

| Treatment | Dose (g ha$^{-1}$) | Stage of application (DAT) | Total weed dry weight (g m$^{-2}$) 60 DAT | | Crop shoots (No. m$^{-2}$) 60 DAT | | Crop dry weight (g m$^{-2}$) 60 DAT | | Rice grain yield (kg ha$^{-1}$) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 | 2000 | 2001 | Mean |
| Almix | 4 | 3 | 58.3 | 62.5 | 262 | 258 | 1518 | 1487 | 5008 | 4872 | 4940 |
| Butachlor+Almix | 4+938 | 3 | 7.3 | 5.8 | 281 | 284 | 1756 | 1762 | 6390 | 6200 | 6295 |
| Butachlor+Almix | 4+1250 | 3 | 5.7 | 4.8 | 293 | 297 | 1789 | 1790 | 6535 | 6285 | 6410 |
| Butachlor | 938 | 3 | 50.2 | 53.6 | 274 | 268 | 1645 | 1641 | 5387 | 4905 | 5146 |
| Butachlor | 1250 | 3 | 19.4 | 17.5 | 287 | 292 | 1684 | 1702 | 5852 | 5615 | 5734 |
| Butachlor fb HW | 938 | 3 fb 30 | 7.0 | 5.8 | 295 | 290 | 1786 | 1780 | 6615 | 6482 | 6549 |
| Butachlor fb Almix | 938 fb 4+Surf. | 3 fb 21 | 9.8 | 4.2 | 291 | 293 | 1792 | 1792 | 6305 | 6305 | 6304 |
| Anilofos | 375 | 3 | 20.4 | 18.7 | 289 | 290 | 1768 | 1765 | 5798 | 5680 | 5739 |
| Pretilachlor | 625 | 3 | 19.0 | 16.8 | 287 | 292 | 1767 | 1771 | 5892 | 5785 | 5839 |
| Weed-free | - | - | 0.0 | 0.0 | 296 | 298 | 1801 | 1792 | 6550 | 6405 | 6478 |
| Weedy | - | - | 278.4 | 248.5 | 231 | 227 | 1097 | 1081 | 1812 | 1705 | 1759 |
| LSD (P=0.05) | - | - | 10.2 | 9.3 | NS | NS | 107 | 102 | 481 | 415 | - |

Surf.–Surfactant Triton at 0.2%, fb–followed by, HW–Hand weeding.
NS–Not Significant.

treatments (Table 2). Minimum crop dry weight was observed in weedy check, which was significantly less than all other treatments. Crop dry matter production was significantly less in plots treated with butachlor alone at 938 g $ha^{-1}$ and 1250 g $ha^{-1}$ than butachlor at 938 or 1250 g $ha^{-1}$ supplemented with Almix at 4 g $ha^{-1}$, which were at par with weed-free treatment.

There was more than 72% reduction in the grain yield of rice in weedy check when compared with weed-free treatment (Table 2). All the treatments produced grain yields significantly more than the weedy check. Almix alone at 4 g a. i. $ha^{-1}$ and butachlor alone at 938 g $ha^{-1}$, being at par yielded significantly less than Almix+butachlor (4.0+938 g $ha^{-1}$ and 4.0+1250 g a. i. $ha^{-1}$). Almix as tank mixture with two doses of butachlor produced grain yields at par with weed-free treatment. Addition of Almix at 4 g a. i. $ha^{-1}$ as tank mixture with butachlor at 938 or 1250 g $ha^{-1}$ caused significant increase in grain yields over application of butachlor alone at these doses. Tank mixed combinations of Almix and butachlor at two doses produced similar grain yields. Post-emergence application of Almix at 4 g $ha^{-1}$ with surfactants (Triton at 2%) as follow up application over pre-emergence application of butachlor at 938 g $ha^{-1}$ or butachlor at 938 g $ha^{-1}$ supplemented with one weeding at 30 DAS produced grain yields similar to tank mixed application of butachlor, Almix and weed-free.

## REFERENCES


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