

Efficacy of Some New Herbicides in Wet Seeded Rice (*Oryza sativa* L.)

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ABSTRACT

Pyrazosulfuron-ethyl at 25 g ha⁻¹ applied 10 days after sowing (DAS) was found most effective, recording 85.8% reduction in dry matter of weeds and 54.6% higher grain yield over weedy check. The corresponding increase in grain yield was 45.7, 39.0 and 28.8% with pyrazosulfuron-ethyl at 20 g ha⁻¹ applied 10 DAS, two hand weedings done 20 and 40 DAS, and butachlor+safener at 1.00 kg ha⁻¹ applied 3 DAS, respectively.

INTRODUCTION

Rice with an area of 81.5 thousand hectare in Himachal Pradesh is grown under various toposequences at various elevations by different methods viz., transplanting, wet seeding (direct sowing of pre-sprouted seeds in puddled fields) and direct sowing of dry seeds in moist soil called *wattar* sowing or under dry conditions. Due to high labour requirement coupled with scarcity of labour for transplanting, wet seeding is more popular with the farmers in irrigated/water sufficient areas. As in direct seeded upland rice, wet seeded rice also suffers badly due to infestation of wide variety of grasses, sedges and broad leaf weeds. Notwithstanding the labour scarcity and increasing labour costs, weeding in rice under moist conditions is the last choice of the agricultural labourers which has given momentum to the use of herbicides for weed management in rice. Of late, the increased emphasis has also been witnessed on the use of low dose high efficacy herbicides capable of controlling mixed weed flora (Moorthy, 2002). Keeping this in view, the present investigation was undertaken to evaluate some herbicides with safeners.

MATERIALS AND METHODS

Field experiment was conducted in **kharif** 2002 and 2003 at CSK HPKV Rice and Wheat Research Centre, Malan (76°2' E, 32° 1' N and 950 m above mean sea level). Nine treatments comprising seven herbicide treatments viz., butachlor+safener 47.6 EC at 1000 g a. i. ha⁻¹ at three days after sowing,

pretilachlor+safener 45 EC at 500 and 750 g a. i. ha⁻¹ at 7 DAS, pyrazosulfuron-ethyl 5 WP at 20 and 25 g a. i. ha⁻¹ at 10 DAS, almix 20 WP+surfactant (0.2%) at 4 g a. i. ha⁻¹ at 20 and 25 DAS, a hand weeding treatment (done at 20 and 40 days after sowing) and a weedy check (Table 1) were tested in randomized block design. The soil of the experimental site was silty clay loam in texture, acidic (pH 5.7) in reaction, and medium in available nitrogen, phosphorus, potash and organic carbon. Pre-sprouted seeds of cultivar RP 2421 were broadcast in puddled fields on July 1 and 10 in respective years at 100 kg seeds (dry) ha⁻¹. Application of 45 kg N (through urea 46%), 40 kg P₂O₅ (through SSP 16%) and 40 kg K₂O (through MOP 60%) was done at the time of last puddling and remaining 45 kg N was top dressed in two equal splits at tillering and panicle initiation stages. The herbicides were applied with a knapsack sprayer with flat fan nozzle using 750 litre water ha⁻¹. The data on weed density and dry weight were recorded at flowering stage of the crop.

RESULTS AND DISCUSSION

Effect on Weeds

The predominant weed flora comprised *Monochoria vaginalis* (23.5%), *Bonnaya veronicaefolia* (18.3%), *Cyperus iria* (13.3%), *Echinochloa colona* (11.5%), *Fimbristylis miliacea* (11.3%), *Paspalum paspalodes* (7.0%), *Cyperus difformis* (4.1%), and *Commelina benghalensis* (3.0%) and remaining 8.0% of other weeds. The infestation was much higher during 2003 compared

Table 1. Effect of different treatments on weed density and dry matter

| Treatment | Dose (g a. i. ha ⁻¹) | Stage of application (DAS) | Weed dry weight (g m ⁻²) | | Weed density (No. m ⁻²) | | | | | | Weed control rating | |
|---------------------------|-------------------------------------|----------------------------------|--|-------|-------------------------------------|--------------|----------------|----------------|--------------|--------------|------------------------|-------------|
| | | | 2002 | 2003 | 2002 | | 2003 | | 2002 | 2003 | | |
| | | | | | BLW | Sedges | Grass | Grass | | | | |
| Butachlor+ | 1000 | 3 | 16.6 | 65.3 | 4.35 (19) | 3.93 (15) | 3.26 (11) | 12.07 (146) | 5.13 (26) | 4.92 (24) | 2.87 (8) | 2.70 (7) |
| Safener 47.6 EC | 500 | 7 | 23.0 | 158.0 | 4.65 (22) | 4.20 (18) | 3.39 (12) | 13.83 (190) | 4.85 (24) | 6.48 (42) | 2.78 (8) | 1.72 (3) |
| Pretilachlor+ | 750 | 7 | 23.7 | 155.0 | 5.03 (25) | 4.03 (16) | 3.74 (14) | 12.33 (154) | 3.65 (13) | 6.93 (48) | 2.74 (7) | 1.80 (3) |
| Safener 45 EC | 20 | 10 | 10.8 | 12.7 | 4.40 (19) | 3.93 (15) | 3.63 (13) | 3.93 (17) | 1.00 (1) | 5.23 (28) | 2.96 (8) | 3.11 (9) |
| Pyrazosulfuron-ethyl 5 WP | 25 | 10 | 15.7 | 22.7 | 5.26 (28) | 3.94 (16) | 3.71 (14) | 5.25 (28) | 1.72 (4) | 5.97 (37) | 2.91 (8) | 3.02 (9) |
| Pyrazosulfuron-ethyl 5 WP | 4 | 20 | 25.2 | 58.7 | 4.72 (22) | 3.90 (15) | 4.07 (17) | 4.91 (25) | 6.87 (46) | 6.05 (37) | 2.91 (8) | 3.00 (9) |
| Almix 20 WP+ | 4 | 25 | 22.0 | 75.3 | 4.95 (25) | 3.20 (10) | 3.31 (11.0) | 6.15 (39) | 6.89 (48) | 6.82 (47) | 2.91 (8) | 2.91 (8) |
| Surfactant 0.2% | 20 & 40 | | 18.1 | 11.7 | 5.23 (28) | 4.08 (17) | 2.10 (4) | 12.45 (156) | 4.39 (19) | 3.46 (12) | 2.91 (8) | 2.94 (9) |
| Hand weeding | | | 62.5 | 208.7 | 8.64 (75) | 6.28 (40) | 6.30 (40) | 16.80 (282) | 8.92 (80) | 7.74 (60) | 1.00 (1) | 1.14 (1) |
| Weedy | | | 6.0 | 25.4 | 0.86 (40) | 0.57 (40) | 0.60 (40) | 1.78 (282) | 1.09 (80) | 1.27 (60) | 0.14 (1) | 0.34 (1) |
| LSD (P=0.05) | | | | | | | | | | | | |

DAS-Days after sowing, BLW-Broad leaf weeds. Figures in parentheses correspond to the original values of the data.

Table 2. Effect of treatments on yield attributes and yield of rice

| Treatment | Dose (g a. i. ha ⁻¹) | Stage of application (DAS) | Panicles (No. m ⁻²) | | Panicle weight (g) | | Grain yield (kg ha ⁻¹) | | |
|-----------------------------|-------------------------------------|----------------------------------|------------------------------------|------|-----------------------|------|------------------------------------|------|------|
| | | | 2002 | 2003 | 2002 | 2003 | 2002 | 2003 | Mean |
| | | | Butachlor+Safener 47.6 EC | 1000 | 3 | 514 | 394 | 1.74 | 1.75 |
| Pretilachlor+Safener 45 EC | 500 | 7 | 503 | 401 | 1.74 | 1.65 | 4217 | 2806 | 3511 |
| Pretilachlor+Safener 45 EC | 750 | 7 | 541 | 399 | 1.84 | 1.75 | 4212 | 3222 | 3717 |
| Pyrazosulfuron-ethyl 5 WP | 20 | 10 | 504 | 392 | 2.02 | 1.76 | 4805 | 3417 | 4111 |
| Pyrazosulfuron-ethyl 5 WP | 25 | 10 | 562 | 407 | 1.88 | 1.74 | 4667 | 4056 | 4361 |
| Almix 20 WP+Surfactant 0.2% | 4 | 20 | 634 | 418 | 1.78 | 1.69 | 4397 | 3028 | 3712 |
| Almix 20 WP+Surfactant 0.2% | 4 | 25 | 577 | 394 | 1.85 | 1.71 | 4429 | 3167 | 3798 |
| Hand weeding | | 20 & 40 | 526 | 371 | 1.84 | 1.80 | 4397 | 3442 | 3919 |
| Weedy | | | 434 | 246 | 1.60 | 1.49 | 3836 | 1806 | 2821 |
| LSD (P=0.05) | | - | 80 | 63 | 0.16 | 0.18 | 288 | 60 | - |

DAS=Days after sowing.

to 2002. All the treatments significantly reduced the density of BLW, sedges and grass weeds except that of grassy weeds in weedy check and pretilachlor+safener (500 and 750 g ha⁻¹) and almix+surfactant 0.2% at 25 DAS which was statistically equal during second year (Table 1). Different weed control treatments resulted in significantly lower dry weight as compared to weedy check. Pyrazosulfuron-ethyl at 20 or 25 g ha⁻¹ recorded lowest dry weight during 2003, being at par with two hand weedings at 20 and 40 days after sowing. Similar trend was observed during 2002 when butachlor+safener was also at par. The effect of pyrazosulfuron-ethyl on the population of sedges was more pronounced during second year.

Effect on Crop

Significant increase in the number of panicles per unit area and panicle weight was brought by different weed control treatments as compared to weedy check (Table 2). Pyrazosulfuron-ethyl recorded panicle number at par with that of butachlor+safener (existing recommendation). Significantly more yield was produced by different

weed control treatments over weedy check. Pyrazosulfuron-ethyl at 25 g ha⁻¹ 10 DAS, pyrazosulfuron-ethyl at 20 g ha⁻¹ 10 DAS, almix+surfactant 0.2% at 4 g ha⁻¹ 25 DAS and butachlor+safener at 1.0 kg ha⁻¹ brought 54.6, 45.7, 34.6 and 28.8% increase in grain yield, respectively, over weedy check, whereas corresponding increase by two hand weedings treatment was 39.0%. Higher efficacy of pyrazosulfuron-ethyl has also been reported by Moorthy (2002) for wet seeded rice, and Chopra and Chopra (2003) and Shekhar *et al.* (2004) for transplanted rice.

REFERENCES

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