Performance of Tank Mixtures of Chlorsulfuron and Dinitroaniline Herbicides for the Control of Weeds in Wheat

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ABSTRACT

Alone application of chlorsulfuron at lower doses (20 and 30 g ha⁻¹) was not effective against *Phalaris minor* but it was at par with sulfosulfuron in reducing the broad leaf weeds at lowest (20 g ha⁻¹) dose. Tank mixture of chlorsulfuron either with pendimethalin or trifluralin at 1430+70 g ha⁻¹ provided effective control of both *P. minor* and broad leaf weeds. The number of spikes and wheat yield increased with the increase in dose of chlorsulfuron from 20-40 g ha⁻¹. Tank mixture of pendimethalin or trifluralin with chlorsulfuron did not increase grain yield of wheat over their alone application at corresponding doses.

INTRODUCTION

Due to continuous use of one herbicide, there are possibilities of acquiring of resistance by some weeds (Malik and Malik, 1994). To increase the spectrum of weed control and for avoidance of evolution of resistance in weeds, mixtures of herbicides with different target sites are recommended (Bayer *et al.*, 1987). Use of some herbicides also enhances shift of weed flora towards difficult to control weed species. Experiment with herbicide mixture of chlorsulfuron and dinitroanilines was conducted in the light of above facts for the management of *Phalaris minor* and other weeds of wheat.

MATERIALS AND METHODS

A field experiment was conducted at CCS Haryana Agricultural University Regional Research Station, Karnal using wheat cv. PBW 343 in a randomized block design, replicated thrice. Crop was sown on November 11, 1999 and November 22, 2000 and harvested on April 20 in both the years. Various doses of chlorsulfuron alone and as tank mixture with pendimethalin and trifluralin were compared with sulfosulfuron, weedy and weed-free checks (Table 1). Sulfosulfuron was applied 35 DAS, whereas all other herbicides were applied pre-emergence. All the herbicides were sprayed by knapsack sprayer using flat fan nozzle at spray volume of 300 l ha⁻¹. Recommended doses of fertilizers and irrigations were uniformly applied.

RESULTS AND DISCUSSION

Effect on Weeds

The field was dominated with *P. minor* and other broad leaf weeds such as *Rumex dentatis*, *Anagallis arvensis*, *Melilotus indica* and *Medicago denticulata* were also present at small scale. Application of chlorsulfuron at 40 g ha⁻¹ significantly decreased the density of *P. minor* compared to its lower dose (30 g ha⁻¹) but proved inferior to sulfosulfuron. However, chlorsulfuron at 30 g ha⁻¹ was at par with sulfosulfuron in reducing the density of broad leaf weeds.

Tank mixture of chlorsulfuron either with pendimethalin or trifluralin provided similar control of weeds. Lowest weed dry weight was recorded with trifluralin+chlorsulfuron (1950+50 g ha⁻¹). Chlorsulfuron at 50 g ha⁻¹, pendimethalin or trifluralin at 2000 g ha⁻¹, pendimethalin/trifluralin at 1960+40 g ha⁻¹ and trifluralin+chlorsulfuron at 1470+30 g ha⁻¹ provided significant reduction in dry weight of weeds and were at par with sulfosulfuron at 25 g ha⁻¹. Reduction in dry weight
<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (g ha(^{-1}))</th>
<th>Weed density (No. (m^{-2}))</th>
<th>Phalaris minor</th>
<th>Total weed density (No. (m^{-2}))</th>
<th>Total weed dry weight (g (m^{-2}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorsulfuron</td>
<td>20</td>
<td>6.60 (43)</td>
<td>6.87 (47)</td>
<td>1.97 (3)</td>
<td>2.30 (4)</td>
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<td>Chlorsulfuron</td>
<td>30</td>
<td>5.58 (30)</td>
<td>5.97 (35)</td>
<td>1.79 (2)</td>
<td>1.97 (3)</td>
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<tr>
<td>Chlorsulfuron</td>
<td>40</td>
<td>4.45 (19)</td>
<td>5.26 (27)</td>
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<td>1.82 (2)</td>
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<td>Chlorsulfuron</td>
<td>50</td>
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<td>4.22 (17)</td>
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<td>1.52 (1)</td>
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<tr>
<td>Pendimethalin</td>
<td>1500</td>
<td>3.57 (12)</td>
<td>3.73 (13)</td>
<td>2.87 (7)</td>
<td>2.81 (7)</td>
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<tr>
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<td>2000</td>
<td>3.32 (10)</td>
<td>3.39 (11)</td>
<td>3.00 (8)</td>
<td>2.63 (6)</td>
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<tr>
<td>Pendimethalin+Chlorsulfuron</td>
<td>980+20</td>
<td>4.10 (16)</td>
<td>3.97 (15)</td>
<td>1.82 (2)</td>
<td>2.49 (5)</td>
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<tr>
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<td>3.15 (9)</td>
<td>3.59 (12)</td>
<td>1.82 (0)</td>
<td>1.82 (3)</td>
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<tr>
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<td>1960+40</td>
<td>2.73 (5)</td>
<td>2.43 (5)</td>
<td>1.52 (1)</td>
<td>1.52 (1)</td>
</tr>
<tr>
<td>Trifluralin</td>
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<td>2.80 (7)</td>
<td>2.82 (7)</td>
<td>2.81 (7)</td>
<td>2.98 (8)</td>
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<td>2.63 (6)</td>
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<td>3.15 (9)</td>
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<td>4.59 (7)</td>
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<td>1.52 (1)</td>
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<td>4.21 (17)</td>
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<td>1.52 (1)</td>
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<td>1.52 (1)</td>
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<tr>
<td>Sulfosulfuron</td>
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<td>2.43 (5)</td>
<td>2.36 (5)</td>
<td>1.82 (3)</td>
<td>1.99 (3)</td>
</tr>
<tr>
<td>Weedy</td>
<td>-</td>
<td>9.47 (89)</td>
<td>10.61 (112)</td>
<td>3.59 (12)</td>
<td>3.73 (13)</td>
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<tr>
<td>Weed-free</td>
<td>-</td>
<td>1.00 (0)</td>
<td>1.00 (0)</td>
<td>1.00 (0)</td>
<td>1.00 (0)</td>
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<td>LSD (P=0.05)</td>
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<td>0.57</td>
<td>0.69</td>
<td>0.35</td>
<td>0.29</td>
</tr>
</tbody>
</table>

LSD (P=0.05)
Table 2. Effect of tank mixture of chlorsulfuron and dinitroaniline herbicides on spikes and yield of wheat

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (g ha&lt;sup&gt;-1&lt;/sup&gt;)</th>
<th>Spikes (No. m&lt;sup&gt;-2&lt;/sup&gt;)</th>
<th>Grain yield (kg ha&lt;sup&gt;-1&lt;/sup&gt;)</th>
</tr>
</thead>
</table>

was higher with the increase in proportion of chlorsulfuron in tank mixture of trifluralin+chlorsulfuron at all the doses.

**Effect on Yield**

Highest grain yield of wheat was recorded with weed-free treatment followed by sulfsulfuron at 25 g ha<sup>-1</sup>, tank mixture of pendimethalin+chlorsulfuron (1470+30 g ha<sup>-1</sup>), pendimethalin alone at 2000 g ha<sup>-1</sup> and trifluralin+chlorsulfuron at 1470+30 g ha<sup>-1</sup>, which was significantly higher than other treatments (Table 2). The number of spikes also showed similar trends as the yield of wheat. Sulfsulfuron produced highest number of spikes. No differences in the yield were observed in the mixture of pendimethalin or trifluralin with chlorsulfuron when averaged over treatments. Weedy check plots resulted in lowest crop yield (3967 kg ha<sup>-1</sup>), which was 29% lower than weed-free plots. Similarly, number of spikes was also found lowest in weedy plots.

**REFERENCES**
