EVALUATION OF PRE-EMERGENCE HERBICIDES USED FOR CONTROLLING WEEDS IN TRANSPLANTED RICE

Mazher Farid Iqbal and Rab Nawaz*

ABSTRACT

The study was conducted during Kharif 2010-11 at Adaptive Research Farm, Gujranwala, Pakistan to evaluate butachlor orthosulfamuran and pretilachlor used 5 days after transplanting of rice as pre-emergence herbicides for controlling narrow, broad leaves and sedges type of weeds in transplanted rice. The experiment was laid out in RCBD comprising four treatments T₁ (Control), T₂ (Butachlor 2000 ml/ha) T₃ (Orthosulfamuran 150g/ha) and T₄ (Pretilachlor 1000 g/ha) with three replications. Statistically significant effect in yield was recorded in T₂ (4.57t/ha) followed by T₃ (4.21t/ha) and T₄ (3.95t/ha) compared to T₁ (2.97t/ha) during 2010. However significant effect in yield was recorded by T₂ (4.37t/ha) followed by T₃ (4.11t/ha) and T₄ (3.81t/ha) compared to T₁ (2.99t/ha) during 2011. The economic analysis of different weed control treatments depicted that maximum economic return was recorded in T₂ (Rs.18664/ha) with CBR (1:1.73); during 2010-2011. It was concluded that orthosulfamuran 5DAT is most effective against all types of weeds in transplanted rice.

KEYWORDS:  Oryza sativa L.; pre-emergence; herbicides; cost benefit ratio; Gujranwala; Pakistan.

INTRODUCTION

Rice (Oryza sativa L.) is an important cereal, ranking third, after cotton and wheat crops in Pakistan (2). However it not only meets the domestic requirements but is also source of foreign exchange earnings. It is grown on an area of 1.98 million hectares with total annual production of 3.64 million tons and average yield of 1842 kg per hectare (1).

It is the main livelihood of rural population living in subtropical and tropical Asia and hundreds of millions people living in Africa and Latin America. A number of energy rich compounds such as carbohydrates, fat, protein and reasonable amount of iron, calcium, thiamine, riboflavin and niacin are found in rice (9).

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The area under rice crop during 2010-11 was decreased by 2.5 percent, but the yield was improved by 4.9% at national level due to favorable weather conditions and no attack of pest and diseases (3).

There are so many factors responsible for low yield but weed infestation is major production constraint. Weeds can reduce rice yield by competing for nutrients, light and moisture during the growing season. Reduction in paddy yield due to weed infestation ranges between 17.00-86.70 percent depending upon weed species and level of infestation (10, 16).

The weed intensity reduction due to weedicides application ranged between 59.38-78.12 percent. After weedicides application paddy yield also increased from 31.75-78.95 percent as compared to control (6).

Present study was conducted at Gujranwala to evaluate the performance of three pre-emergence herbicides applied after transplanting of rice.

MATERIALS AND METHODS

The study was conducted at Adaptive Research Farm, Gujranwala, Pakistan to compare three pre-emergence herbicides (Butachlor, orthosulfamuron and pretetchlor) used for controlling narrow, broad leaved and sedge type weeds during Kharif, 2010-11. DAP @ 125 kg per hectare along with SOP @ 125 kg per hectare was applied after puddling of soil just before planking. Nursery of super basmati was transplanted maintaining P x P distance 9 inches and assured 200,000 plant population/hectare. Pre-emergence herbicides were applied 5 days after transplantation (DAT) with shaker bottle and water level was maintained at 3 inches and over flooding from one field to other was stopped. Crystalline zinc sulphate 21 percent was applied @ 25 kg per hectare, 25 days after transplantation. Nitrogen was applied @ 150 kg per hectare in two splits at 30-35 DAT and 55-60 DAT. Two split doses of cartap monohydrate were also applied in the field @ 22.5 kg per hectare after 60 and 90 DAT and copper hydro-oxide was sprayed in the field for controlling diseases. The experiment was laid-out in RCBD with three replications and four treatments i.e. T1 (control), T2 (Butachlor 2000 ml/ha) T3 (Orthosulfamuron 150 g/ha) and T4 (Pretetchlor 1000 g/ha). All other agronomic practices and plant protection measures were kept constant in all treatments to avoid biasness. The parameters measured were weeds mortality (%), number of tillers per plant, 1000 grain weight (g), grain yield (t/ha) and cost benefit ratio. Weed population was recorded 35 DAT from three randomly selected places with one meter square ring. The data on yield parameters and paddy yield were recorded at the time of harvesting. The cost benefit ratio was computed on the basis of prevailing rates of inputs and yield.

RESULTS AND DISCUSSION

Weeds mortality (%)

Fig. 1 depicted that maximum weed mortality was recorded in T2 (91.23%) followed by T3 (83.16%) and T4 (78.89%) during kharif 2010 compared to untreated weed infested control (0%). However maximum weed mortality was recorded in T2 (88.25%) followed by T3 (78.95%) and T4 (72.81%). These results are in line with earlier studies (6, 8, 13, 14). Ali et al. (5) reported that butachlor gave statistically similar control against weeds populated in transplanted rice. Narayanan et al. (11) reported that the performance of various pre-emergence herbicides showed that pretiachlor (0.4 kg/ha) gave the highest control of weeds followed by butachlor.

Number of productive tillers/plant

Fig. 2 revealed that maximum productive tillers (Pt) was recorded in T2 (34.98/plant) followed by T3 (29.17/plant) and T4 (26.11/plant) compared to T1 (16.29/plant) during kharif 2010. Similarly higher Pt was recorded in T2 (32.25/plant) followed by T3 (28.45/plant) and T4 (25.90/plant). However the lowest Pt was recorded in control (15.10/plant). These results are in line with those of Sharma and Upadhaya (14) and Singh et al. (16).
1000 grain weight (g)

Data (Fig. 3) showed that significantly higher 1000 grain weight was recorded in T2 (24.38g) followed by T3 (22.07g) and T4 (17.38g) compared to that of T1 (13.55 g) during kharif 2010. During kharif 2011, statistically higher 1000 grain weight was recorded in T2 (23.61g) followed by T3 (21.53g) and T4 (18.70g). However the lowest weight was recorded control in T1 (14.60g). These results agreed with previous studies that weeds competition affected 1000 grain weight (5, 6, 13).

Paddy yield (t/ha)

The data presented in Table 1, showed highly significant difference in yield was recorded in T2 (4.57t/ha) followed by T3 (4.21 t/ha) and T4 (3.95 t/ha) compared to T1 (2.97t/ha) during 2010. However significant difference in yield was recorded in T2 (4.37t/ha) followed by T3 (4.11t/ha) and T4 (3.81t/ha) compared to T1 (2.99t/ha) during 2011. Weed control resulted in better utilization of soil nutrients by crop plants having maximum productive tillers, higher number of grains per panicle and heavier grains ultimately giving higher yield. Similar results were reported by earlier scientists (5, 7, 13, 14).

Economic analysis

The data presented in Table 1 depicted that maximum economic return was recorded in T2 (Rs.18664/ha) followed by T3 (Rs.9663/ha) and T4 (Rs. 1597/ha) with CBR (1:1.73); (1:1.38) and (1:1.06), respectively during 2010-11. The cost benefit ratio for these herbicides was comparable with earlier scientists (4, 5, 7, 15).
**Evaluation of pre-emergence herbicides for weed control in rice**

Table 1. Yield and economic analysis of pre-emergence herbicides in rice during 2010 and 2011.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Yield (t/ha)</th>
<th>Mean yield (t/ha)</th>
<th>Additional yield over control (t/ha)</th>
<th>Additional income (Rs/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
<td>2011</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T₁ = Control</td>
<td>2.97d</td>
<td>3.02d</td>
<td>2.99d</td>
<td>-</td>
</tr>
<tr>
<td>T₂ = Butachlor @ 2000ml/ha</td>
<td>4.57a</td>
<td>4.37a</td>
<td>4.47a</td>
<td>1.48</td>
</tr>
<tr>
<td>T₃ = Orthosulfamuron @ 150g/ha</td>
<td>4.21b</td>
<td>4.11b</td>
<td>4.18b</td>
<td>1.17</td>
</tr>
<tr>
<td>T₄ = Pretiachlor @ 1000g/ha</td>
<td>3.95c</td>
<td>3.81c</td>
<td>3.88c</td>
<td>0.89</td>
</tr>
</tbody>
</table>

LSD @ 0.05% 0.045 0.100 0.043, Calculation based on paddy @ Rs. 30000/t.

**CONCLUSION**

It was concluded that all the herbicides were effective for controlling weeds. However, orthosulfamuran was found to be most effective against all types of weeds in transplanted rice. The farmers are advised to use new chemistry i.e. orthosulfamuran 5 days after transplanting the rice for weed control.

**REFERENCES**


Received: January 20, 2014   Accepted: December 10, 2014