Echinochloa spp. is a very problematic weed in rice nursery and difficult to control by manual weeding because of its morphological similarity with rice. It usually emerges before or along with rice and outgrows crop plants and results in weaker seedlings of rice and also gets transplanted with rice seedlings. Therefore, maintenance of weed free nursery is a prerequisite for transplanted rice cultivation in order to ensure good seedling vigour in rice and also to reduce early weed competition in main field. In past several reports on the use of pre emergence herbicides such as thiobencarb, butachlor, pretiIachlor, anilophos etc. were found to be effective in rice nursery with varying degrees of control and selectivity (Hari Om et al., 1993; Narasimha et al., 1999; Venkataraman et al., 2000). However, the information about the control of Echinochloa spp. by using new pre and post emergence herbicides is scanty. Keeping this in view, the present investigation was conducted to study the effect of some new pre and post emergence herbicides on Echinochloa spp. control in rice nursery.

**MATERIALS AND METHODS**

A field experiment comprising of eight treatments as presented in Table 1 was conducted in randomized block design with three replications during Kharif 2003 and 2004 at rice fallow pulses project area of Regional Agricultural Research Station of ANGRAU, Lam, Guntur, A.P. The soil of the experimental plot was clay loam with a pH of 8.0. The seeds of rice Cultivar. Samba Mashuri (BPT 5204) at 50 kg ha⁻¹ and Echinochloa spp. seeds at 10 kg ha⁻¹ were mixed thoroughly and were broadcasted uniformly on the upper surface of soil in 2 X 2 m size plots. The rice and Echinochloa seeds were intermixed with soil in the upper 2 to 3 cm layer. The plots were irrigated immediately after sowing and pre-emergence herbicides were applied on 3 DAS and post-emergence herbicides on 14 DAS by using a spray volume of 500 l ha⁻¹. All the recommended package of practices other than weed control were followed. Phytotoxicity rating was made on 7 days after treatment (DAT) and 30 DAS. Observations on seedling density, weed density, dry weight of crop and weed were recorded from two randomly selected spots of 0.25 m² size from each plot at 7 DAT and 30 DAS.

**RESULTS AND DISCUSSION**

**Effect on weeds**

The dominant weed during both the years was Echinochloa colonum (>90%). However Echinochloa crus-galli, Cyperus rotundus, Commelina benghalensis, Phyllanthus niruri were also present. All the herbicide treatments significantly recorded lower density and dry weight of Echinochloa spp over unweeded check at both stages of the observation (Table 1). At 30 DAS all the post emergence herbicides achieved excellent control.
Table 1: Effect of different treatments on density and dry weight of *Echinochloa* spp. in rice nursery (pooled data of 2003 and 2004)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (gha⁻¹)</th>
<th>Time of application (DAS)</th>
<th>Echinochloa density (No/ 0.25 m²) at 7DAT</th>
<th>Echinochloa density (No/ 0.25 m²) at 30DAS</th>
<th>WCE % at 7DAT</th>
<th>WCE % at 30DAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁ Un weeded check</td>
<td>-</td>
<td>-</td>
<td>6.37(40.17)</td>
<td>7.83(60.83)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T₂ Hand weeding</td>
<td>-</td>
<td>15</td>
<td>2.41(5.33)</td>
<td>4.80(22.50)</td>
<td>1.50(1.75)</td>
<td>2.68(6.85)</td>
</tr>
<tr>
<td>T₃ Pretilachlor + Safener</td>
<td>500</td>
<td>3</td>
<td>2.58(6.50)</td>
<td>3.47(11.67)</td>
<td>1.23(1.03)</td>
<td>1.95(3.33)</td>
</tr>
<tr>
<td>T₄ Pyrazosulfuron ethyl</td>
<td>20</td>
<td>3</td>
<td>2.83(7.50)</td>
<td>3.18(9.67)</td>
<td>1.26(1.11)</td>
<td>1.86(3.03)</td>
</tr>
<tr>
<td>T₅ Oxadiargyl</td>
<td>80</td>
<td>3</td>
<td>2.41(5.30)</td>
<td>2.48(5.67)</td>
<td>1.18(0.92)</td>
<td>1.78(2.70)</td>
</tr>
<tr>
<td>T₆ Fenoxaprop-p-ethyl</td>
<td>56</td>
<td>14</td>
<td>1.21(1.00)</td>
<td>0.81(0.18)</td>
<td>0.76(0.08)</td>
<td>0.74(0.05)</td>
</tr>
<tr>
<td>T₇ Clodinafop propargyl</td>
<td>53</td>
<td>14</td>
<td>1.58(2.17)</td>
<td>1.10(0.83)</td>
<td>0.89(0.29)</td>
<td>0.86(0.25)</td>
</tr>
<tr>
<td>T₈ Cyhalofop butyl</td>
<td>100</td>
<td>14</td>
<td>1.28(1.17)</td>
<td>0.98(0.50)</td>
<td>0.87(0.26)</td>
<td>0.80(0.10)</td>
</tr>
<tr>
<td>SEM⁺</td>
<td>-</td>
<td>-</td>
<td>0.22</td>
<td>0.17</td>
<td>0.08</td>
<td>0.16</td>
</tr>
<tr>
<td>CD (P=0.05)</td>
<td>-</td>
<td>-</td>
<td>0.65</td>
<td>0.51</td>
<td>0.3</td>
<td>0.49</td>
</tr>
</tbody>
</table>

Note: DAS: Days after sowing DAT: Days after transplantation. WCE: Weed control efficiency; Data transformed to (X+0.5)^1/2 transformation. Figures in parenthesis are original values.

Table 2: Effect of different treatments on density and dry weight of rice (pooled data of 2003 and 2004)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Dose (gha⁻¹)</th>
<th>Time of application (DAS)</th>
<th>%crop injury</th>
<th>Density of rice (No/ 0.25 m²) at 7DAT</th>
<th>Density of rice (No/ 0.25 m²) at 30DAS</th>
<th>Dry weight of rice (g/ 0.25 m²) at 7DAT</th>
<th>Dry weight of rice (g/ 0.25 m²) at 30DAS</th>
<th>Cost of treatment (Rs. ha⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁ Un weeded check</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>639.5</td>
<td>552.8</td>
<td>24.7</td>
<td>115</td>
<td>-</td>
</tr>
<tr>
<td>T₂ Hand weeding</td>
<td>-</td>
<td>15</td>
<td>-</td>
<td>651</td>
<td>539.4</td>
<td>34.5</td>
<td>180.8</td>
<td>3400</td>
</tr>
<tr>
<td>T₃ Pretilachlor + Safener</td>
<td>500</td>
<td>3</td>
<td>10</td>
<td>643</td>
<td>568.3</td>
<td>30.5</td>
<td>134.2</td>
<td>1135</td>
</tr>
<tr>
<td>T₄ Pyrazosulfuron ethyl</td>
<td>20</td>
<td>3</td>
<td>-</td>
<td>652.2</td>
<td>559.3</td>
<td>30.5</td>
<td>129.5</td>
<td>850</td>
</tr>
<tr>
<td>T₅ Oxadiargyl</td>
<td>80</td>
<td>3</td>
<td>-</td>
<td>649.7</td>
<td>564.8</td>
<td>31.3</td>
<td>142.5</td>
<td>810</td>
</tr>
<tr>
<td>T₆ Fenoxaprop-p-ethyl</td>
<td>56</td>
<td>14</td>
<td>10</td>
<td>630.7</td>
<td>551.8</td>
<td>29.5</td>
<td>146.7</td>
<td>1170</td>
</tr>
<tr>
<td>T₇ Clodinafop propargyl</td>
<td>53</td>
<td>14</td>
<td>10</td>
<td>643</td>
<td>552.8</td>
<td>29.2</td>
<td>148.3</td>
<td>1600</td>
</tr>
<tr>
<td>T₈ Cyhalofop butyl</td>
<td>100</td>
<td>14</td>
<td>-</td>
<td>656.5</td>
<td>7.8</td>
<td>34.8</td>
<td>154.8</td>
<td>1500</td>
</tr>
<tr>
<td>SEM⁺</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16.29</td>
<td>21.89</td>
<td>1.26</td>
<td>5.6</td>
<td>-</td>
</tr>
<tr>
<td>CD (P=0.05)</td>
<td>-</td>
<td>-</td>
<td>NS</td>
<td>NS</td>
<td>6.79</td>
<td>17.07</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: DAS: Days after sowing DAT: Days after treatment
of *Echinocloa* by recording 85 to 87 percent WCE. Where as, the pre emergence recorded a WCE of 65 to 69 percent. At both stages of observation, herbicide treatments were found to be superior to hand weeding treatment.

**Effect on crop**

The visual rating on phytotoxicity of herbicides recorded at 7 DAT indicated that pre emergence application of pretillachlor 500 g ha⁻¹ + safener, post emergence application of fenoxaprop-p-ethyl 56 g ha⁻¹ and clodinafop propargyl 53 g ha⁻¹ applied at 14 DAS caused initial injury of crop showing pale yellow, tip burning *etc.* (Table 2). However, the crop completely recovered within two weeks after spray. The post emergence herbicide, cyhalofopbutyl 100 g ha⁻¹ applied at 14 DAS did not cause any crop injury besides its excellent control of *Echinocloa*. All the herbicide treatments have significantly influenced dry weight of rice seedlings over unweeded check at both stages of observation. Among the herbicides post emergence application of cyhalofopbutyl 100 g ha⁻¹ recorded higher dry weight, but was on par with the herbicides fenoxaprop-p-ethyl, clodinafop propargyl and oxadiargyl at 30 DAS. However, none of the herbicides could reach to the level of hand weeding, which recorded the highest dry weight of rice seedlings at 30 DAS. The results are akin to those reported by Angiras N.N.; 2003.

From this study it can be concluded that post emergence application of cyhalofop butyl 100 g ha⁻¹ applied at 14 DAS was found to be most effective due to its effective control, high selectiveness to rice without any phytotoxicity and greater dry matter accumulation in rice seedlings this was followed by pre emergence application of oxadiargyl 80 g ha⁻¹.

**REFERENCES**


