NATIONAL SEMINAR ON
Ecorestoration of Soil and Water Resources
Towards Efficient Crop Production
AT FTC (LAKE HALL), KALYANI ON JUNE 6-7, 2007

EXTENDED SUMMARY

Organized by
Crop and Weed Science Society,
Bidhan Chandra Krishi Viswavidyalaya

In Collaboration With
Directorate of Agriculture,
Directorate of Food Processing & Horticulture, Govt. of WB
Weed management in jute through pre and post emergence herbicides

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Introduction

Jute (Corchorus olitorius L.), an important fibre yielding cash crop, is mainly grown in the states of West Bengal, Assam, Orissa and Bihar. Intermittent rain associated with hot and humid climate during the jute growing season in alluvial plains encourage profuse weed growth (Saraswat, 1999) and about 75-80% yield loss may occur (Sahoo and Saraswat, 1988). In general grasses are the dominant weeds in jute. Management of grass and broadleaved weeds in jute by use of pre-emergence herbicides such as Trifluralin is possible (Sarkar et al., 2005). However, Trifluralin is not effective against the sedge weeds which may pose serious problem in some specific situation of jute area. There are a number of post-emergence herbicides like Cyhalofop butyl, Quizalofop ethyl and Fenoxaprop-p-ethyl which showed best weed control in broadleaved field crops like sunflower, soybean and potato (Ito et al., 1998; Bedmar, 1997). Among the available post-emergence herbicides, only Quizalofop ethyl (5% EC) was tried and found effective to control grass weeds in jute (Ghorai et al., 2004). Therefore, a field experiment was designed to study the effectiveness of the available pre-
emergence herbicide having effect on sedges (S-Metolachlor) and post-emergence grass herbicides in jute (cv. JRO 524).

Materials and methods

The experiment was conducted during 2006 in medium fertile neutral soil (pH 6.9) at the main farm (22.75°N, 88.43°E and 3.14 m altitude) of Central Research Institute for Jute and Allied Fibres (ICAR), Barrackpore, West Bengal with nine treatments and three replications, laid out in randomised block design with a plot size of 4 m x 3 m. The nine treatments were weeded control, two hand weeding (HW) at 3 and 5 weeks after sowing (WAS), Trifluralin @ 0.75 kg a.i. ha\(^{-1}\) one day before sowing (DBS), S-Metolachlor @ 0.50 kg a.i. ha\(^{-1}\) (1 DBS), S-Metolachlor @ 0.50 kg a.i. ha\(^{-1}\) as pre-emergence (just after sowing of jute seed), Trifluralin @ 0.50 kg a.i. ha\(^{-1}\) + S-Metolachlor @ 0.50 kg a.i. ha\(^{-1}\) (1 DBS), Cyhalofop butyl @ 75 g a.i. ha\(^{-1}\), Fenoxaprop-p-ethyl @ 75 g a.i. ha\(^{-1}\) and Quinalofop ethyl @ 75 g a.i. ha\(^{-1}\). All the post emergence herbicides were applied at 21 days after sowing (DAS) when the grass weeds were at three-four leaf stage. Jute seed (JRO 524) was sown in line with a row spacing of 25 cm in the 2\(^{nd}\) week of April and harvested at 110 days crop age. Biometrical observations on jute plant height, fibre yield, type of weeds, and dry weight of weeds were recorded.

Results and discussion

Effect on weeds

The highest weed dry weight was recorded in the weeded control treatment (46.3 g m\(^{-2}\)) (Table 1) and in contrast the lowest weed biomass was observed in hand weeded plot (8.8 g m\(^{-2}\)) which corroborates the observations of Ghorai et al., (2004) and Sarkar et al., (2005). Among the herbicides tested, the lowest weed dry weight (9.7 g m\(^{-2}\)) was resulted with S-Metolachlor @ 0.50 g a.i ha\(^{-1}\).

The highest weed control efficiency (WCE) of 80.9% was recorded in two hand weeding treatment. Among the herbicides, S-Metolachlor @ 0.50 kg a.i. ha\(^{-1}\) showed good WCE (79%). However, Fenoxaprop-p-ethyl at 75 g ha\(^{-1}\) and Quinalofop ethyl @ 75 g a.i. ha\(^{-1}\) as post emergence spray showed only 40% WCE, which was due to the dominance of sedge weeds which are not controlled by graminicides. It was earlier reported (Sarkar, 2006) that if the weed complex in jute is dominated by the grasses, higher WCE of 79-87% may be obtained with the application of graminicides like Quinalofop ethyl and Fenoxaprop-p-ethyl.

Effect on crop

The highest plant height of jute at harvest was recorded in S-Metolachlor treatment (252 cm) which was statistically at par with the plant height obtained with
Table 1. Effect of pre and post-emergence herbicides on weed control, growth and yield of jute

<table>
<thead>
<tr>
<th>Weed control methods</th>
<th>Dose (kg a.i. ha(^{-1}))</th>
<th>Dry weight of weeds at 45 DAS (g m(^{-3}))</th>
<th>WCE (%)</th>
<th>PH (cm)</th>
<th>Fibre yield (kg ha(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>-</td>
<td>46.27</td>
<td>-</td>
<td>199</td>
<td>1261</td>
</tr>
<tr>
<td>Hand weeding (21 and 35 DAS)</td>
<td>Twice</td>
<td>8.83</td>
<td>80.92</td>
<td>242</td>
<td>2418</td>
</tr>
<tr>
<td>Trifluralin (PPI at 1 DBS)</td>
<td>0.75</td>
<td>27.2</td>
<td>41.21</td>
<td>233</td>
<td>1793</td>
</tr>
<tr>
<td>S-Metolachlor (PPI at 1 DBS)</td>
<td>0.50</td>
<td>31.43</td>
<td>32.07</td>
<td>232</td>
<td>1878</td>
</tr>
<tr>
<td>S-Metolachlor (PE)</td>
<td>0.50</td>
<td>9.70</td>
<td>79.04</td>
<td>252</td>
<td>2492</td>
</tr>
<tr>
<td>Trifluralin + S-Metolachlor (PPI)</td>
<td>0.50 + 0.50</td>
<td>29.00</td>
<td>37.32</td>
<td>239</td>
<td>2252</td>
</tr>
<tr>
<td>Cyhalofop butyl (POE at 21 DAS)</td>
<td>0.075</td>
<td>39.47</td>
<td>14.70</td>
<td>235</td>
<td>2111</td>
</tr>
<tr>
<td>Fenoxaprop-p-ethyl (POE at 21 DAS)</td>
<td>0.075</td>
<td>27.73</td>
<td>40.07</td>
<td>249</td>
<td>2329</td>
</tr>
<tr>
<td>Quizalofop ethyl (POE at 21 DAS)</td>
<td>0.075</td>
<td>27.60</td>
<td>40.35</td>
<td>244</td>
<td>2334</td>
</tr>
<tr>
<td>CD (0.05)</td>
<td>5.82</td>
<td>18.31</td>
<td></td>
<td></td>
<td>350</td>
</tr>
</tbody>
</table>

DBS: Days before sowing; PPI: pre plant soil incorporation; PE: Pre-emergence just after sowing of jute
Fenoxaprop-p-ethyl @ 75 g ha\(^{-1}\) (249 cm). Unweeded control treatment produced the shortest (199 cm) jute plants (Table 1).

**Effect on fibre yield**

Among the treatments, S-Metolachlor @ 0.50 kg a.i. ha\(^{-1}\) produced the highest fibre yield of 2492 kg ha\(^{-1}\) followed by the fibre yield obtained from two hand weeding treatment (2418 kg ha\(^{-1}\)), quizalofop ethyl (2334 kg ha\(^{-1}\)) and Fenoxaprop ethyl (2329 kg ha\(^{-1}\)). Whereas, the lowest fibre yield was recorded with unweeded control treatment (1261 kg ha\(^{-1}\)).

**Conclusion**

Pre-emergence application of S-Metolachlor @ 0.50 kg a.i. ha\(^{-1}\) or two hand weeding at 21 and 35 days after sowing could effectively control the weeds in jute if the weed complex is dominated by sedges and resulted in higher fibre yield.

**References**


