STUDY OF ECONOMICS ON MAIZE (ZEA MAYS L.) INFLUENCED BY WEED MANAGEMENT

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Abstract: A field investigation was conducted at BAU experimental Farm, Ranchi during kharif season 2015 on sandy clay loam soil. The experiment was laid out in a RBD with 13 treatments: pretilachlor 1.0 kg ha\(^{-1}\) PE (T\(_1\)), atrazine 1.0 kg ha\(^{-1}\) PE (T\(_2\)), pendimethalin 1.0 kg ha\(^{-1}\) PE (T\(_3\)), metribuzin 0.35 kg ha\(^{-1}\) PE (T\(_4\)), pretilachlor 0.5 + metribuzin 0.175 kg ha\(^{-1}\) PE (T\(_5\)), atrazine 0.5 + pendimethalin 0.5 kg ha\(^{-1}\) PE (T\(_6\)), pretilachlor 1.0 kg ha\(^{-1}\) at 15 DAS (T\(_7\)), metribuzin 0.35 kg ha\(^{-1}\) at 15 DAS (T\(_8\)), atrazine 1.0 kg ha\(^{-1}\) at 15 DAS (T\(_9\)), green manuring by Sesbania @ 80 kg ha\(^{-1}\) (b) 2,4-D 0.625 kg ha\(^{-1}\) at 30 DAS (T\(_{10}\)), two mechanical weeding at 20 and 40 DAS (T\(_{11}\)), two hand weeding at 20 and 40 DAS (T\(_{12}\)), and weedy Check (T\(_{13}\)). Results revealed that gross return (70591 Rs ha\(^{-1}\)), net return (44623 Rs ha\(^{-1}\)) and B: C ratio (1.72) were observed maximum due to application of same treatment (atrazine 0.5 + pendimethalin 0.5 Rs ha\(^{-1}\) PE). The cost of treatment (atrazine 0.5 + pendimethalin 0.5 kg ha\(^{-1}\) PE) is much lower (1768 Rs ha\(^{-1}\)) against mechanical weedicings (3749 Rs ha\(^{-1}\)) and hand weedicings (9372 Kg, ha\(^{-1}\)).

Keywords: Maize, Weed management, Economics, Investigation

INTRODUCTION

Maize (Zea mays L.) is one of the most versatile crops having wider adaptability under diverse soil and climatic conditions. Globally, maize is known as the “Queen of Cereals” because it has the highest genetic yield potential amongst the cereals owing to its better dry matter accumulation efficiency in a unit area and time particularly up to 30° North and 30° South latitude. It is cultivated in an area of about 150 M ha in 160 countries in diverse soil types, climate, and management practices with wider plant biodiversity that contributes about 36% towards the global food grain production (Anonymous, 2013a). It is the third most important crop of India after rice and wheat that occupies an area of about 8.67 M ha with an average productivity of about 2.57 t/ha compared to the world average productivity of about 4.94 t ha\(^{-1}\) (Anonymous, 2014). It is grown on an area of 1.86 m ha with an average productivity of 1.45 t ha\(^{-1}\) in Jharkhand (Anonymous, 2013b). Yield losses caused due to different weed categories in maize were quantified as 77.4% by grassy, 44.2% by broad-leaf and 38.4% by sedges, indicating the need for weed management for realizing optimal crop yields. Manual weeding is exhaustive, lengthy, economically not feasible and laborious. Availability of man power for manual weeding at critical period of maize growth is difficult owing to pre-occupied farm work in other crops like rice, pulses etc. For controlling weeds in maize crop, pre-emergence or early post-emergence application of atrazine depending upon the soil type has been recommended. Application of pendimethalin also has been recommended under maize + legume intercropping situations. These herbicides do not control hardy weed species like Commelinabenghalensis, Ageratum conyzoides and Brachiariaramosus as they appear late in the season. The infestation of these weeds is increasing day by day in the maize-growing areas of the state especially where the farmers are using atrazine year after year. So in order to widen the weed control spectrum, it is imperative to use combination of herbicides having different mode of action. After reviewing these facts a studies performed with the objective to find out the economics of maize as influenced by weed management practices.

MATERIAL AND METHOD

The experiment was carried out during kharif, 2015 at BAU experimental Farm, Ranchi on sandy clay loam soil. The experiment was laid out in a RBD with 13 treatments: pretilachlor 1.0 kg ha\(^{-1}\) PE (T\(_1\)), atrazine 1.0 kg ha\(^{-1}\) PE (T\(_2\)), pendimethalin 1.0 Kg,ha\(^{-1}\) PE (T\(_3\)), metribuzin 0.35 kg ha\(^{-1}\) PE (T\(_4\)), pretilachlor 0.5 + metribuzin 0.175 kg ha\(^{-1}\) PE (T\(_5\)), atrazine 0.5 + pendimethalin 0.5 kg ha\(^{-1}\) PE (T\(_6\)), pretilachlor 1.0 kg ha\(^{-1}\) at 15 DAS (T\(_7\)), metribuzin 0.35 kg ha\(^{-1}\) at 15 DAS (T\(_8\)), atrazine 1.0 kg ha\(^{-1}\) at 15 DAS (T\(_9\)), green manuring by Sesbania @ 80 kg ha\(^{-1}\) (b) 2,4-D 0.625 kg ha\(^{-1}\) at 30 DAS (T\(_{10}\)), two mechanical weeding at 20 and 40 DAS (T\(_{11}\)), two hand weeding at 20 and 40 DAS (T\(_{12}\)), and weedy Check (T\(_{13}\)). Maize var. Suwan was sown (on 30-06-2015) with spacing of 70 x 20 cm, seed rate 20 kg ha\(^{-1}\) and RDF 120:60:40 kg ha\(^{-1}\). Gross return and cost of cultivation was calculated for each treatment, using current purchase price of inputs and the selling price of outputs prevailing in local market. Net profit was calculated as gross income subtracted

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by cost of cultivation. Benefit cost ratio was computed as the ratio of net return and cost of cultivation.

RESULT AND DISCUSSION

Economics

Economics of maize production as influenced by weed management practices are presented in Table 1. It was observed that percent increase (highest) in gross return, net return and B: C ratio was to the tune of 44.30, 71.10 and 70.93%, respectively due to application of atrazine 0.5 + pendimethalin 0.5 kg/ha PE (T₆) in comparison to weedy check (T₇).

Cost of treatment with application of atrazine 0.5 + pendimethalin 0.5 kg/ha ¹ PE (T₆) was lower (1768 Rs ha⁻¹) compared to normal practice of hand weedings at 20 and 40 DAS (9372 Rs ha⁻¹) and resulted cost of cultivation 25969 and 33572 Rs ha⁻¹, respectively. Application of atrazine 0.5 + pendimethalin 0.5 kg/ha ¹ PE (T₆) recorded maximum gross return (70,591 Rs ha⁻¹) which was at par with two hand weedings at 20 and 40 DAS (T₀), two mechanical weedings at 20 and 40 DAS (T₁), atrazine 1.0 kg/ha¹ PE (T₈) and pretillachlor 0.5 + metribuzin 0.175 kg/ha¹ PE (T₅). Weedy check recorded significantly lowest gross return (39,318 Rs ha⁻¹) and also it recorded significantly highest net return (44,623 Rs ha⁻¹) as compared to rest of the other treatments. Weedy check recorded significantly lowest net return (15,117 Rs ha⁻¹) and significantly highest benefit: cost ratio (1.72) was observed with application of atrazine 0.5 + pendimethalin 0.5 kg/ha¹ PE (T₆) as compared to rest of the other treatments. Weedy check recorded significantly lowest benefit: cost ratio (0.63).

Similar results were also reported by Walia et al. (2007), Shantveerayya et al. (2013), Shankar et al. (2015) and Barlaet al. (2016).

Table 1. Effect of weed management practices on economics (Rs ha⁻¹) and B: C ratio in maize (var. Suwan) during kharif, 2015.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Cost of weed management practice (Rs ha⁻¹)</th>
<th>*Cost of cultivation (Rs ha⁻¹)</th>
<th>Gross return (Rs ha⁻¹)</th>
<th>Net return (Rs ha⁻¹)</th>
<th>B:C ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>T₁</td>
<td>Pretillachlor 1.0 kg/ha¹ PE</td>
<td>1695</td>
<td>25895</td>
<td>50152</td>
<td>24256</td>
</tr>
<tr>
<td>T₂</td>
<td>Atrazine 1.0 kg/ha¹ PE</td>
<td>1295</td>
<td>25495</td>
<td>59399</td>
<td>33903</td>
</tr>
<tr>
<td>T₃</td>
<td>Pendimethalin 1.0 kg/ha¹ PE</td>
<td>2241</td>
<td>26442</td>
<td>52822</td>
<td>26380</td>
</tr>
<tr>
<td>T₄</td>
<td>Metribuzin 0.5 kg/ha¹ PE</td>
<td>1950</td>
<td>26150</td>
<td>50481</td>
<td>24330</td>
</tr>
<tr>
<td>T₅</td>
<td>Pretillachlor 0.5 + metribuzin 0.175 kg/ha¹ PE</td>
<td>1637</td>
<td>25838</td>
<td>58935</td>
<td>33097</td>
</tr>
<tr>
<td>T₆</td>
<td>Atrazine 0.5 + pendimethalin 0.5 kg/ha¹ PE</td>
<td>1768</td>
<td>25969</td>
<td>70591</td>
<td>44623</td>
</tr>
<tr>
<td>T₇</td>
<td>Pretillachlor 1.0 kg/ha¹ at 15 DAS</td>
<td>1695</td>
<td>25895</td>
<td>49160</td>
<td>23264</td>
</tr>
<tr>
<td>T₈</td>
<td>Metribuzin 0.35 kg/ha¹ at 15 DAS</td>
<td>1950</td>
<td>26150</td>
<td>53814</td>
<td>27663</td>
</tr>
<tr>
<td>T₉</td>
<td>Atrazine 1.0 kg/ha¹ at 15 DAS</td>
<td>2375</td>
<td>26755</td>
<td>50941</td>
<td>24366</td>
</tr>
<tr>
<td>T₁₀</td>
<td>Green manuring fb 2, 4-D 0.625 kg/ha at 30 DAS</td>
<td>4573</td>
<td>28774</td>
<td>46832</td>
<td>18059</td>
</tr>
</tbody>
</table>

SEM ±, CD (P=0.05) and CV% are presented in Table 1. It was observed that percent increase (highest) in gross return, net return and B: C ratio was to the tune of 44.30, 71.10 and 70.93%, respectively due to application of atrazine 0.5 + pendimethalin 0.5 kg/ha ¹ PE (T₆) in comparison to weedy check (T₇).

CONCLUSION

Based on the results of present investigation, it can be concluded that application of atrazine 0.5 + pendimethalin 0.5 kg/ha¹ PE can be practiced as an economical weed management practice in maize (Zea mays L.) for higher productivity.

REFERENCES


