BIOEFFECTIVITY OF INSECTICIDES AGAINST GIRDLE BEETLE ON SOYBEAN CROP.

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Abstract: A Field experiment will be laid out in randomized block design with seven treatments including untreated control replicated four times. This crop will be sown on 3rd July 2010 in plot size of 25 square meters. In this experiment number of girdle beetle infested plants will be counted in randomly selected three one meter rows in each plot. Observations will be taken 24 hours before the spraying of insecticides and after 10 days and 15 days of spraying of insecticides. Solomon 300 OD, a compound insecticide comprising Imidacloprid and Batacyfluthrin when applied at the rate of 350 ml/ha, was most effective against the girdle beetle with minimum 3.8 damaged plants/meter row and highest grain yield of 27.3 q/ha. It was most economical with 1.75:1 benefit cost ratio and 42.49 per cent avoidable losses. It was followed by Triazophos 40 EC @ 625 ml/ha.

Keywords: Bioefficacy, Solomon, Girdle beetle, Soybean, Imidacloprid, Triazophos

INTRODUCTION

Soybean is a wonder crop of twentieth century. It is an excellent source of protein and oil. It is a two dimensional crop as it contains about 40-42 per cent high quality protein and 20-22 per cent oil. It also contains 20-30 per cent carbohydrates. The protein quality of soybean is equivalent to that of meat, milk products and eggs. Hence, it is well established fact that soybean is cheap source of protein and edible oil. These characteristics have made soybean to fit well in sustainable agriculture. During the late sixties and early seventies, the soybean crop was considered to be comparatively safe crop as regards to insect pest attack. However, Gangrade (1976) reported over 99 insect species attacking soybean crop at Jabalpur but now the situation has changed and as many as 275 insect species have been recorded attacking soybean crop in India. Researchers in many parts of India have confirmed that seed yield and seed quality are being adversely affected by major insect pests viz. girdle beetle, tobacco caterpillar, green semilooper, Helicoverpa armigera, jassids and white fly.

MATERIAL AND METHOD

A Field experiment was laid out in randomized block design with seven treatments including untreated control replicated four times. The crop was sown on 4th July 2010 in plot size of 25 square meters. The crop management practices (i.e. field preparation, sowing, weeding, fertilizer application etc.) were adopted as per the recommended practices. In this experiment, number of Girdle beetle infested plants from three one meter row was counted at seven days interval starting from 25-30 days after sowing till harvest. To assess the efficacy of different insecticides against Girdle beetle in soybean crop, two sprayings were given by hand operated knapsack sprayer. Observations were recorded 24 hours before the spraying of insecticides and after 10 and 15 days of spraying of insecticides. The layout and other treatment details of this experiment are given in fig. 1 and table 1.

Design: Randomized Block Design

Treatments : 7
Replication : 4
Plot size : 25 square meter 
Spacing between rows: 30 cm 
Variety : JS-93-05

Table 1: List of test insecticides against Girdle Beetle of soybean

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Dose (ml/ha)</th>
<th>Dose (ml/plots)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Untreated control</td>
<td>0</td>
</tr>
<tr>
<td>T2</td>
<td>Solomon 300 OD</td>
<td>250</td>
</tr>
<tr>
<td>T3</td>
<td>Solomon 300 OD</td>
<td>300</td>
</tr>
<tr>
<td>T4</td>
<td>Solomon 300 OD</td>
<td>350</td>
</tr>
<tr>
<td>T5</td>
<td>Solomon 300 OD</td>
<td>700</td>
</tr>
<tr>
<td>T6</td>
<td>Betacyfluthrin 25% SC</td>
<td>1260</td>
</tr>
<tr>
<td>T7</td>
<td>Imidacloprid 200 SL</td>
<td>367.5</td>
</tr>
<tr>
<td>T8</td>
<td>Triazophosphos 40 EC</td>
<td>625</td>
</tr>
</tbody>
</table>

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RESULT AND DISCUSSION

An experiment for evaluating the bio-efficacy of Solomon 300 OD along with Imidacloprid 200 SL, Betacyfluthrin 2.5 % SC and Triazophos 40 EC as standard checks against girdle beetle on soybean crop was carried out during kharif, 2010. The average infested plants by girdle beetle per meter row length was recorded from randomly selected three one meter row lengths from each plot before 24 hours of application of insecticides as pretreatment observations and after 10 and 15 days of spray as post treatment observations. Second spray was given 20 days after the first spray. Grain yield recorded from each plot separately and converted into q/ha is presented in Table 2.

Table 2: Relative efficacy of Solomon 300 OD against girdle beetle Obereopsis brevis on soybean during kharif, 2010.

| Treatment         | Dose ml/ha | Percentage of plants infested by girdle beetle per meter row length after Pretreatment | I Spray | II Spray | Grain yield Q/ha
<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>After 10 days</td>
<td>After 15 days</td>
<td>After 10 days</td>
</tr>
<tr>
<td>Untreated Control</td>
<td>_</td>
<td>4.05 (11.37)</td>
<td>12.65d (20.45)</td>
<td>17.56c (24.74)</td>
<td>21.20e (27.37)</td>
</tr>
<tr>
<td>Solomon 300 OD</td>
<td>250</td>
<td>4.80 (12.51)</td>
<td>9.00bc (17.52)</td>
<td>14.25c (22.35)</td>
<td>15.10d (22.53)</td>
</tr>
<tr>
<td>Solomon 300 OD</td>
<td>300</td>
<td>3.95 (11.38)</td>
<td>6.71b (14.88)</td>
<td>7.96b (16.32)</td>
<td>9.36bc (17.76)</td>
</tr>
<tr>
<td>Solomon 300 OD</td>
<td>350</td>
<td>3.22 (12.38)</td>
<td>3.50a (11.78)</td>
<td>3.58a (11.84)</td>
<td>3.72a (11.96)</td>
</tr>
<tr>
<td>Betacyfluthrin</td>
<td>1260</td>
<td>4.42 (11.78)</td>
<td>7.62bc (15.83)</td>
<td>9.37b (17.60)</td>
<td>12.35cd (20.56)</td>
</tr>
<tr>
<td>Imidacloprid</td>
<td>367.5</td>
<td>3.25 (10.27)</td>
<td>6.33b (14.38)</td>
<td>8.06b (16.49)</td>
<td>11.65cd (19.28)</td>
</tr>
<tr>
<td>Triazophos</td>
<td>625</td>
<td>3.75 (11.12)</td>
<td>6.00b (14.46)</td>
<td>6.41ab (14.57)</td>
<td>7.06ab (15.27)</td>
</tr>
<tr>
<td>CD at 5 %</td>
<td>NS</td>
<td>2.26</td>
<td>3.24</td>
<td>3.77</td>
<td>4.12</td>
</tr>
</tbody>
</table>

Figures in parenthesis are under root transformed values.
In a column means followed by a common letter are not significantly different at 5 per cent level.

The percent plants damaged by girdle beetle in the pretreatment observations ranged from 3.22 to 4.80 per meter row, it differed non-significantly among different treatments. After 10 days of first spray, the percentage of girdle beetle damaged plants per meter row on soybean crop ranged from 3.50 to 12.65. The plot treated with Solomon 300 OD @ 350 ml/ha with 3.50 percent infested plants was least infested by girdle beetle, it was significantly followed by Triazophos @ 625 ml/ha and Imidacloprid @ 367.5...
and 300 ml/ha with 6.00, 6.33 and 6.71 percent infested plants, respectively, the three being at par. Solomon 300 OD @ 250 ml/ha with 9.00 percent infested plants was least effective against girdle beetle. It was at par with Betacyfluthrin 2.5% SC but differed significantly from untreated control. After 15 days of first spray, the percent girdle beetle damaged plants on soybean crop ranged from 3.58 to 17.56 per meter row. Solomon 300 OD @ 350 ml/ha with 3.58 percent infested plants was most effective against the girdle beetle. It was at par with Triazophos @ 625 ml/ha with 6.41 percent infested plants but differed significantly from Solomon 300 OD @ 300 ml/ha, Imidacloprid @ 367.5 ml/ha and Betacyfluthrin 2.5% SC with 7.96, 8.06 and 9.37 percent infested plants, respectively. Solomon 300 OD @ 250 ml/ha with 14.25 percent infested plants was least effective and at par with untreated control with 17.56 percent infested plants by girdle beetle. After 20 days of first spray, the crop was again treated with different insecticides. Solomon 300 OD @ 350 ml/ha continued to exhibit its superiority over other treatments in controlling girdle beetle with 3.72 percent infested plants after 10 days of second spray. It was at par with Triazophos @ 625 ml/ha with 7.06 percent infested plants, but differed significantly from Solomon 300 OD @ 300 ml/ha with 9.36 percent infested plants. Solomon 300 OD @ 250 ml/ha with 15.10 percent infested plants was least effective and at par with Betacyfluthrin and Imidacloprid but differed significantly from untreated control. After 15 days of second spray, Solomon 300 OD @ 350 ml/ha with 3.90 infested plants was significantly most effective against the girdle beetle. It was followed by Triazophos 40 EC and Solomon 300 OD @ 300 ml/ha, the two differing non-significantly. Solomon 300 OD @ 250 ml/ha with 18.27 infested plants was least effective and at par with Betacyfluthrin 2.5 % SC and untreated control. Yield recorded at harvest was subjected to statistical and economical analysis after converting these data from kg/plot into q/ha. It revealed that Solomon 300 OD, when applied at the rate of 350 ml/ha was most effective against girdle beetle with 27.3 q/ha yield. There was 11.6 q/ha actual increase in yield over untreated control which account for 74.35 per cent increase in yield with 42.49 per cent avoidable losses (Table 4.15). It was significantly followed by Triazophos @ 625 ml/ha with 23.4 q/ha but was at par with Betacyfluthrin 2.5% SC (22.6 q/ha) and Solomon 300 OD @ 300 ml/ha (21.9 q/ha). Imidacloprid 200 SL @ 367.5 ml/ha with 18.2 q/ha yield was least remunerative and at par with Solomon 300 OD @ 250 ml/ha and untreated control. Patil et al. (2003) reported Imidacloprid 0.05% most effective against girdle beetle infesting soybean with grain yield of 17.85 q/ha and benefit cost ratio of 1.5:1. In the present study, Imidacloprid 200 SL @ 367.5 ml/ha was least effective against the girdle beetle. However, when it was combined with Betacyfluthrin, it proved to be most effective against the girdle beetle. Chaudhary et al. (2007) and Chaudhary and Bajpai (2007) found Triazophos most effective against the girdle beetle. In the present studies, the same Insecticide was second best after the most effective treatment i.e. Solomon 300 OD @ 350 ml/ha. Parsai et al. (1990) recorded Quinalphos as most effective

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Dose (g a.i./ha)</th>
<th>Yield of controle dPlot (Q/ha.)</th>
<th>Yield of untreated control plot (Q/ha.)</th>
<th>Actual increase in yield (Q/ha.)</th>
<th>Percent increase in yield due to treatment</th>
<th>Avoidable losses (%)</th>
<th>Benefit Cost ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solomon 300 OD</td>
<td>250</td>
<td>19.5</td>
<td>15.6</td>
<td>3.9</td>
<td>25</td>
<td>20</td>
<td>1.25:1</td>
</tr>
<tr>
<td>Solomon 300 OD</td>
<td>300</td>
<td>21.9</td>
<td>15.6</td>
<td>6.3</td>
<td>40.38</td>
<td>28.76</td>
<td>1.40:1</td>
</tr>
<tr>
<td>Solomon 300 OD</td>
<td>350</td>
<td>27.3</td>
<td>15.6</td>
<td>11.6</td>
<td>74.35</td>
<td>42.49</td>
<td>1.75:1</td>
</tr>
<tr>
<td>Betacyfluthrin 2.5% SC</td>
<td>1260</td>
<td>22.6</td>
<td>15.6</td>
<td>7</td>
<td>44.87</td>
<td>30.97</td>
<td>1.44:1</td>
</tr>
<tr>
<td>Imidacloprid 200 SL</td>
<td>367.5</td>
<td>18.2</td>
<td>15.6</td>
<td>2.6</td>
<td>14.28</td>
<td>14.28</td>
<td>1.14:1</td>
</tr>
<tr>
<td>Triazophos 40 EC</td>
<td>625</td>
<td>23.4</td>
<td>15.6</td>
<td>7.8</td>
<td>50</td>
<td>33.33</td>
<td>1.50:1</td>
</tr>
</tbody>
</table>

Based on overall mean, Solomon 300 OD, when at the rate of 350 ml/ha was most effective against the girdle beetle with minimum 3.81 damaged plants per meter row and maximum grain yield of 27.3 q/ha it was also most economical with 42.49 percent avoidable losses and 1.75:1 benefit cost ratio, it was significantly followed by Triazophos 40 EC and Solomon 300OD @ 300 ml/ha, the two differing non-significantly. Based on seasonal mean, Solomon 300 OD, when applied @ 350 ml/ha, was most effective against girdle beetle with minimum 7.62 percent damaged plants by girdle beetle and highest 27.3 q/ha grain yield.
against the Cerambycid beetle with 3.19 percent infested plants.

CONCLUSION

Solomon 300 OD, a compound insecticide comprising Imidacloprid and Batacyfluthrin when applied at the rate of 350 ml/ha, was most effective against the girdle beetle with minimum 3.8 damaged plants/ meter row and highest grain yield of 27.3 q/ha. It was most economical with 1.75:1 benefit cost ratio and 42.49 per cent avoidable losses. It was followed by Triazophos 40 EC @ 625 ml/ha.

REFERENCE


