Varietals screening against shoot and fruit borer (Leucinodes orbonalis G.) of brinjal

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Abstract: Study was carried out to determine less susceptible variety of brinjal and efficacy of insecticide against shoot & fruit borer, Leucinodes orbonalis Guenee during kharif season of 2011-12 at R.V.S.K.V.V., Gwalior (M.P.). It was found that per cent fruit damage among different varieties was ranged from 4.6 to 12.9 per cent on number basis and 3.7 to 10.8 per cent on weight basis. Variety Deshi was found less susceptible followed by Pusa kranti, Pant rituraj, NDB-4 and Pant samrat. Whereas variety Pusa bindu found highly susceptible followed by Jawahar-64, Jumbo Hy, NSC Hy, Pusa shyamla and NBH-249. On the basis of shoot infestation Pusa shyamla was found highly susceptible of 10.50 per cent followed by Pusa bindu and NDB-4. Variety Deshi of 1.30 per cent was found less susceptible followed by Jawahar 64, NBH-249 and NBH-21. On the basis of varietal screening and efficacy of insecticides against shoot & fruit borer, variety Deshi and Pusa kranti may be used as a component of IPM against shoot & fruit borer under the protection with insecticidal application of indoxacarb (0.007%), carbosulfan(0.005%) or emamectin benzoate (0.002%) at an interval of 15 DAS.

Key Words: Brinjal, Insecticide, Leucinodes orbonalis, Indoxacarb and Variety

Introduction

Brinjal (Solanum melongena L.) is one of the widely used vegetable crops by most of the people and is popular in many countries viz., Central, South and South East Asia, some parts of Africa and Central America. This crop is regularly and simultaneously attacked by several insect pests like leafhopper (Amrasca biguttula biguttula Ishida), whitefly (Bemisia tabaci Gennadius) and brinjal shoot and fruit borer, Leucinodes orbonalis Guenee (Bhadauria et al., 1999). Brinjal shoot and fruit borer is regarded as one of the most destructive pest attacking brinjal crop right from nursery stage to harvesting. The pest poses a serious problem because of its high reproductive potential, rapid turnover of generations and intensive cultivation of brinjal both in wet and dry seasons of the year. The yield losses caused by this pest has been estimated upto 70-92 per cent (Chakraborti and Sarkar, 2011). Larvae of pest bore into tender shoots make zig zag feeding tunnels in fruits, which are clogged with frass that make fruits unfit for consumption and marketing. Insecticides resistance in brinjal shoot and fruit borer especially to pyrethroids is now widespread in many brinjal producing countries. Resistance detection is the vital component of the pesticide resistance management strategies. It aims to identify the initial presence of resistant individuals in a pest population. According to Brent (1986) and Chatterjee and Roy, (2004), the practical resistance detection must give emphasis on the establishment of baseline toxicity which would help in understanding the level of resistance developed by pest and any possible cross-resistance there in, could be assessed in advance. Although several insecticides have been recommended for the control of shoot and fruit borer in brinjal, yet the changing agro-environmental conditions needed to investigate and assess some newly introduced insecticidal molecules for the effective control. Therefore, it is urgently required to find an alternative and non-insecticide method for this pest. The use of host plant resistance against a pest is environmentally safe and economically sound technique.

Materials and Methods

A field experiment was conducted at the at research farm of College of Agriculture, R.V.S.K.V.V., Gwalior during kharif season of 2011-12. The experiment site is situated at the latitude of 26°.13' North and longitude 76°.14' east with an altitude of 211.52 meters from mean sea level at Gird zone having fairly uniform topography with gentle slope and adequate drainage in Madhya Pradesh. The area has semi-arid sub-tropical climate with extreme weather condition having hot and dry summer and cold winter and annual rainfall ranges from 700 to 800 mm, the maximum temperature goes up to 45°C during summer and minimum as low as 5°C during winter. Total six treatments viz., Indoxacarb 0.007%, Novaluron 0.01%, Emamectin benzoate 0.002%, Carbosulfan 0.005%, Neem oil 5% and untreated were tested in randomized block design with five replication. Twelve varieties Pusa bindu, Jawahar 64, NBH-249, Jumbo, NHB-21 Hy, NSC hy, Pusa kranti, Pusa shyamla, Pant rituraj, NDB-4, Pant samraat and Desi were sown at 45 x 60 cm spacing using 100 kg N, ha-1, 50 P, O3 kg ha-1 and 50 K, O kg ha-1. The efficacy of the various insecticides against shoot and fruit borer was judged on the basis of the per cent shoot infestation at 7 and 14 days after each spray and per cent fruit infestation at each picking on number and weight basis. In case of shoot infestation...
pretreatment observations were recorded at 24 hours before spraying (1 DBS) of treatment and post-treatment observations were recorded at 7 and 14 days after spraying. The shoot infestation was recorded by counting total number of healthy and infested shoot on randomly selected five plants in each treatment. For recording fruit infestation, during harvesting brinjal fruits from each plot were separated as infested and healthy fruits at each picking. The fruits showing exit holes of insect were considered as infested fruits. These healthy and infested fruits were weighted and counted separately. Further the percentage of fruit infestation was worked out on the basis of number and weight of the fruits at each picking for different treatments.

Results and Discussion

Varietals screening against shoot & fruit borer L. orbonalis: Data recorded on per cent shoot infestation in different varieties were significantly recorded at 36 DAT, 43 DAT and 50 DAT and presented in table-1.

At 36 days after transplanting: Minimum shoot infestation was recorded in variety Deshi which found significantly less than the damage in Jumbo Hy, Pusa bindu, Pusa shyamla, Pant rituraj, NDB-4, Pant samrat, NBH-249, NBH-21, NSC Hy, Pusa kranti but was at par to Jawahar 64. Significantly maximum shoot infestation in Pusa shyamla than Jumbo Hy, Pusa bindu, Jawahar 64, Deshi, Pant rituraj, NDB-4, Pant samrat, NBH-249, NBH-21, NSC Hy, Pusa kranti. Pusa shyamla variety was significantly minimum shoot infestation less than the rest of varieties.

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At 43 days after transplanting: Pusa shyamla was found significantly maximum shoot infestation than Jumbo Hy, Pusa bindu, Jawahar 64, Deshi, Pant rituraj, NDB-4, Pant samrat, NBH-249, NBH-21, NSC Hy, Pusa kranti. Deshi variety was found minimum shoot infestation less than the rest of varieties.

At 50 days after transplanting: Significantly maximum shoot infestation in Pusa shyamla than Jumbo Hy, Pusa bindu, Jawahar 64, Deshi, Pant rituraj, NDB-4, Pant samrat, NBH-249, NBH-21, NSC Hy, Pusa kranti. Whereas Deshi variety was found minimum shoot infestation found less than the rest of varieties.

At 57 days after transplanting: Minimum shoot infestation was recorded in variety Deshi which found significantly less than the damage in Jumbo Hy, Pusa bindu, Pusa shyamla, Pant rituraj, NDB-4 and Pant samraat. Whereas maximum fruit infestation was recorded in NDB-4 which found significantly higher than which in Jawahar-64, NBH-249, NBH-21, NSC Hy, Pusa kranti and Deshi but was at par to rest of varieties.

At 64 days after transplanting: Significantly minimum fruit infestation was recorded in variety Deshi than the damage in Pusa bindu and Pusa shyamla. Whereas maximum fruit infestation was recorded in Pusa shyamla which found significantly higher than which in Jawahar-64, NBH-249, Jumbo Hy, NBH-21, NSC Hy, Pusa kranti, Pant rituraj, NDB-4, pant samraat and Deshi but was at par to rest of varieties.

At 71 days after transplanting: Deshi variety was significantly minimum fruit infestation recorded than the damage in Pusa bindu, Jawahar 64, NSC HY, NBH-21 and NBH249. Maximum fruit infestation was recorded in Pusa bindu which found significantly higher than which in Jumbo Hy, Pusa kranti, Pusa shyamla, Pant rituraj, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

At 78 days after transplanting: Minimum fruit infestation was recorded in variety Deshi which found significantly less than the damage in Pusa bindu, Jumbo Hy, NSC Hy and Jawahar-64. Whereas maximum fruit infestation was recorded in Pusa bindu than which in NBH-249, NBH-21, Pusa kranti, Pusa shyamla, Pant rituraj, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

At 85 days after transplanting: Pant rituraj variety was examine minimum fruit infestation than the damage in Pusa bindu, Jawahar 64, NBH-249, Jumbo Hy, Pant samrat, NSC Hy, Pusa bindu was recorded maximum fruit infestation than which in Pusa kranti, Pusa shyamla, NBH-21, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

At 92 days after transplanting: Pant rituraj variety recorded minimum fruit infestation which found significantly less than the damage in Pusa bindu, Jawahar 64, NBH-249, Jumbo Hy, NBH-21 and NSC Hy. Maximum fruit infestation was significantly recorded in Pusa bindu than which in Pusa kranti, Pusa shyamla, Pant rituraj, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

At 99 days after transplanting: Pant samraat variety was recorded minimum fruit infestation than the damage in Pusa bindu, Jawahar 64, NBH-249, NDB-4 and NSC Hy. Whereas maximum fruit infestation was recorded in Pusa bindu which found significantly higher than which in Pusa kranti, Pusa shyamla, Pant rituraj, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

At 106 days after transplanting: Minimum fruit infestation was recorded in variety Pant samrat which found significantly less than the damage in Pusa bindu, Jawahar 64, NBH-249, Jumbo Hy, NBH-21 and NSC Hy. Maximum fruit infestation was significantly recorded in Pusa bindu than which in Pusa kranti, Pusa shyamla, Pant rituraj, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

At 113 days after transplanting: Pant rituraj variety was found significantly minimum fruit infestation than the damage in Pusa bindu, Jawahar 64, NBH-249, Jumbo Hy, NBH-21 and NSC Hy. Maximum fruit infestation was significantly recorded in Pusa bindu than which in Pusa kranti, Pusa shyamla, Pant rituraj, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

Table-1: Per cent shoot infestation in different varieties at different days after transplanting

<table>
<thead>
<tr>
<th>Variety</th>
<th>Per cent shoot infestation at days after transplanting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>36 DAT</td>
</tr>
<tr>
<td>Pusa bindu</td>
<td>6.1 (8.60)</td>
</tr>
<tr>
<td>Jawahar 64</td>
<td>2.4 (5.35)</td>
</tr>
<tr>
<td>NBH-249</td>
<td>3.2 (6.21)</td>
</tr>
<tr>
<td>Jumbo Hy</td>
<td>5.6 (8.24)</td>
</tr>
<tr>
<td>NBH-21</td>
<td>3.2 (6.24)</td>
</tr>
<tr>
<td>NSC Hy</td>
<td>3.9 (6.81)</td>
</tr>
<tr>
<td>Deshi</td>
<td>1.3 (3.96)</td>
</tr>
<tr>
<td>Pusa shyamla</td>
<td>8.6 (10.26)</td>
</tr>
<tr>
<td>NDB-4</td>
<td>6.3 (8.74)</td>
</tr>
<tr>
<td>Pant samrat</td>
<td>5.3 (8.04)</td>
</tr>
<tr>
<td>Pant rituraj</td>
<td>5.0 (7.78)</td>
</tr>
<tr>
<td>Pusa kranti</td>
<td>3.9 (6.84)</td>
</tr>
<tr>
<td>SEm.(±)</td>
<td>(0.52)</td>
</tr>
<tr>
<td>CD at 5%</td>
<td>(1.55)</td>
</tr>
</tbody>
</table>
At 57 days after transplanting: Minimum fruit infestation was recorded in variety Deshi which found significantly less than the damage in Jawahar 64, NBH-249, NBH-21, NSC Hy, Pusa kranti, Pant rituraj, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

Significant differences were recorded in per cent fruit infestation on weight basis in different varieties were recorded at 57 DAT, 64 DAT, 71 DAT, 78 DAT, 85 DAT, 92 DAT, 99 DAT, 106 DAT, 113 DAT and 120 DAT and presented in table-3.

At 71 days after transplanting: Pant rituraj variety was found significantly minimum fruit infestation than which in Jumbo Hy, NBH-21, NSC Hy, Pusa kranti, Pant rituraj, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

At 78 days after transplanting: Minimum fruit infestation was recorded in variety NDB-4 which found significantly less than the damage in Pusa bindu, Jumbo Hy, NSC Hy and NBH-21. Pusa bindu was significantly minimum fruit infestation than which in Jawahar 64, NBH249. Maximum fruit infestation was recorded in Pusa bindu which found significantly higher than which in Jawahar 64, NBH-249, NBH-21, NSC Hy, Pusa kranti, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

At 85 days after transplanting: Minimum fruit infestation was recorded in variety Pant rituraj which found significantly less than the damage in Pusa bindu, Jumbo Hy NSC Hy and NBH-21.
damage in Pusa bindu, Jawahar 64, NBH-249, NSC Hy. Whereas maximum fruit infestation was recorded in Pusa bindu which found significantly higher than which in Pusa kranti, Pusa shyamla, NBH-21, Jumbo Hy, Pant samrat, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

At 92 days after transplanting: Minimum fruit infestation was recorded in variety Pant rituraj which found significantly less than the damage in Pusa bindu, Jawahar 64, Jumbo Hy, and NSC Hy. Whereas maximum fruit infestation was recorded in Pusa bindu which found significantly higher than which in Pusa kranti, Pusa shyamla, Pant rituraj, NDB-4, NBH-249, NBH-21, Pant samraat and Deshi but was at par to rest of varieties.

At 99 days after transplanting: Minimum fruit infestation was recorded in variety Pusa kranti which found significantly less than the damage in Pusa bindu, Jawahar 64, NBH-249, NBH-21 and NSC Hy. Whereas maximum fruit infestation was recorded in Pusa bindu which found significantly higher than which in Pusa kranti, Pant samrat, Jumbo Hy, Pusa shyamla, Pant rituraj, NDB-4, and Deshi but was at par to rest of varieties.

At 106 days after transplanting: Pant samrat variety was significantly minimum fruit infestation than the damage in Pusa bindu, Jawahar 64, NBH-249, NBH-21 and NSC Hy. Whereas maximum fruit infestation was recorded in Pusa bindu which found significantly higher than which in Pusa kranti, Pusa shyamla, Pant rituraj, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

At 113 days after transplanting: Deshi variety was recorded minimum fruit infestation than the damage in Jawahar 64, NBH-249, NBH-21 and NSC Hy. Whereas maximum fruit infestation was recorded in Jawahar-64 which found significantly higher than which in Pusa kranti, Pant rituraj, NDB-4, Pant samraat and Deshi but was at par to rest of varieties.

At 120 days after transplanting: Pusa kranti was significantly minimum fruit infestation than the damage in Pusa bindu, and Jawahar 64. Whereas maximum fruit infestation was recorded in Jawahar 64 which found significantly higher than which in Pusa kranti, NDB-4, and Deshi but was at par to rest of varieties.

From the study it was concluded that Variety Deshi was found less susceptible to L. orbonalis G. followed by Pusa kranti, Pant rituraj, NDB-4 and Pant samrat. Variety Pusa bindu was found highly susceptible to L. orbonalis G. followed by Jawahar-64, Jumbo Hy, NSC Hy, Pusa shyamla and NBH-249. Pusa shyamla was highly susceptible to L. orbonalis G. on the basis of shoots infestation whereas moderately susceptible on the basis of fruit infestation. Variety Deshi and Pusa kranti may be used as a component of IPM against shoot & fruit borer under the protection with insecticidal application of indoxacarb (0.007%), carbosulfan(0.005%) or emamectin benzoate (0.002%) at an interval of 15 DAS. The various authors also worked in same direction such as Biswas et al., 2007; Bodke et al., 2004; Dutta et al., 2006; Kumar et al., 1998; Kumar et al., 2006; Patel et al., 1995; Singh, and Vishwanath, 2007; Yadav et al., 2003.

References