EFFECT OF NEEM AND PUNGAM OIL AGAINST THE BIOLOGY OF SPODOPTERA LITURA

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Abstract
Among the neem and pungam oil tested against biology of Spodoptera litura larvae, highest mortality of Spodoptera litura larvae were recorded in pungam oil 2% (55.55%) followed by neem oil 3% (44.44%) and pungam oil 2% (44.44%). Highest pupation was recorded in pungam oil 1% (88.89%) followed by neem oil 2% (66.66%). Highest pupicidal activity was recorded in neem oil 3% (80.00%). Lowest adult emergence percentage was recorded in neem oil 3%. From the above results it was clear that pungam oil was found in causing mortality of Spodoptera litura at 2% and lowest adult emergence percentage also recorded in pungam oil.

Key words: Pungam oil, neem oil, Spodoptera litura, biology.

Introduction
Tobacco cutworm, Spodoptera litura (Noctuidae: Lepidoptera), is an important lepidopterous, noctuid, polyphagous and multivoltine pest. It has worldwide distribution and cosmopolitan in food habits, feeding on the plants of economic importance. The larva of S. litura has been reported to feed on 112 cultivated crops all over the world affecting all stages of the crop. The pest has developed resistance against all groups of insecticides (Kranthi et al., 2002). Botanical pesticides are one of the important components in Integrated Pest Management (IPM) in managing the insect population. Among the botanicals, neem and pungam products are promising in the management of insect population. The malformation and mortality is referred as the dose-dependent in the insect feeding on the neem treated hosts due to various developmental, post-embryonic, reproductive and growth inhibitory effects (Ascher, 1993). Essential oils (EO) from plants may be an alternative source of S. litura third in star larvae control. It is because they are the rich source of bioactive compounds that are safe for human health and the environment. Neem oil is known to be active over 400 insect pests. It varies in colour from golden yellow, reddish brown, dark brown, greenish brown or bright red. The compounds present in the neem oil are reported as strong antifeedants and growth inhibitors against lepidopteran larvae (Koul et al., 2004). Kumar and Kalidhar, 2003 reported that pungam oil consists of higher proportions of mono-unsaturated fatty acids (46%) and polyunsaturated fatty acids (33%) and was found effective against insect pests of stored grains, field and plantation crops. Juices from the plant, as well as oil are antiseptic and resistant to pests. The oil has high content of triglycerides and bitter flavanoids including karangin, pongamol, tannin and karanjochromene. Krishnaveni et al., 2013 reported that pungam oil at larval mortality from 49.79% to 79.79%. Based on the above literatures, study was conducted in the Department of Entomology, Annamalai University to know the effect of pungam and neem oil against the biology of Spodoptera litura.

Materials and Methods
Egg masses of Spodoptera litura were collected from groundnut field at Sivapuri near Cuddalore District of Tamil Nadu. The eggs were surface sterilized with 0.02% sodium hypochlorite solution, dried and allowed to hatch. After hatching, the neonate larvae were reared on leaves of castor Ricinus communis, till pre-pupal stage and sterilized soil was provided for pupation. After pupation, the pupae were collected from soil and placed inside the oviposition champers (40 × 25 × 25 cm). After adult emergence, cotton soaked with 10% (w/v) sugar solution with few drops of multivitamins was provided

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Results and Discussion

Among the different concentrations of neem oil tested against biology of *Spodoptera litura*, highest mortality of larvae was recorded in 3% (44.44%) followed by 2% (33.33%) and 1% (33.33%) where as highest pupation (66.66%) and pupicidal (80.00%) were observed in 3%. Highest adult emergence was observed in 1% (66.67%)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Treatments</th>
<th>Larval mortality (%)</th>
<th>Pupation (%)</th>
<th>Pupicidal (%)</th>
<th>Adult emergence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Neem oil 1%</td>
<td>33.33 (35.26)†</td>
<td>66.66 (54.73)†</td>
<td>33.33 (35.06)†</td>
<td>66.67 (54.74)†</td>
</tr>
<tr>
<td>2.</td>
<td>Neem oil 2%</td>
<td>33.33 (35.26)†</td>
<td>66.66 (54.73)†</td>
<td>50.00 (45.00)‡</td>
<td>50.00 (45.00)‡</td>
</tr>
<tr>
<td>3.</td>
<td>Neem oil 3%</td>
<td>44.44 (41.81)§</td>
<td>55.55 (48.20)§</td>
<td>80.00 (68.54)§</td>
<td>25.00 (30.00)§</td>
</tr>
<tr>
<td>4.</td>
<td>Pungam oil 1%</td>
<td>11.11 (19.47)†</td>
<td>88.89 (70.72)†</td>
<td>37.75 (37.76)†</td>
<td>62.50 (52.25)†</td>
</tr>
<tr>
<td>5.</td>
<td>Pungam oil 2%</td>
<td>55.55 (48.20)§</td>
<td>44.44 (41.80)§</td>
<td>25.00 (30.00)§</td>
<td>50.00 (45.00)§</td>
</tr>
<tr>
<td>6.</td>
<td>Pungam oil 3%</td>
<td>44.44 (41.81)§</td>
<td>55.55 (48.20)§</td>
<td>60.00 (50.77)§</td>
<td>40.00 (39.23)‡</td>
</tr>
<tr>
<td>7.</td>
<td>Control</td>
<td>0 (1.65)†</td>
<td>100.00 (88.35)†</td>
<td>0 (1.66)†</td>
<td>100.00 (89.72)†</td>
</tr>
<tr>
<td>SEd</td>
<td>0.62‡</td>
<td>3.02‡</td>
<td>2.61‡</td>
<td>1.66‡</td>
<td></td>
</tr>
<tr>
<td>CD (0.05)</td>
<td>1.34§</td>
<td>3.02</td>
<td>2.61</td>
<td>1.66</td>
<td></td>
</tr>
</tbody>
</table>

Values with different alphabets differ significantly according to LSD

Values in parenthesis are arc sine transformed

Table 1: Effect of neem and pungam oil against the biology of *Spodoptera litura*.
Baskar and Srivastava, 2011 found that karanj oil and Jatropha oil at 1% caused the mortality of only 15% when compared to other insecticide formulations of Cypermethrin, Lamdacyhalothrin and Alphamethrin when evaluated against Spodoptera litura.

Our results also coincided with Krishnaveni et al., 2013 who also reported that pongam oil was more effective with the mortality of 49.79% to 79.79% with median lethal concentrations (LC50) ranging from 38.74% to 31.83% followed by neem gold (44.59% to 69.79%) with the (LC50) value of 40.65% to 35.92%. Packiam et al., 2013 studied that neem oil and pongam oil caused toxic effect of 22.93 and 25.40% at 5µ/L against fourth instar larvae of Helicoverpa armigera.

Results of our experiment clearly indicated that the active principles such as karanjin and azadirachtin presented in pongam and neem inhibiting larval feeding and may have effect on larval mortality, pupation percentage, pupal mortality and adult emergence percentage.

References


