

Comparative efficacy of insecticides and neem formulations against Litchi fruit borer, *Conopomorpha cramerella* Snellen (Gracillariidae: Lepidoptera)

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The litchi (*Litchi chinensis* Sonn.) is one of the important fruits growing in the tropical and sub-tropical regions. It has high export potential. Litchi is infested by eleven major and minor pests. Among these pests, *Conopomorpha cramerella* Snellen (Gracillariidae : Lepidoptera) is a major pest of litchi. According to Fletcher (3), Sharma & Agarwal (8), Bhatia *et al.* (1), and Sharma (7) this pest causes severe damage to fruits. The young larvae enter into the fruit and bore through it. According to Bhatia *et al.* (1) the pest is most important factor for the lower yield of litchi in Himachal Pradesh and the pest attack varied from 13.6 to 64.9%.

Field study was carried out during June 2006 to June 2007 in litchi orchard (cv. Bombai). The nature of damage was observed throughout the year. To determine the comparative efficacy of insecticides to control litchi fruit borer (*Conopomorpha cramerella*), the experiment was conducted in a randomized block design. To obtain the desired concentration, the chemical formulation was diluted with water and then they were sprayed on litchi plants with the help of foot sprayer. The insecticides were sprayed at 15 liters per tree. Two sprays were done. First spray was given at the colour formation stage and second spray was given after 15 days of first spray. Observation was recorded on 7th days and 14th day after each spraying. Spraying was done with dichlorvos 76% EC at 0.076%, endosulfan 35EC at 0.07%, imidacloprid 17.8SL at 0.006%, thiamethoxam 25% WG at

0.008%, azadirachtin 0.15% EC at 5ml/L, Azadirachtin 1% EC at 3 ml/L, 4ml/L 6ml/L and there was one untreated control. Each treatment was replicated 5 times.

The results revealed that all the insecticides were significantly superior over the untreated control (Table1). After 7 days of 1st spraying, endosulfan (0.07%) was found to be most effective . After 14 days of 1st spraying again all the insecticides were found to be significantly superior over the untreated control. Among these, endosulfan (0.07%) was found to be most effective and this insecticide was found to be at par with dichlorvos (0.076%), imidacloprid (0.006%) azadirachtin 0.15% EC at (5 ml/L), azadirachtin 1% EC at (4ml/L) and azadirachtin 1% EC at (6 ml/L) and significantly superior over thiamethoxam (0.008%) and azadirachtin 1% at (3 ml/L).

After 7 days of second spraying, all the insecticides were found to be significantly superior over the untreated control. Endosulfan (0.07%) was found to be most effective due to lowest mean percent of fruit infestation (24.66), but this insecticide was found to be at par with dichlorvos (0.076%) and azadirachtin 1% EC at (6 ml/L). After 14 days of 2nd spraying it was observed that the percentage of fruit infestation in endosulfan (0.07%) treated plants was slightly higher (24.66) than the dichlorvos (0.076%) treated plants (24.11). Dichlorvos (0.076%) was found to be at par with endosulfan (0.07%), azadirachtin 1% EC at (4ml/L and 6

Table 1.Bioefficacy of insecticides against litchi fruit borer (*Conopomorpha cramerella* Snellen)

| Treatments | Concentration in spray fluid | Percent fruit infested* | | | | |
|--------------------------------------|------------------------------|-------------------------|---------------------------------------|--|---------------------------------------|--|
| | | Pre-Treatment count | 7 Days after 1 st spraying | 14 days after 1 st spraying | 7 Days after 2 nd spraying | 14 days after 2 nd spraying |
| Dichlorvos 76% EC (Nuvan) | 0.076% | 31.20(33.93) | 27.20(31.40)b | 26.40 (30.85)cd | 19.20(25.92)de | 16.80(24.11)d |
| Endosulfan 35 EC (Hildan) | 0.07% | 30.40(33.45) | 26.40(30.85)b | 25.60(30.35)d | 17.60(24.66)e | 17.60(24.66)d |
| Imidacloprid 17.8 SL (Hilmidia) | 0.006% | 30.40(33.45) | 28.80(32.43)b | 30.40(33.43)bcd | 30.40(33.43)bc | 31.20(33.93)b |
| Thiomethoxam 25% WG (Click) | 0.008% | 31.20(33.93) | 28.80(32.45)b | 32.00(34.43)b | 31.20(33.93)b | 32.00(34.42)b |
| Azadirachtin 0.15% EC (Achook) | 5 ml/L | 32.00(34.42) | 28.00(31.90)b | 28.80(32.43)bcd | 28.00(31.93)bc | 27.20(31.40)bc |
| Azadirachtin 1% EC (Ozoneem Trishul) | 3 ml/L | 33.60(35.37) | 29.60(32.91)b | 31.20(33.92)bc | 26.40(30.85)bc | 24.80(29.73)c |
| Azadirachtin 1% EC (Ozoneem Trishul) | 4 ml/L | 32.00(34.43) | 28.00(31.93)b | 29.60(32.93)bcd | 24.00(29.21)cd | 22.40(28.15)cd |
| Azadirachtin 1% EC (Ozoneem Trishul) | 6 ml/L | 32.80(34.80) | 28.00(31.90)b | 27.20(31.40)bcd | 20.00(26.45)de | 18.40(25.33)d |
| Control | - | 31.20(33.93) | 38.40(38.28)b | 39.20(38.75)a | 45.60(42.45)a | 46.40(42.93)a |
| S.Em (±) | - | - | 1.02 | 0.99 | 1.39 | 1.34 |
| CD (0.05) | - | - | 2.94 | 2.86 | 4.02 | 3.87 |

Similar alphabets denote homogeneous means due to Duncan's test * Mean of five replications, Figures in parentheses are angular transformed values

ml/L) and significantly superior over imidacloprid (0.006%), thiomethoxam (0.008%), azadirachtin 0.15% EC at (5 ml/L) and azadirachtin 1% EC at (3 ml/L).

Lall & Sharma (5) reported on controlling *Acrocercops cramerella* infesting litchi, which revealed that endosulfan 0.08%, carbaryl 0.3%, dimethoate 0.45% and phosphamidon 0.05% showed satisfactory result in the reduction of larval population. Bhatia *et al.* (1) reported that endosulfan at 0.05% and 0.1% was moderately effective in controlling *Conopomorpha*

cramerella. According to Ranjan & Singh (6) field efficacy of two rounds of spraying at an interval of 15 days during April showed 22 %, 34.7 %, 38 % and 38.3 % fruit infestation when treated with carbaryl (0.2%), endosulfan (0.07%), neem oil (0.2%) and nimbecidine (0.25%), respectively. Biswas *et al.* (2) reported that the order of effectivity of the pesticides used against litchi fruit borers was endosulfan 0.07% > endosulfan 0.07%+nimbecidine 0.2% combination > carbaryl 0.1% > nimbecidine 0.2% > neem seed kernal extract 4%.

From the study of bioefficacy of various insecticides against this pest, dichlorvos (0.076%) and endosulfan (0.07%) were found to be very effective and resulted in lower fruit infestation as compared to other chemicals. But from the export point of view, application of azadirachtin 1 % E C (6 ml/L) was found to be most effective.

Acknowledgement

The authors are thankful to the Officer -In-charge of All India Coordinated Research Project on Sub-Tropical Fruits for providing facility for carrying out the experiment.

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