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# Bio-rational management of thrips (*Thrips tabaci* Lindeman) infesting cucumber under polyhouse condition

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**Abstract**
The present experiment "Bio-rational Management of Thrips (*Thrips tabaci* Lindeman) Infesting Cucumber under Polyhouse Condition" was conducted to study biointensive approaches against thrips on cucumber under polyhouse condition during *rabi* 2018. The treatments, Neem oil @ 1 ml/l, Karanj oil @ 1 ml/l, *Metarhizium anisopliae*@ 4 gm/l, *Lecanicillium lecanii*@ 4 gm/l, Mineral oil hortimin @ 0.5 ml/l, Polyether Modified Trisiloxane @ 0.25 ml/l, were evaluated along with the standard check of lamda-cyhalothrin @ 0.5 ml/l. Among the bio-rational components entomopathogenic fungi, *Lecanicillium lecanii* and *Metarhizium anisopliae* proved to be effective, having gradual cumulative reduction after the application of consecutive sprays. Among the oils, neem oil (botanical) @ 1 ml/l and Hortimin @ 0.5 ml/l were the second best bio rational components. The treatment with lambda cyhalothrin @ 0.5 ml/l was significantly superior in the suppression of thrips and yield.

**Keywords:** Bio-rational, thrips, cucumber, polyhouse

## Introduction
Due to the high productivity of cucumber under polyhouse condition and its consistent demand in the market the area under cultivation is increasing. At the same time pest and disease are regularly occurring on the cucumber under polyhouse condition due to uniform climatic condition. The farmers are mostly dependent on chemical insecticides for the control of insect pest which are regularly occurring namely leaf hoppers, aphids, whiteflies, scale insects, thrips and mites to have developed resistance to insecticides [1]. The entomopathogenic fungi has an important position among all the bio-control agents because of its route of pathogenicity, broad host range and its ability to control both sap sucking pests such as thrips, aphids, mealy bugs as well as pests with chewing mouth-parts [2]. Botanicals like neem seed powder extract and neem soap can be effectively used as alternative to synthetic insecticides [3]. Plant essential oils in general have been recognized as an important natural source of pesticides and favours beneficial insects [4]. To mitigate the adverse effect of chemical insecticides, the present investigation has been conducted to evaluate eco-friendly options of pest management against thrips on cucumber under polyhouse condition.

## Materials and Methods
Cucumber seeds were sown in the plots of size 4 m x 1 m i.e. One rack containing 20 pots. Seeds of variety "Falconstar" were sown in the pot with the spacing 60 cm x 30 cm with FYM and coco-pit mixture. Three sprays were given at an interval of 15 days. For recording observations on thrips, ten plants were selected randomly from each plot. Pretreatment count was recorded one day before spraying and observations on post treatment count were taken on 3, 7, 10 and 14 days after spraying. The observations were taken in morning hours, by three tapings on upper, middle and lower leaf i.e. 3 leaves each from 10 selected plants per plot on black paper sheet. Nymphs and adults were counted with the help of magnifying lens (10x). The data on thrips population per plant was used to calculate percent reduction in population in each treatment using the formula given by Henderson and Tilton (1955) [5]. Data on percent reduction was transformed into Arc Sin values and subjected to CRD analysis to draw valid conclusion.

## Result and Discussion

The treatment with lamda-cyhalothrin @ 0.5 ml/l was found to be superior at all intervals of observations in controlling the thrips in cucumber under polyhouse condition. The trisiloxane @0.25 ml/l was found to be unconventional option in controlling thrips equal in its efficacy to Hortimin @0.5ml/l at first interval of observation but reduction in Trisiloxane start declining 7 days after spraying (DAS) whereas Hortimin @0,5ml/l and Neem oil 1 ml/l were effecting till 10 DAS. However, Karanj oil @ 1 ml/ l was least effective in reducing thrips amongst all ecofriendly options under test.

The bio-intensive treatments with by *Lecanicillium lecanii* and *Metarhizium anisopliae*@ 4 g/l were next best to standard check of lamdacyhalothrin at 14 DAS with 62.36 and 60.38% reduction of thrips which indicates that myco-insecticides have taken their time for mycosis in first 7 to 10 days and actual reduction was observed in last interval of observation. It was also noticed that the per cent reduction was gradually increase as the number of sprays progressed it is due to which may be due the cumulative effect of fungal pathogen in plot. Thus, bothmyco-insecticides *Lecanicillium lecanii and Metarhizium anisopliae*@ 4 g/l were proved the best bio-intensive option for the suppression of thrips in cucumber under polyhouse conditions. The thrips population was successfully controlled in cucumber by using *L. lecanii* and *M. anisopliae* [6], under polyhouse, shade net and field condition, respectively [7-9].

Use of surfactant polyether modified trisiloxane@ 0.25 ml/l also found one of the ecofriendly option for the thripscontrol which is more or less equal in efficacy percentage with mineral oil (Hortimin). Surfactants mainly act as a physical poison as well as they might be affecting physiological activity of the insect pests. These methylated silicones are considered inert ingredients, but their superior surfactant properties allow them to wet, and either suffocate or disrupt important physiological processes in mites and insects. These results are in support of current results. The mortality due to the use of silicon based surfactant in the present study is confirmed [10, 11].

The botanical oil such as neem oil @ 1 ml/l also found to be more or less similar effect as like myco-insecticides and superior than mineral oils. Neem oil was found as essential component of IPM against thrips in cucumber under protected conditions which is in accordance with the present results of neem oil against thrips in cucumber [12, 8]. The mineral oil (Hortimin) @ 0.5 ml/l found to be successful in reduction of thrips. Mineral oil was found as a effective eco-friendly option for the control of legume bud thrips [13]. Whereas, it was less effective option than neem oil in controlling thrips in cucumber, conforms the present results. However, the least effective treatment among the bio-rationales was karanj oil in the present research, which is confirmed by the results which reported the karanj oil as a least effective in reducing thrips population among all botanicals [14]. The treatment, lamda cyhalothrin @ 0.5 ml/l recorded significantly highest yield of cucumber (23.81 t/ha) followed by neem oil formulation @ 1 ml/l (20.33 t/ha) which is at par with *Lecanicillium lecanii* @ 4 g/l (18.67 t/ha). Remaining treatments except untreated control (13.40 t/ha) were statistically similar in recording yield

## Conclusion

*Lecanicillium lecanii and Metarhizium anisopliae* once again proved to be effective, having gradual cumulative reduction after the application of consecutive sprays. Among the oils, neem oil (botanical) and hortimin (mineral oil were the biorational components in management of thrips. Moreover, Trisiloxane found to be the nonchemical option in for the control of thrips but it may need frequent application. Also, it may become good substitute in breaking the resistance to insecticides and effective component in organic farming of cucumber under polyhouse condition.

**Table 1:** Pooled data on bioefficacy studies after three sprays:

| Treatment No. | Treatment details | Dose | Pre-Count thrips/3 leaves/ Plant $ | Mean Per cent reduction of thrips at | | | | Yield (t/ ha) |
|---|---|---|---|---|---|---|---|---|
| | | | | 3 DAS # | 7 DAS # | 10 DAS # | 14 DAS # | |
| T1 | Neem oil formulation | 1 ml/l | 21.03 (4.69) | 57.44 (49.25) | 64.70 (53.53) | 61.44 (51.59) | 54.40 (47.50) | 20.33 |
| T2 | Karanj oil formulation | 1 ml/l | 19.92 (4.57 | 56.03 (48.44) | 56.79 (48.88) | 50.12 (45.05) | 44.13 (41.61) | 16.10 |
| T3 | *Metarhizium anisopliae* | 4 g/l | 20.49 (4.63) | 43.86 (41.45) | 47.51 (43.55) | 55.65 (48.22) | 60.38 (50.97) | 18.00 |
| T4 | *Lecanicillium lecanii* | 4 g/l | 18.32 (4.39) | 45.86 (42.61) | 50.04 (45.00) | 57.30 (49.18) | 62.36 (52.13) | 18.67 |
| T5 | Mineral oil (Hortimin) | 0.5 ml/l | 19.65 (4.54) | 60.23 (50.88) | 60.39 (50.98) | 56.07 (48.46) | 51.22 (45.67) | 17.33 |
| T6 | Polyether Modified Trisiloxane (Break-Thru) | 0.25ml/l | 23.55 (4.95) | 61.68 (51.73) | 55.62 (48.21) | 51.98 (46.11) | 46.80 (43.14) | 17.66 |
| T7 | Lambda cyhalothrin | 0.5 ml/l | 16.96 (4.23) | 76.92 (61.26) | 86.17 (68.14) | 82.55 (65.28) | 74.42 (59.59) | 23.81 |
| T8 | Untreated control | --- | 22.87 (4.88) | 6.28* | 17.03* | 25.36* | 29.47* | 13.40 |
| | SE ± | | 0.04 | 0.29 | 0.48 | 0.26 | 0.42 | 0.62 |
| | CD @ 5% | | 0.13 | 0.90 | 1.47 | 0.80 | 1.30 | 1.86 |
| | CV% | | 1.63 | 1.03 | 1.63 | 0.90 | 1.51 | 5.87 |

$ indicates figures in parentheses from this column are √n+1 transformed values

# indicates figures in parentheses from these columns are arc sin transformed values

* indicates per cent increase in population in untreated control over pre-count

DAS- Days After Spraying

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