

**Interactions Between the Predatory Bug *Orius laevigatus*
and the Entomopathogenic Nematode *Steinernema feltiae*,
Natural Enemies of the Western Flower Thrips**

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Abstract

The western flower thrips (WFT), *Frankliniella occidentalis* (Pergande), is an important cosmopolitan pest of many field, greenhouse and ornamental crops all over the world. In addition to direct damage caused by feeding on plant parts, WFT transmits different kinds of viruses to a wide range of plants. Chemical control of *F. occidentalis* is generally difficult due to the pest's habit, development of insecticide resistance, fast spreading over the world, high reproductive rate, pupation in soil and wide host range.

Biological control could be the alternative way to control this pest. However inundative release of predatory mites and bugs and inoculative release of entomopathogenic nematode have not been found effective in reducing the population of WFT to a desirable level. The combined action of multiple biological control agents has yet to be tested. The desirability of using multiple biological control agents to control a specific pest is a highly debated issue. Biological control can be more effective if the natural enemies perform in a synergistic or additive mode in suppressing the pest. If intraguild predation exists among the natural enemies, this may result in higher mortality of natural enemies and lower mortality of the pest. The predatory bug *Orius laevigatus* and entomopathogenic nematode *Steinernema feltiae* are natural enemies of WFT that are widely used to control this pest. Study of the about possible interaction of these two natural enemies is essential to explore possibilities in biological control of western flower thrips.

The overall objective of the study was to explore possible interactions between *Orius laevigatus* and the entomopathogenic nematode *Steinernema feltiae* (predation, parasitism and synergism) and the impact of the nematode on the population of western flower thrips in the presence of naturally occurring *Orius* in pepper fields in the Arava.

Experiments were conducted in the laboratory to determine possible interactions between *Orius* and the nematode. Adult *Orius* females and fifth instars were placed in Petri dishes with filter paper soaked with a nematode

suspension (5000/ml water); filter paper soaked with water served as a control. Survival time of the predator was recorded twice daily and dead predators were dissected to identify nematode infections. Significantly shorter survival time of *Orius* was observed in nematode treatments as compare to controls. About 80% were infected with the nematode. To study the food preference of *Orius* in the presence and absence of nematodes, starved *Orius* females were offered various foods in arenas with and without nematodes. Negative response of the predator towards the nematode was recorded; *Orius* clearly avoided the nematode-infected arenas. Similarl experiments were carried out to determine the ability of *Orius* to differentiate between nematode-infected and healthy thrips. Thrips were infected with nematodes, and *Orius* was offered one nematode-infected and one healthy thrips. *Orius* did no feed preferentially on healthy thrips.

To study the impact of the nematode on western flower thrips populations, an experiment was carried out at the Arava experimental station on peppers grown in screen tunnels. The entomopathogenic nematode *Steinernema feltiae* strain IS6 was applied at a rate of 150 / cm² along a 2m row. Water was applied as a control. A total of four tunnels served as blocks, with two replicates per tunnel. Leaf samples were collected after 14 and 26 days and insects were counted under a stereo microscope. No significant difference was found between WFT populations in control and nematode treatments. Similarly, there was no significant different between the populations of *Orius* in control and nematode treatments.

In conclusion, under laboratory conditions *Orius* and *Steinernema feltiae* were found to be incompatible for use in biological control of western flower thrips. In spite of these findings, field experiment need to be conducted. No significant impact of the nematode on western flower thrips control was found in the presence of naturally occurring *Orius* in the Arava valley, Israel.