Managing western flower thrips by the use of biocontrol agents in conventional and solar greenhouses

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Western flower thrips (*Frankliniella occidentalis*) are one of the most important greenhouse pests in Canada and throughout the world. They have a wide host range that includes greenhouse vegetable crops, flower crops, ornamentals and nursery crops. Thrips scratch and pierce their mouthparts into plant tissue to suck out the cellular contents. This results in the deformation of flowers, leaves, shoots and fruits. The damage by thrips reduces the photosynthetic area, weakens plant vigour, destroys the plants visual appeal and makes produce unmarketable Thrips also transmit and spread plant viruses.

A study was initiated at Assiniboine Community College's sustainable greenhouse with 3 conditions; a conventional greenhouse and 2 solar greenhouses. The objective or goal was to control pests by using biological control agents (living beneficial organisms, called natural enemies) and minimize the use of chemical pesticides in the greenhouse. There are a variety of vegetable, nursery and ornamental crops being grown this greenhouse. Before setting up this experiment, a concerted effort was made to control thrips through various pesticide applications with little success.

Thrips control was extremely difficult for several reasons. Adult female thrips lay eggs inside the leaf or petal tissue such that the eggs are protected from pesticides. The eggs hatch into larvae which usually remain protected in flower buds or foliage terminals. During the next stage, the insects move down into the growing media to pupate and remain protected from pesticides. Since the two stages (egg and pupal) are completely protected from direct contact with pesticides, successful control with chemicals was limited.

The experiments began with regular monitoring the pest population in all three conditions. *Ambysieus cucumeris* (predatory mite) was applied on plant alone, and was applied along with soil applications of *Steinernema feltiae* (parasitoid nematodes) to reduce number of larvae feeding on plants and the adults emerging from pupation. Our results revealed that these biological controls agents tested were highly effective at controlling thrips. The pest population numbers and crop damage were significantly reduced in the greenhouse. Effectiveness of biocontrol agents to control thrips was higher when both *A.cucumeris* and *S. feltiae* were used together as compared to when *A. cucumeris* was used alone. Within a 6 months' time period, weekly monitoring revealed that the thrips population in the conventional greenhouse decreased from 132 to 15 per 4 inch^2 yellow sticky card. In the first solar greenhouse, thrips decreased from 50 to 5 per 4 inch^2 yellow sticky card. The second solar greenhouses greenhouses saw a reduction from 30 thrips to 3 per 4 inch^2 yellow sticky card. Currently no pesticide have been applied for over a year. The thrips are being successfully managed using only biocontrol agents. Biocontrol agents have proved to be safe, effective, environment friendly, target specific (in comparison to chemical pesticides), and are providing a long-term solution to the pest problems.

Key Words: western flower thrips, biocontrol agents, greenhouse, predators, parasitoids

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