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Biocontrols for High Tunnel *Cannabis sativa*

Judson Reid, Cornell Cooperative Extension

High tunnels are lower technology greenhouses that use the soil for crop production. High tunnels are an effective tool for farmers that desire to extend their growing season with the technology benefits of a greenhouse while using 'field' soil as a growing medium. High tunnels can be used to exclude certain pests and diseases, however the hot, dry environment can accentuate certain pests compared to field production. In the case of *C. sativa*, this would include Western Flower Thrips, Aphids and Two Spotted Spider Mites. The soil-based nature of high tunnels can lead to overwintering of these pests as well.

The introduction of beneficial insects and mites, herein called biocontrols, is an effective pest management technique in other high tunnel crops. Biocontrols are known to have a delay in control (when compared to 'sprays'), therefore must be used preventatively. The value of *C. sativa* and lack of registered pesticides justifies the long term strategy and expense of introduced biocontrols.

The specific biocontrol to be introduced depends on the pest species present in the high tunnel. In the case of Thrips, Aphids and Two Spotted Spider Mites there are different biocontrols best suited to control each pest. Below we give brief examples of options for these common Cannabis pests.

For Two Spotted Spider Mites the predatory mite *Phytoseiulus persimilis* can be effective. These highly specialized predators require high relative humidity to survive, so may require repeat releases. Other beneficials to control mites include *Feltiella acarisuga* and *Amblyseius californicus*. Again, plan to release these biocontrols before mites are a visible presence in the crop. These predators are shipped in packaging that can be shaken out into the crop to assure uniform distribution.

P. persimilis in a shaker bottle to be distributed in a high tunnel crop for Two Spotted Spider Mite control

Biocontrols for aphids include parasitoids, which lay eggs inside aphids, or predators, which attack and consume aphids. Parasitoids often target specific species of aphids, which can make biocontrol selection a challenge. An advantage of predators over parasitoids, is the wide diet range of predators. The predatory gall midge *Aphidoletes aphidimyza* is an example. This wasp preys on over 60 species of aphid. *A. aphidimyza* lays up to 70 eggs within an aphid colony. The larvae hatch and directly attack live aphids. The larvae will eventually drop to the soil to pupate and remerge as adults. The adults are night fliers attracted to aphid colonies. The potential exists to establish an ongoing population of this beneficial in high tunnels. Some keys to success with this biocontrol:

- Scout for aphids and release early in an outbreak.
- Keep nighttime temperatures above 60F.
- Place the release bottle within crop canopy for shade and relative humidity.

Control of Thrips in high tunnel settings parallels Two Spotted Spider Mite Control, however we rely on generalist (vs specialist) predatory mites. These include the predatory mites:

- *Amblyseius swirskii,*
- *Amblyseius cucumeris,*
- *Amblydromalus limonica*

Other generalist predators with increased mobility: include Lady beetles, Rove beetles and Lacewings. Note that even 'natural' spray materials do not combine well with the release of biological controls. Biocontrols are best introduced early within the production cycle before populations are high.

Interested in learning more? Biocontrol suppliers have excellent websites and staff that are willing to customize a biocontrol plan. Suppliers include:

- Arbico
- Biobest
- IPM Labs
- Koppert

A. aphidimyza for aphid control in a high tunnel crop.

We encourage growers to reach out to the Harvest NY Emerging Crops educator, Daniela Vergara or High Tunnel Specialist Judson Reid with questions on biocontrols in high tunnel crops.

Judson Reid jer11@cornell.edu

Daniela Vergara dv255@cornell.edu