

**Title:** Increasing use of biocontrol in NYS greenhouses with a producer-based biocontrol mentoring network

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**Abstract:**

There is a low adoption of biocontrol for pest management in NYS greenhouses although it has been used successfully elsewhere for years. Because lack of experience is a deterrent for adoption, a project to encourage grower-to-grower training and discussion on biocontrol was initiated, funded by NYFVI. A group of NY growers toured Canadian greenhouses using biocontrol and participated in outreach activities after their return to share what they had learned. Because the number of tour participants was low, and additional meetings were needed to encourage the exchange of information, a series of 6 on-farm grower discussions were held around the state. Sites were chosen based on grower experience or interest in biocontrol, and the grower led the discussion, explaining how they used biocontrol in their operations. Other resource people, from research, industry and extension, contributed information but the discussion followed the questions from the audience. In most cases, the group also toured the greenhouse to see biocontrol in action. Evaluations after the event showed that most growers intended to try biocontrol. Response was very positive on the interaction and the format as well as the information presented.

**Background and justification:**

While biocontrol methods have been used successfully for insect control as a part of Integrated Pest Management (IPM) programs for many years, there is a low adoption of these practices by NYS greenhouse producers. In a 2000 survey of greenhouse growers (Lamboy, IPM Pub. 417), only 13% (65 of 507) reported that they used biological control. Information from growers suggests that the low adoption of biological control as a method of IPM is based on lack of experience with the procedures or unsuccessful previous attempts. Because biocontrol requires a lot of new information and adaptation to each situation, it is a good candidate for farmer-to-farmer mentoring with a grower who has successfully implemented it.

There are several examples of producer to producer interaction being successful in transferring new technologies and procedures, including the Tactical Agriculture (TAg) teams used by NYS IPM in field crops. Small groups of growers discuss pest management problems and compare methodologies that have worked to give everyone the benefits of the group's knowledge. The Ontario greenhouse growers are another example of producer-to producer interaction intended to result in reduced pest losses for all the participants and is one of the reasons that they have successfully adopted biological control.

This project was funded by the New York Farm Viability Institute.

**Objectives:**

1. Identify and work with a base group of producers to increase their knowledge of biocontrol methods for greenhouse production

2. Encourage the formation of a producer to producer teaching/mentoring web for increasing adoption of biocontrol as a pest management method in NYS greenhouses

Procedures:

The initial step in the project was a tour to visit floriculture greenhouses in Ontario, Canada that were successfully using biological insect control in order to give a group of growers the experience of seeing successful biocontrol and talking directly to growers using it. Ontario was chosen as the site of the tour because there is a concentration of growers using biological control in an area that can be toured in a relatively short period, without extensive or expensive travel to get there. A tour was chosen as the means of transferring information as producers can see the procedures ‘in action’ and discuss them with producers who have similar production, quality, environmental, etc. constraints.

On the suggestion of the tour participants who saw local workshops as a way to encourage the discussion of biocontrol in greenhouses, particularly retail operations, we planned a series of 6 workshops around NY. The locations were Williamsville, Warwick, Cicero, Keene Valley, Peconic, and Rensselaer. In most cases, local CCE Educators helped us identify the locations and also helped with registration and local arrangements. There was no set agenda for the program but a variety of resources were provided. At each program, several people were involved in the discussion in addition to the local grower. John Sanderson, Department of Entomology/Cornell, Carol Glenister, IPM Labs, Mark Yadon, Mischler’s Florist, Laurie Mickaliger, Land Stewardship/Long Island, Jim Willmot and Rick Yates, Griffin, and local CCE Educators each participated in some of the programs. The intent was to encourage questions from the audience based on the grower’s descriptions of the biocontrol procedures they had tried and how successful they had been. In most cases the discussion was followed by a tour of the facility to see the biocontrol in action.

Results and discussion:

The tour was successful in that the participants were enthusiastic about the information and the majority intended to apply it in their own greenhouses. Further evaluations indicate that about a third started or increased their use of biocontrol. The limitation in the tour was the low number of participants. While each did participate in one or more outreach activities, there was not a large enough base, nor were they confident enough in their knowledge, to serve as the foundation for a mentoring network. Therefore, we decided to put on the series of on-farm tour/discussion workshops.

Approximately 135 people attended the workshops. Most were growers but several Master Gardeners also attended. The growers ranged from those experienced with biocontrol to others that were just considering it and from owners of large wholesale greenhouses to small retail operations. Based on the 96 responses to the evaluation, 36% were already using biocontrol, most commonly for aphids, whitefly and thrips. Eighty-two percent were considering using it after the program. Future evaluation will give us a more complete view of how many try biocontrol in the next season. Thrips, fungus gnats and aphids were highest on that list, probably in part because of the experienced growers’ explanations of their successful use of biocontrol to manage these pests. In fact, the ‘experts’ would not have suggested thrips biocontrol as a good place to start, so the growers were definitely providing a mentoring effect.

There was a wide range of additional information requested. On-site visits and hands-on assistance were most frequently requested. Other ‘hot’ topics are insect id training, compatibility

with pesticides, and application methodology. Workshops were considered the best way to extend information. On-farm tours and printed materials were also requested and we are starting to see requests for web-based information. In the open ended comments section, several people noted that they liked the interaction and atmosphere of the discussion format.

Although it is difficult to create mentoring groups from a single event, 84% of those answering the questionnaire said they would be willing to help us share the information with other growers, which suggests there is a basis for cooperative information exchange. Several comments indicated that just learning that the grower wasn't the only one with a particular situation was helpful and that they enjoyed the opportunity to share information. We are hoping to hold follow-up meetings in the same locations with specific educational content to build on the interactions already formed. As one participant said, "Don't give up hope – adapt, adjust and overcome!"

Implications:

There is certainly growing interest in the use of biocontrol, particularly in retail greenhouses in NY. With a large number of growers just starting out with biocontrol, it may be difficult to set up mentoring networks, on the one hand, because of a small number of experienced growers. On the other hand, new adopters might be willing to share information as in a sense they are all in the same boat and understand where each other are in the process. It will certainly take more work to see a functioning information/mentoring network in place, but I think the groundwork has been laid.

Project location:

On-farm workshops

C. J. Van Bourgondien, Inc., Peconic, Suffolk  
Mischler's Florist, Williamsville, Erie  
Becker's Farm, Rensselaer, Rensselaer  
Technigrowers Greenhouse, Warwick, Orange  
Barone's Greenhouse, Cicero, Onondaga  
Rivermede Farm, Keene Valley, Essex

Samples of resources:

General information on biocontrols (below)



Deborah Sweeton describes her biocontrol program to other growers at her farm in Warwick NY



## General information on biological control agents

Biological control type	Pests controlled	Application method	Comments
<b>Wasps</b>			
<i>Aphidius colemani</i>	Green peach aphid Melon aphid	Mummies mixed with carrier	Golden brown mummy
<i>Aphidius ervi</i>	Potato aphid Foxglove aphid	Mummies mixed with carrier	Golden brown mummy
<i>Aphelinus abdominalis</i>	Potato aphid Foxglove aphid	Adults (feed and parasitize eggs)	Black mummy
<i>Encarsia formosa</i>	Greenhouse whitefly	Loose pupae Pupae on cards	Black pupae Parasitize and feed on larvae
<i>Eretmocerus eremicus</i>	Greenhouse whitefly Silverleaf whitefly	Pupae with carrier	More tolerant of higher temperatures than <i>Encarsia</i>
<i>Eretmocerus mundus</i>	Silverleaf whitefly	Loose pupae Pupae on cards	More tolerant of high and low temperature than <i>E. eremicus</i>
<i>Diglyphus isaea</i>	Leafminer larvae	Adults	Parasitize and feed on larvae Will work on high populations
<i>Dacnusa sibirica</i>	Leafminer larvae	Adults	Use with low populations
<i>Synacra</i>	Fungus gnat larvae		Wild spp?
<i>Hexacola neoscatellae</i>	Shoreflies		Wild spp?
<b>Mites</b>			
<i>Phytoseiulus persimilis</i>	Two spotted spider mite	Adults and nymphs mixed with carrier	Red mites Can move plant to plant if plants touch Doesn't tolerate high temperature or low RH
<i>Amblyseius</i>	Two spotted spider	Adults and nymphs	More tolerant of high

<i>californicus</i>	mite Broad mite Cyclamen mite	mixed with carrier	temperature and low RH than <i>P. persimilis</i> Will also feed on pollen
<i>Amblyseius cucumeris</i> ( <i>Neoseiulus</i> )	Thrips	Slow release sachets with bran and bran mites Sprinkled with carrier Blown with carrier	Will also feed on pollen
<i>Amblyseius swirskii</i>	Greenhouse whitefly Silverleaf whitefly Thrips larvae	Slow release sachets with bran and bran mites Sprinkled with bran	
<i>Amblyseius degenerans</i>	Thrips	Adults and nymphs mixed with carrier	More tolerant of low RH than <i>A. cucumeris</i> Better in flowers Also feeds on pollen
<i>Hypoaspis miles</i>	Fungus gnat larvae Thrips pupae Root aphids	Adults and nymphs mixed with carrier	Best used preventatively
<i>Hypoaspis aculeifer</i>	Bulb mites Fungus gnat larvae Thrips pupae Root aphids	Adults and nymphs mixed with carrier	
<b>Gall midges</b>			
<i>Aphidoletes aphidimyza</i>	Aphids	Pupae with carrier	
<i>Feltiella acarisuga</i>	Two spotted spider mite Carmine spider mite	Pupae on leaf	Use in combination with <i>P. persimilis</i>
<b>Rove beetle</b>			
<i>Atheta coriaria</i>	Shore fly larvae Fungus gnat larvae Thrips pupae	Adults with or without carrier	Adults and larvae feed in soil Adults can fly
<b>Lacewings</b>			
<i>Chrysopa spp.</i>	Aphids Others - thrips, spider mites, whitefly, small caterpillars, mealybugs	Larvae in cardboard cells	Only larva active Tolerant of temperature and RH fluctuations
<b>Ladybugs</b>			
<i>Adalia bipunctata</i>	Aphids	Larvae with carrier	Adult and larva active

<i>Stethorus punctillum</i>	Two spotted spider mite Carmine spider mite Spruce spider mite		Used with predatory mites
<i>Cryptolaemus montrouzieri</i>	Mealybugs	Adults	Adults and larvae active
<i>Delphastus pusillus</i>	Greenhouse whitefly Silverleaf whitefly	Adults	
<i>Harmonia axyridis</i> (Multicolored Asian ladybeetle)	Aphids		Aggregation and odor
<i>Hippodamia convergens</i> (Convergent ladybeetle)	Aphids		Dispersal unless fed
<b>Predatory bugs</b>			
<i>Orius insidiosus</i> (Minute pirate beetle)	Thrips Other - whiteflies, aphids, red spider mites	As adults with carrier	Also feeds on pollen Takes time to become established
<i>Orius laevigatus</i>	Thrips Other - whiteflies, aphids, red spider mites	As adults with carrier	
<i>Orius majusculus</i>	Thrips Other - whiteflies, aphids, red spider mites	As adults with carrier	
<i>Macrolophus caliginosus</i>	Whitefly	Nymphs and adults with carrier	
<i>Dicyphus hesperus</i>	Whitefly		
<b>Nematodes</b>			
<i>Steinernema feltiae</i>	Thrips Fungus gnat larvae		
<b>Hoverflies</b>			
<i>Episyrrhus balteatus</i>	Aphids	Pupae on cards	
<b>Hunter fly</b>			
<i>Coenosia attenuata</i>	Fungus gnat adults White fly		Introduced Catches insects on the fly