Create Continuous Biocontrol in Greenhouses: 5 Ways

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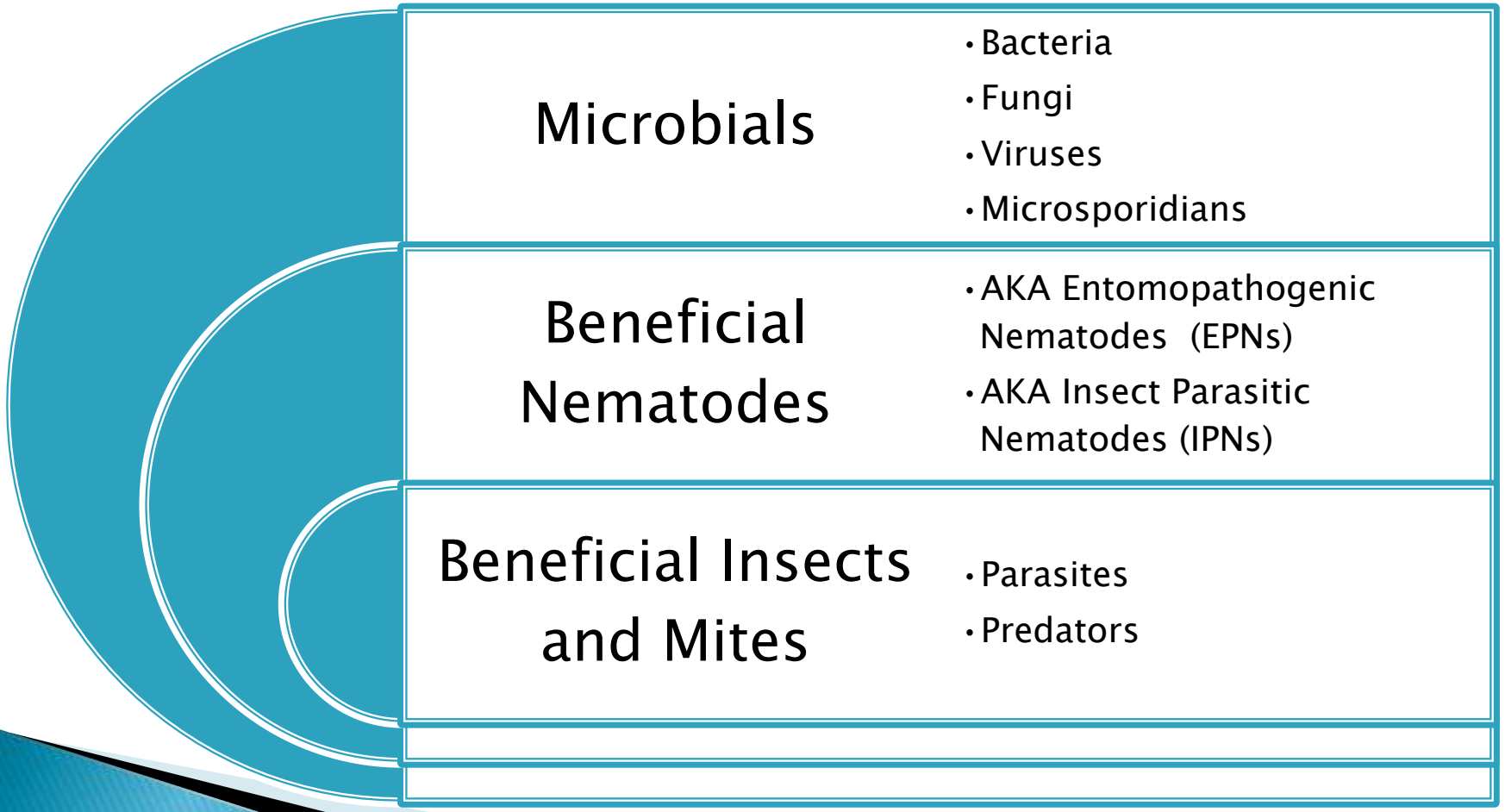
Today's topics

- Biological control basics
- Continuous presence of beneficials
- Banker Plants
- Habitat Plants
- Pollen supplementation
- Ephestia egg supplementation
- Breeding Sachets
- Spider mite banker plant research supported by SARE grant.

What are biocontrol agents (BCAs) ?
Natural Enemies of pests manipulated by humans



Fundamentals of Successful Biocontrol

- Keep pest numbers low from the beginning. Biocontrol is preventative
- Right BCA's for the pest identified
- Be sure that the biocontrols are constantly exerting pressure on the pest
- Compatible chemicals

Repeated applications

- One way to assure constant presence of BCAs
- Apply fresh BCAs weekly or every other week

What kinds of beneficials are released continuously?

- Nematodes, weekly for thrips
- Cucumeris, weekly or biweekly for thrips
- Predatory mites for spider mites biweekly or monthly
- Aphid parasites and aphid midges weekly or biweekly

Thrips control with nematodes
new and unexpected, not scientifically proven but there are 7+ years of success

Roger McGaughey
Michaels Greenhouse
2009

250 million beneficial nematodes (S. feltiae) per 1.5 A weekly for thrips control along with wetting agent, Capsil

Sprayed in high humidity, (evenings, rainy days) so the nematodes are not inactivated by drying

Mechanized application techniques

- Modified leafblower makes application of predatory mites for
  Spider mite and
  Thrips control
  in just minutes

Modified Leafblower for regular application of Cucumeris for thrips

Why Time Treatment for the First Generation?

Pest	Reproduction	Time Period
Aphids	3-6 live young	daily
Fungus Gnats	100-300 eggs	7-10 days
Spider Mites	90-200 eggs	8-12 days
Thrips	25-200 eggs	10-21 days
Whitefly	8-400 eggs	9-40 days

Timing is IMPORTANT

Ten-fold increase per generation			Number of Survivors	
Time	Generation	Number	30% kill (70% survivors)	80% kill (20% survivors)
3 wks	1st	1000	700	200
6 wks	2nd	5000	3500	1000
9 wks	3rd	25000	17,500	5000
12	4th	125,000	87,500	25,000

Aphid Population Growth With No Natural Enemies or Pesticides and a 3-day doubling time

Day #	0	3	6	9
# Aphids	100	200	400	800

Aphid Population Growth With No Natural Enemies or Pesticides and a 3-day doubling time

Day #	12	15	18	21
# Aphids	1,600	3,200	6,400	12,800

Aphid Population Growth With No Natural Enemies or Pesticides and a 4-day doubling time

Day #	0	4	8	12
# Aphids	100	200	400	800

Aphid Population Growth With No Natural Enemies or Pesticides and a 4-day doubling time

Day #	16	20	24	28
# Aphids	1,600	3,200	6,400	12,800

The Exceptions: easy establishers

- Stratios (old name Hypoaspis) soil dweller predator mite which finds all it needs in the substrate after a single release
- Dalotia (old name Atheta) soil dweller same as the Stratios

Dalotia = Atheta (a rove beetle)…
very short elytra (wing covers)

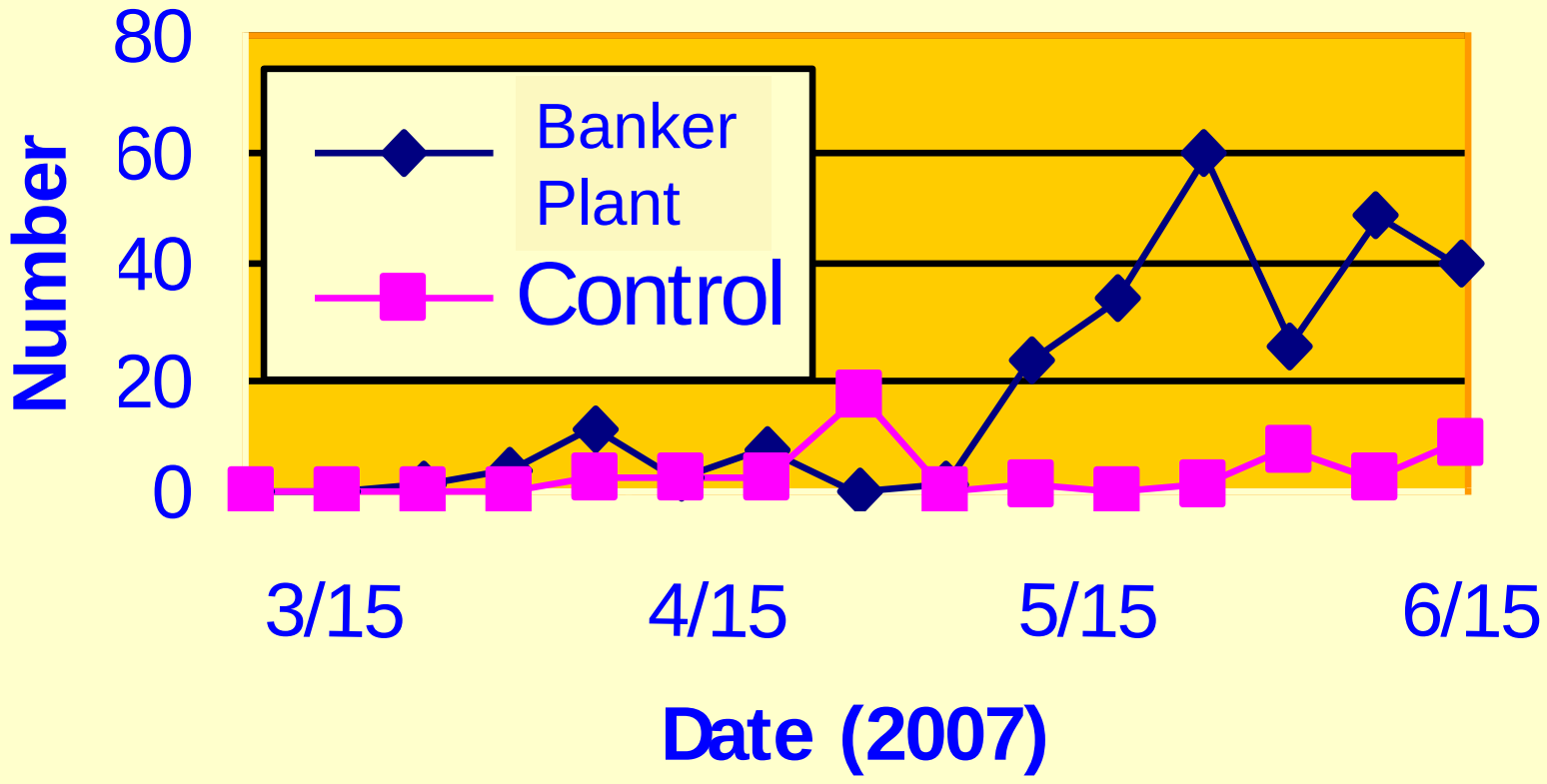
Nematode drench to new flats for fungus gnat control. Dr. John Sanderson's study shows that these nematodes persist for many weeks.

Aphid Banker Plant

Cereal aphid plus Aphidius colemani or Aphidoletes

Number of Aphid Parasites on Sticky Cards by Week

(Aphidius released 3/28 and 4/5 at Bakers Acres)



Habitat: ornamental peppers

- Pepper flowers are a favorite habitat of Orius
- The # of Orius is directly related to the # of pepper flowers
- The flowers offer pollen and small “rooms” to keepthe Orius nymphs away from each other

Any ornamental pepper but black pearl fruits are not flowers!

Purple Flash works particularly well

- Faster flowering
- Long bloom period

Sweet alyssum
another favorite of Orius

Dicyphus hesperus /mullein

- Mirid bug on first year mullein plants
- Generalist predator used for whitefly control in vegetables.

Ontario Ministry of Agriculture

“New” predator foods

- Cattail pollen to support predatory mites
- Ephestia eggs for Orius and Dicyphus

Cattail Pollen

- Supports Swirskii
- Resistant to Botrytis
- Spread very thinly to avoid feeding thrips
- 500 g per ha (5 g / 1000 sq ft)

Ephestia Eggs

- Grain moth eggs
- Tiny eggs, about the size of pollen
- Adds a little meat to the plant diet on habitat plants
- Add some every week or 2

Breeding units

- Self-contained
- Cucumeris for thrips and broad mite
- Swirskii for whitefly & thrips& broad mite

Sachets or slow release bags

Minisachets for hanging baskets.

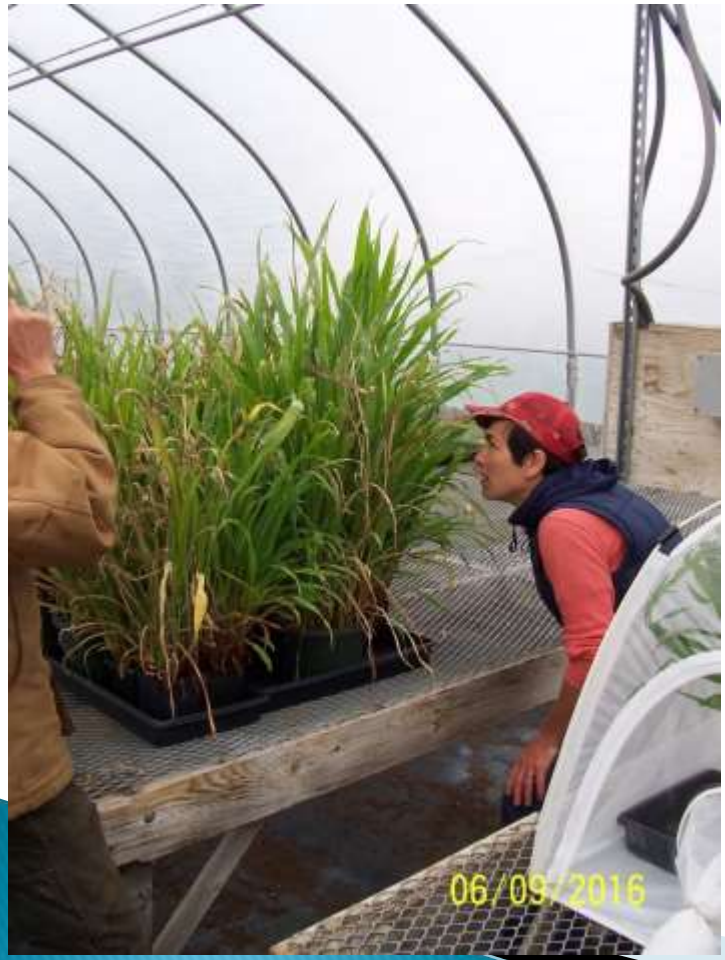
Banks grass mite on corn to support spider mite predators

- 2016 SARE grant
- A method demonstrated by Dr. Lance Osborne in Apopka FL
- Attempted to address a need in tomatoes to have the predatory midge Feltiella establish early before spider mites start to do damage in the tomatoes.

Organic CSA near Burlington VT

Andy Jones and Jill Rotondo, BP experimenters beside nursery area

Assessing the Banks grass mite #'s



Tomato greenhouse

Searching for Feltiella on banker plants in tomato greenhouse

Spider mite predator beetles & immatures common on BP system


08/05/2016

Numerous Feltiella larvae on bean trap plants

Experimental outcome

- Feltiella colonized the corn briefly but appeared to prefer the beans and tomatoes
- Sandy Menasha alerted us that the Banks grass mite also attacked the beans (broad leaved plants)
- The best corn (at Nathan Ludlow's) had roots going into the ground under the pot> The corn tassled and fruited. All the over-crowded corn simply died.

For Success:

- Select the right BCA for the pest and habitat
- Release early, when the pest first gets started
- Create continuous presence
- Avoid pesticides harmful to BCAs

Acknowledgements

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Thank you!

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