Pesticides and BCA’s....how about compatibility?

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What do we need to consider when thinking about compatibility?:

- Which product
- Which BCA’s
- Application technique (Spray, drench, drip, fog)
- Direct effect
- Residual effect

But above all:
- Is it really necessary to spray?
- Are there any other options?
- Do I need to apply everywhere or can I spot treat?
- How did it get to this point??
- How can I avoid this situation( in the future)?
- Is this going to affect my overall pest management program?
Here are some points for discussion:

• Which pesticides, pest and BCA (‘s) are we talking about?
• What crop? (poinsettia = easier → cut gerbera more complicated)
• What stage of the crop (size of the plant)
• When was the pesticide used → this or previous crop, GH structure…
• Where was the product used (supplier or at own GH)
• Geographical location → Conditions
• What other BCA’s are used in the ‘bio-control system’?
• How is the planned application going to impact the overall system?
• How well are BCA’s established in the crop, especially those that might be affected?
• How fast can a BCA re-establish after an application?
• What if residues of pesticides on cuttings is unknown?
• Check out the side effect manual at [www.biobest-usa.com](http://www.biobest-usa.com)
• Available as mobile application (i-phone, blackberry…)

However….
• Also talk to your consultant **prior** to application!!!

The side effect list **does not** take into consideration:
• Your bio-control system → Multiple BCA’s in the system
• The current status of your system (pest and BCA levels)
• What is the prognosis/outlook
• Long term effect on the system
• Size of the plant
• Your location
• Threshold of pest problems
Greenhouse cucumber production:
• How many thrips is acceptable??
• What is the ratio pest – BCA?
• How does thrips respond if pesticide is applied?
• Are there any other options
• Bio-control is pro-active
• Patience → it takes time
What is a ‘clean’ cutting or plant?

- Abamectine (Avid)
- Buprofezin (Talus)
- Fenazaquin (Milicide)
- Pyridaben (Sanmite)
- Pyriproxifen (Distance)
- Spinosad (Conserve)
- Spiromesifen (Judo)
- Thiacloprid (neonic)
- Thiamethoxam (Flagship)
- Novaluron (Pedestal)

- Acephate (Orthene)
- Aceрапrid (Tristar)
- Bifenthrin (Talstar)
- Clothianidin
- Cyfluthrin (Neonic)
- Imidacloprid (Marathon)
- Lambda-cyhalothrin
- Methamidiphos (Monitor)
- Methomyl (Lannate)
- Omethoate
- Oxamyl (Vydate)
History of cuttings/plugs/plants is VERY important:

- “Clean” means as low as possible pest levels on cuttings/plugs……
- However, does it also mean no long residual pesticides on plant material?
- If resistance development starts at breeders, guess what will happen……..the problem gets larger as it goes down the line!
- Producer of cuttings/Breeders → their actions can affect your program → ‘Clean’ plugs / plants are important
- Grower to breeders and propagators → your reaction can trigger their actions.
- Positive and constructive communication between breeder, propagator/rooting station, and grower is very important!
- It is not a blaming game! → Industry needs to solve these challenges as a team.

Encarsia formosa & Eretmocerus mundus
Poinsettia Mix cards used in stock plants
This is possible!
Residual effects of pesticides

This too!

Amblyseius cucumeris mini sachets for thrips control
Clean vegetable propagation

No residue of pesticides

*Amblyseius cucumeris* mini sachets for thrips control
Residual effects of pesticides

Worst case scenario?

- Acaricide (Pyriproxyfen)
- Buprofezin (Taurus)
- Fenazaquin (Mitec)
- Pyridaben (Sanmite)
- Pyriproxifen (Distance)
- Buprestan (Conserv)
- Spinosan (Endrudis)
- Thiobencarb (niconic)
- Thiamethoxam (Flagship)
- Nevaluron (Pedesta)
- Befluzate (Cithane)
- Acetamiprid (Tebon)
- Imidacloprid (Brazo)
- Aludrin
- Efikrin (Rovral)
- Imidacloprid (Meronon)
- Lambda cyhalothrin
- Methamidophos (Monitor)
- Malathion (Levate)
- Chlorpyrifos
- Dinotefuran
Biological control as a first line of defense

- Biological control is a systems approach! → Trying to do one pest problem with BCA’s and another with a strictly pesticide program is difficult and asking for trouble!
- A pest problem that didn’t use to be a problem when on a traditional program can disrupt a program that includes BCA’s → don’t let a problem like that torpedo your program!!!
- Best results are achieved if the all key pest problems are all pro-actively dealt with using BCA’s as a first line of defence.
- If hot spots arise, consider other options first before spraying a traditional pesticide.
- Many newer pesticides are more compatible with BCA’s, however they can be compatible for some and not for others.
- If no other option is possible (and there are moments when this can happen) consider the least harmful product that you have available that can do the job. Also, consider spot treatments before full house treatments!

As an example:
- In traditional programs → Thrips is often most challenging
- In bio-control programs → Aphids are often most challenging
An example of compatibility...

Cut gerbera production:
- Whitefly
- Leaf miner
- Aphids
- Spidermite
- Thrips
BCA’s and possible pesticides used in gerbera crops:
What is compatibility in a cut gerbera crop?

A. swirskii
Eretmocerus eremicus.
Encarsia formosa
Delphastus spp
Aphidius spp
Aphidoletes aphidimyza.
Feltiella acarisuga
Phytoseiulus persimilis
Diglyphus isaea.
Orius insidiosus.

Compatible with BCA’s?

Imidacloprid (Marathon)
Pyridaben (Sanmite)
Pymetrozine (Endeavor)
Bifenazate (Floramite)
Cyromazine (Citation)
Abamectine (Avid)
Acetamiprid (Tristar)
Pyriproxifen (Distance)
Spinosad (Conserve)
Compatible with BCA’s?

Compatible with biological control agents: Compatibility in a Gerbera crop?

A. swirskii
Eretmocerus eremicus.
Encarsia formosa
Delphastus spp
Aphidius spp
Aphidoletes aphidimyza.
Feltiella acarisuga
Phytoseiulus persimilis
Diglyphus isaea.
Orius insidiosus.

Compatible
Not compatible
Risky

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Compatible with biological control agents: Compatibility in a cut gerbera crop?

- A. swirskii
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Compatible with MOST/SOME biological control agents!!!

A. swirskii
Eretmocerus eremicus.
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Compatible with BCA’s?

Compatible
Not compatible
Risky
Compatible with **MOST/SOME** biological control agents!!!

Created a WF problem → What options?

**Compatible**

- A. swirskii
- Eretmocerus e remicus.
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- Delphastus spp
- Aphidius spp
- Aphidoletes aphidimyza.
- Feltiella acarisuga
- Phytoseiulus persimilis
- Diglyphus isaea.
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**Not compatible**

**Risky**

- Imidacloprid (Marathon)
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- Abamectine (Avid)
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- Pyriproxifen (Distance)
- Spinosad (Conserve)
Compatible with MOST/SOME biological control agents!!!????

WF problem (3 Wks. later) → What options?

- A. swirskii
- Eretmocerus eremicus
- Encarsia formosa
- Delphastus spp
- Aphidius spp
- Aphidoletes aphidimyza
- Feltiella acarisuga
- Phytoseiulus persimilis
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- Orius insidiosus.

Compatible with BCA’s?
Compatible with MOST/SOME biological control agents!!!
Grower decides to use Marathon:

- A. swirskii
- Eretmocerus eremicus
- Encarsia formosa
- Delphastus spp
- Aphidius spp
- Aphidolletes aphidimyza
- Feltiella acarisuga
- Phytoseiulus persimilis
- Diglyphus isaea
- Orius insidiosus

Compatible
Not compatible
Risky
Compatible with MOST/SOME biological control agents!!!

Leaf miner and thrips population increases:

- A. swirskii
- Eretmocerus eremicus
- Encarsia formosa
- Delphastus spp
- Aphidius spp
- Aphidoletes aphidimyza
- Feltiella acarisuga
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- Imidacloprid (Marathon)
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- Spinosad (Conserve)
Compatible with MOST/SOME biological control agents (BCA)???

Leaf miner and thrips population increases:

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**Not compatible**
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- Acetamiprid (Tristar)
- Abamectin (Avid)
- Cyromazine (Citation)
- Bifenazate (Floramite)
- Pymetrozine (Endeavor)
- Spinosad (Conserve)

**Risky**
- Spinosad (Conserve)

Compatible with BCA’s?
Compatible with MOST/SOME biological control agents!!!????
Looks complicated ?????

- A. swirskii
- Eretmocerus eremicus.
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- Aphidius spp
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Compatible with BCA's?
Another example of compatibility...

Tomato production:
- Whitefly
- Two Spotted Spider Mite
- Aphids
- Loopers
- Tomato Pinworm
- Tomato Russet Mite
Another example of compatibility...

What is difference between these two tomato crops??
DEVELOPMENT OF PLANT, WF AND BCA'S

BIOLOGICAL CONTROL OF GREENHOUSE WHITEFLY ON TOMATO

First cluster (flowers) – L1
- Adult whitefly lays eggs mainly in top of the plant
- HOST FEEDING:
  - Encarsia (3-4 / day) and Eretmocerus (20-30 / day).

2nd cluster
- L2
- PARASITISM:
  - Second larval stage is parasitized by Eretmocerus

3rd cluster
- L3
- PARASITISM:
  - Third larval stage is parasitized by Encarsia and Eretmocerus

4th cluster
- * Adult whitefly
- * Black or yellow pupae

5th cluster
- Encarsia and Eretmocerus will hatch from pupae

Do not deleaf
- 6th cluster
- 7th cluster

Deleafing
- 8th cluster
- Red tomatoes

13 August 2014

Our advice, your growth!
BCA’s and possible pesticides → Tomato crops:
What is compatible?

Compatible

Eretmocerus eremicus.
Encarsia formosa
Dicyphus hesperus
Aphidius ervi
Aphidoletes aphidimyza.
Feltiella acarisuga
Phytoseiulus persimilis
Diglyphus isaea.

Not compatible

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Abamectine (Avid)
Buprofezin
Pyriproxifen (Distance )
B.bassiana Botanigard WP

Risky
Compatible with BCA’s?

BCA’s and possible pesticides → Tomato crops: What is compatible?

Compatible

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Bumble bees.

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Compatible \(\rightarrow\) Not compatible \(\rightarrow\) Risky

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- B. bassiana Botanigard WP

Compatible → Not compatible → Risky
BCA’s and possible pesticides → Tomato crops:
This is the best option if it is needed!
Unlimited applications → resistance development

Compatible with BCA’s?

**Eretmocerus eremicus.**
- Imidacloprid (Marathon)

**Encarsia formosa**
- Pyridaben (Sanmite)

**Dicryphus hesperus**
- Pymetrozine (Endeavor)

**Aphidius ervi**
- Bifenazate (Floramite)

**Aphidoletes aphidimyza.**
- Dinotefuran

**Feltiella acarisuga**
- Abamectine (Avid)

**Phytoseiulus persimilis**
- Buprofezin (Talus)

**Diglyphus isaea.**
- Pyriproxifen (Distance )

**Bumble bees.**
- B.bassiana Botanigard WP
## Side Effect Information

### 13 August 2014

**Our advice, your growth!**

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<td><strong>Encarsia formosa</strong></td>
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<td><strong>Eretmocerus spp.</strong></td>
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**Note:** The table represents the impact of various pesticides on different species. The symbols and numbers indicate the effectiveness and persistence of each pesticide on the life stages of the species.
Compatible with BCA’s?

Take home messages:
• Think carefully and investigate before jumping the (spray)gun
• Is it really necessary to spray or are there other options?
• Is the situation close to ‘turning point’?
• Deliberately trying to combine pesticides and BCA’s in a pest management strategy is dangerous and often leads to disappointing results!
• Often a full house pesticide application can trigger other problems to start developing as a pesticide can be compatible with some BCA’s, but not with others!
• Often in more complex systems (such as cut & potted gerbera, spring crops, potted mums… ) applying a full house application can trigger the ‘beginning of the end’ effect.
• There are very few true compatible products in the sense that they are completely compatible with all BCA’s.
• Check out the side effect list at www.biobest-usa.com
• Talk to your consultant before application!
• If absolutely necessary, limit sprays to spot application if possible
Experience has taught that:

Growers who are using BCA’s as their first line of defense, and look at the big picture of their pest problems, and minimize pesticide use, are generally speaking more successful with Biological Control Systems.
Questions?

Thank you!

Doug Barrow
Biological Crop Protection Specialist
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