

## January 12, 2016, Biological Control in Greenhouses – Success is in the Details!

### Step by Step, Our Schedule for Using Biocontrols

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1. List of cutting/plug/ plant Dates
  - a. This is used to help preorder bio's
  - b. Or you can order bio's weekly if needed.
  
2. List of Bio's to use when opening greenhouse and Thrips/shore fly /fungus gnats control:  
Thrips control:
  - a. Nematodes- Fungus gnats, shore fly, thrips and leafminers (note: different species needed for shore fly)
    - i. Apply with water on cloudy days or later in day for best results
    - ii. Apply on floors or ground before opening greenhouse
    - iii. Apply with a weekly spray over production area cuttings/plugs /plants
    - iv. Apply on newly transplanted product or product that has just arrived
    - v. Order at least 1 pack for every week (1 box holds 5 packs of 250ml does about 25,000sq.ft area these come in smaller packs 50ml. We order 1 box a month in advance for 6 months.
    - vi. Reapply more often on hot spots if needed
  - b. Atheta – Rove Beetle – fungus gnat, shore fly and thrips
    - i. 1 liter tube with ( 500/1000/3000)
    - ii. Apply board casting over plants and ground usually when plants are first arrive or are transplanted into greenhouse.
    - iii. Reapply for hot spots during the season.
    - iv. Order first week that plant material arrives or for weeks that you do heavy transplanting or when opening new greenhouses.
    - v. Reorder and reapply only for hot spots.
  - c. Hypoaspis-Mites used for (fungus gnats and shore flies)
    - i. 1 liter tube with ( 10,000/25,000)
    - ii. Apply broad casting over plants and ground usually when plants first arrive or are transplanted into new greenhouse.
    - iii. Reapply for hot spots during season.
    - iv. Order first week that plant material arrives or for weeks that you do heavy transplanting or when opening new greenhouses.
    - v. Reorder and reapply only for hot spots.
  - d. Amblyseius Cucumeris or ABS System- Thrips and sometimes spider mites
    - i. 1 liter Tube (25,000 mites){about 500 trays}/ 5 liter bucket( 100,000 or 250,000 mites){about 3000pots} sachets with hooks /without hooks and on a stick (5000 mites )
    - ii. Apply by broad casting over plants, also apply in small piles (1tsp. or pinch) on each tray, hanging pot or tray with pots.
    - iii. If holding plugs for short time (1 week to 2 weeks before transplanting into larger pots- apply by broadcasting once a week until transplanted
    - iv. Larger pots apply sachets (like no hooks and on a stick best for flowers or in pots, use sachets with a hook on vegetable plants such as cucumbers and eggplant for more coverage.
    - v. Reapply sachets every 6-8 weeks, broadcast over plug trays once a week and if using piles reapply when transplanted or about once a month.

So, I order one Tube of Atheta and Hypoasais for every week I have shipments coming in based on my plug orders. If shipments are small I will combine two weeks together and get one order. I will also order one of each when we open a greenhouse for our vegetable crops, once these crops have been sowed into (ground or beds or pots) I will broadcast or sprinkle some in each container or pot or over the crop. Once you have introduced these into your greenhouse you shouldn't have to reapply for the season unless you have hotspot.

Cucumeris – I order tubes and buckets for our propagation range. I will order tubes for first week since or 2<sup>nd</sup> shipment is usually a larger order I'll order a bucket and use for piles and broadcasting for a couple of weeks. I order sachets before we transplant or to come in the following week. This way I can get exact amount ordered based on total pots planted.

### 3. Aphids Control – Banker plants are used to house and grow predatory wasp.

#### a. Banker plants – Barley with Cherry Bird aphid

- i. Order 1 to 2 plants to arrive at least two weeks before plugs arrive or when opening greenhouse.
- ii. Split and plant into hanging pots put fresh seed (oats or Barley) around plant grow for about 1-2 weeks in a controlled area separate from greenhouse.
- iii. Move all pots except for one into greenhouse bunch together you will then add the *Aphidius colemani* and *Aphidius matricariae* to these ( you can use hairnets over these) but we just bunch together and after about two weeks you should see Mummies and can move to each greenhouse or bay.
- iv. Use the one leftover pot for making more bankers seed new hangers with oats or Barley Cut off tips of larger banker with aphids and place on top of the newly seeded pots, as grass grows the aphids will jump onto the new sprouts. Also leave the larger banker in with the new pots.
- v. Important to grow far away from bankers infected with *Aphidius*. We grow these in basement of home,
- vi. We continue to make new banker pants until we have one for each greenhouse or bay in gutter connected, these continue to last all season, you might need to trim the grass back in hangers and pots during the season.

#### b. *Aphidius Colemani* – green peach aphids

- i. Order these to come in 2 weeks after you have ordered banker plants

#### c. *Aphidius Matricariae*- green peach and tobacco aphids

- i. Order these to come in 2 weeks after you have ordered banker plants
- ii. Best use on tomato, eggplant, peppers and roses
- iii. We use both *Aphidius* on our flower production and Vegetable production.

#### d. *Chrysopa* (green lace wing larvae)-

- i. Order these for hotspots of aphids liter bottles of (500/1000) or bucket of 10,000.
- ii. Apply these directly on top of aphids and in pots.
- iii. Reapply only if needed for addition hotspots they stick around until food they also are good on mealybug, thrip, red spider mites, whiteflies, and small caterpillars.
- iv. We've never had to use on our flower crop but use on vegetable crops (eggplant, peppers ) they work very fast. We see results within 1 – 3 days.

### 4. White Flies:

You see ONE white fly on a stick card assume there are more and go order your Cards or if you see white flies flying around near their favorite crops (lantana, Fuchsia or Tomato, and eggplants)

- a. Eretmix Cards – For tobacco and greenhouse whitefly occurring together.

- a. Order a box of these (50 or 100) cards these come with hooks to be hung on branches or place in and around areas you have spotted whitefly or have on sticky cards.
  - i. Best to place these in shady areas under leaves on branches or under benches.
- b. Order one box per week for greenhouse flowering crops only if you spot white fly and continue for about two weeks. If you have a lot continue for three weeks you should be rid of them by then.
- c. For Greenhouse Tomato crop we order one box of 100 cards for every week once the plants are a foot tall (or you have spotted white fly) until you are done picking the entire crop.
  - i. We also rotate these on the plants one week low and next week higher as plants get taller, then low again.
- d. Encarsia – Parasitic wasp
- e. Eremocerus – Parasitic wasp

5. Sticky cards:

- a. Put out after you received your plants( usually Yellow).
- b. Monitor cards at first about once a week not necessary to replace unless you have a lot of activity on them.
- c. Check every week usually on weekends or Mondays gives you time to order by midweek if you come across hot spot. Replace about every two weeks or when needed, with bankers up in greenhouse you'll start to see Aphidius all over the cards. Let's you know that the good bugs are still there and how many there are.
- d. You can also change to Blue sticky cards (these catch less aphidius and still catch thrips).

If you are unsure start small, pick one crop in one greenhouse we started with our production area first. Adding another greenhouse range the next year and using Banker plants.

This sounds like a lot of extra work but remember Bio's do not require a license to buy, or apply and can be done anytime of the day, and you don't have to close up greenhouse areas. Anyone can apply usually only takes a couple of minutes and there's no suiting up and wearing respirators.

For us we have more control with bio's then pesticides because most pesticides only work on one or two stages of a pest life cycle where bio's continue to work at all the different stages.