Rearing & Applying Nematodes to Control Alfalfa Snout Beetle

2010

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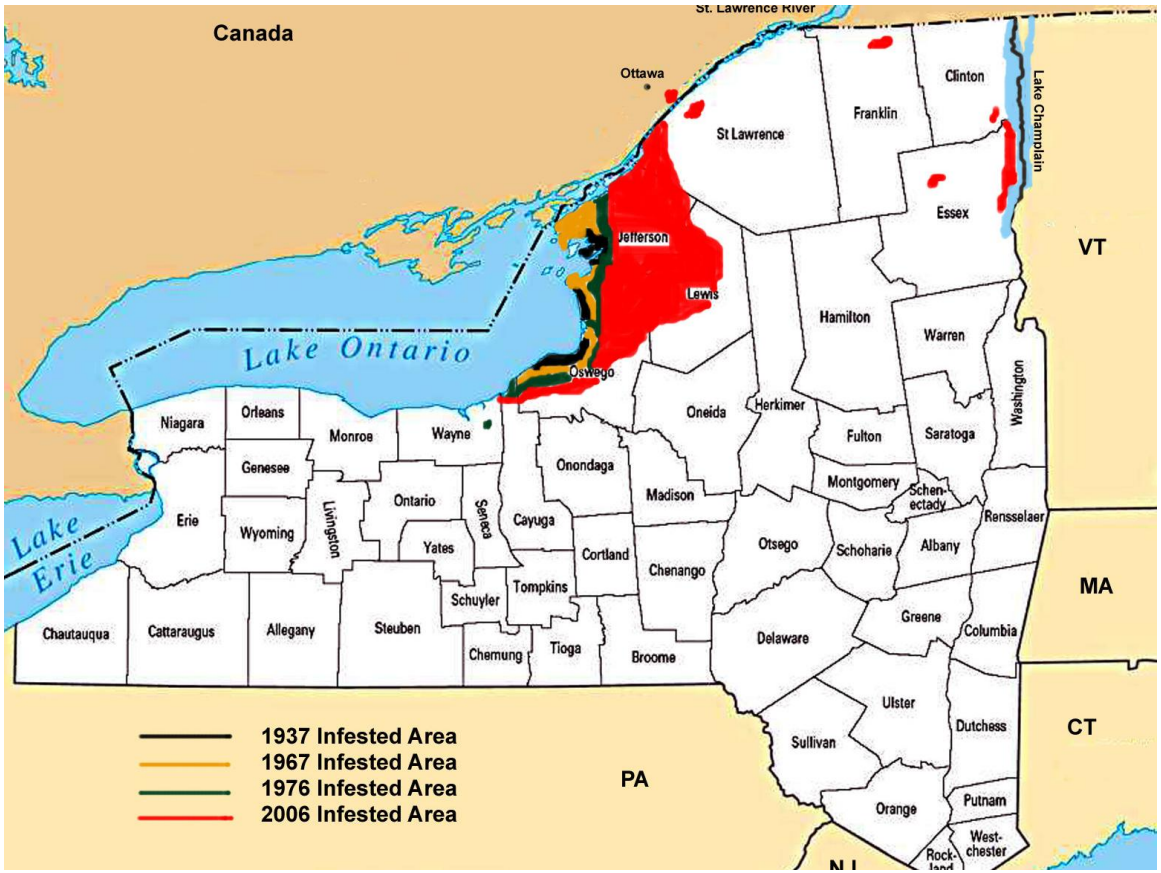
Alfalfa Snout Beetle (ASB)

Background

- In NY, 500,000 acres of agricultural land is estimated to be infested.
- This severe pest is currently restricted to nine counties in NY and a small portion of Ontario, Canada.
- Once established, ASB can destroy entire alfalfa stands in one growing season.
- Adult ASB feed on red and white clovers, broad-leaved dock, wild carrot, wild strawberries, blackberries, dogwood, other legumes and weeds.
- Costs for producing milk rises between 22-25% due to rising feed costs to purchase protein supplement, added replanting costs, and lower yields.



ASB INFESTED AREA

This severe pest is currently restricted to nine counties in NY and a small portion of Ontario, Canada.

Signs of Infestation

- Winter Kill
- Plant Upheaval
- Stand Loss
- Leaf Feeding

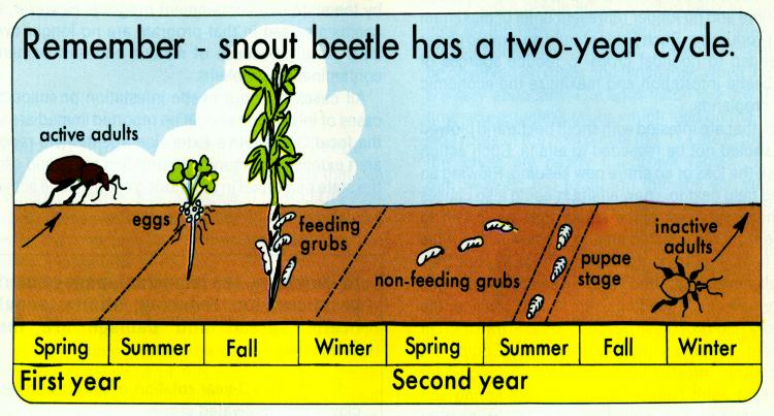
Life Cycle of ASB

Year 1

May: Adults emerge and feed on alfalfa and clover foliage for three weeks to build up fat reserves for egg laying.

May-June: Adults enter a non-feeding dispersal phase, laying eggs at the base of host plants. One adult can lay up to 500 eggs.

June-November: Larvae feed on alfalfa plant roots, the most heavily damaged plants begin to die in August. Remaining plant death occurs in September-October. In November larvae burrow deep into the soil for a full year, they become adults the following summer.



Year 2

April-May: Stand loss is noticed, fields are patchy or barren. Open areas quickly fill in with weeds and grass.

June-August: Larvae remain in hibernation, 18-24” deep in the soil, finish developing and turn into adults.

Year 3

April-May: ASB that began in Year 1 now emerge in alfalfa fields as adults.

Biological Control

Entomopathogenic Nematodes

- Cornell University, in collaboration with NY Farm Viability Institute and Northern NY Agricultural Development Program, have developed a low-cost bio-control procedure to reduce current infestation levels and to help prevent further spread of the insect.
- Biological control is accomplished by inoculating fields with entomopathogenic nematodes (EPNs).
- Close soil contact makes ASB susceptible to attack by EPNs which are insect attacking nematodes.
- The nematodes staged release from host insects are called infective juveniles (IJs).

- Long-term biological control appears to be a feasible management strategy and studies indicate that EPNs can persist in soils for a number of years.
- Alfalfa snout beetles are exposed to EPNs at different stages of their life cycle and at various depths within the soil profile.
- Long-term management strategies turned to using a multi-species EPN approach.
- Results showed significant impact of using the multi-species approach in areas of heavy ASB infestations.
- It is also important to rotate alfalfa and corn if possible to control or prevent infestations.

On-Farm Rearing

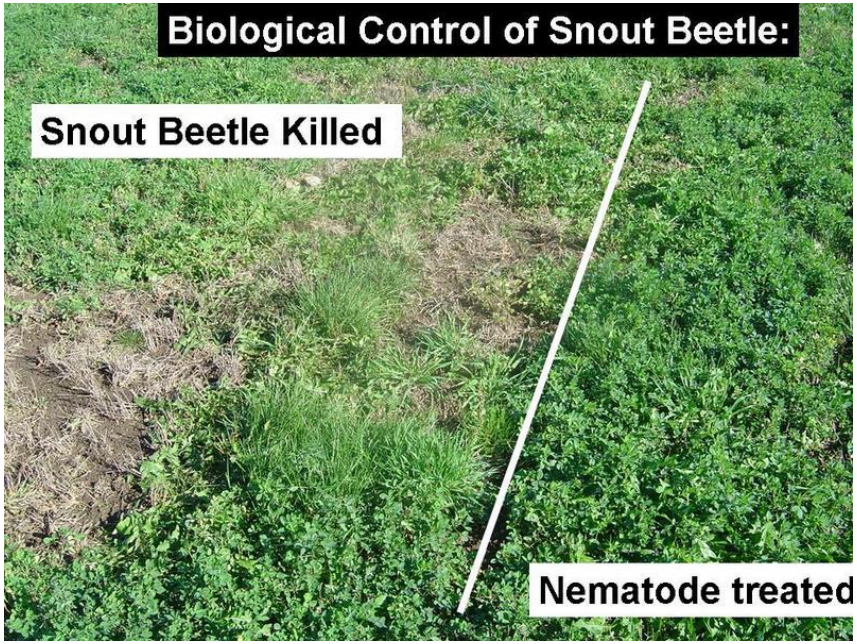
Why

- Protect your crop.
- Prevent financial burden of infestation.
  - An estimated cost of $1,100/acre in the 2nd year
  - $530/acre in 3rd year

Who

- Producers who have alfalfa fields in the 2nd year or 1st year after a grass stand should protect their fields
  - First year alfalfa does not have ASB or other hosts for the nematodes to feed on so there is a low chance of establishment
- Kids may enjoy being involved
  - FFA and 4-H members can help

Benefits



- Protect your crop with a safe, environmentally friendly biological control that is native to the area
- The nematodes will recycle in the field for years given sufficient hosts, research is being completed to see if corn provides sufficient hosts.

Rearing the Nematodes

Timeline

- 17 Days Before Harvest: Order starter cups from Cornell & wax worm larva from supplier
- Date of Harvest: Begin rearing the nematodes
- Three Days After Inoculation: Check for 90-100% infection
- 12-14 Days After Inoculation: Check for yellow clumps on lid and sides of tub
- 14-16 Days After Inoculation: Apply on fields

Materials

- The required amount of wax worm larva cups
  - 8 tubs per 50 gallons of water, four of each species
  - 200 million nematodes per 50 gallons of water
  - 50 gallons will cover approximately 1.7 acres
- Starter tubs of nematodes, one for each of the species
- Water bottle with squirt top, syringe, or paint brush
- Fresh, non-chlorinated water
- Bowls or beakers
- Measuring cup- 2 are helpful
- Dark space at room temperature (65-75° F)

Getting Started

- Cornell will provide starter cups to generate EPNs
- Order the cups & wax worm larva 17-21 days before the planned harvest
  - It is best to order wax worm larva in large orders so producers may collaborate to order together
- Keep wax worm larva at 40-50 degrees until the nematodes are applied

On the day the field is cut…

1. Rinse the nematodes off the lid of the starter cup with non-chlorinated water into a measuring cup. Yellow clumps should be visible on the lids and the water should have yellowish clouds. Can use paint brush, water bottle, or syringe.
2. Add water to the measuring cup until there is a half cup or 4 ounces total.
3. Measure out 1/8 cup and spread it evenly around a tub of wax moth larvae.
4. Repeat with the other 3 tubs for the species.
5. Cover the tubs and label with the species and date.
6. Wash everything or use different cups and repeat steps 1-4 with the second species.

Storage

- Dark space
- 65-75°F
  - Do not let get them get too hot because they will die.
- A Basement is usually good
- Do not store in boxes- they hold in heat
- They begin to smell, so do not put them in a highly used area

3 days later…

- Check for 90-100% infection.
- It should look like this:

Sfv

SC

- If this has not happened, the inoculation was not successful. You can wait for more nematodes to emerge and retry 2-4 days after the first wash.

At 14- 18 days…

- There should be evidence of infective juveniles on the lids and sides of the tub.
- They will often form clumps, like on the left side of this tub:

- If these are visible, the tub can be used for field application.

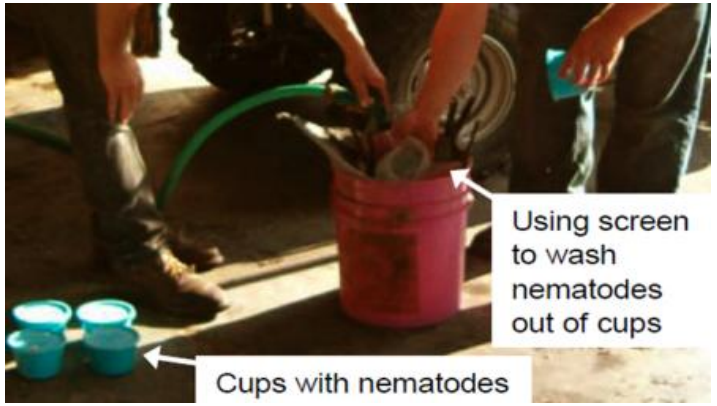
Field application

Materials

- Tubs of infected wax moth larvae
  - 4 tubs of each species for 50 gallons of water
- Sprayer without screens or filters
- Non-chlorinated water
- 5 gallon bucket
- Large funnel
- 3 sq ft of window screen
- Clamps

About two weeks after the stand was harvested…

1. Clamp the window screen to the top of the funnel.
2. Place the funnel in the top of the bucket.
3. Dump the contents of the tub of wax moth larvae onto the window screen.
4. Spray water over the contents and screen so the nematodes will wash through. The sawdust & larvae should stay on top.



5. As the bucket fills, dump it into the sprayer tank.
6. Remaining dead wax worm larva and unused nematodes from the cups can be dumped into a garden/area of the farm so the following year soil can be dug up and wax worms added to determine if you have a source point. The area used to dump should be separated for each species.
7. Continue until all the tubs for this application are filtered and added to the tank.

Sprayer Options

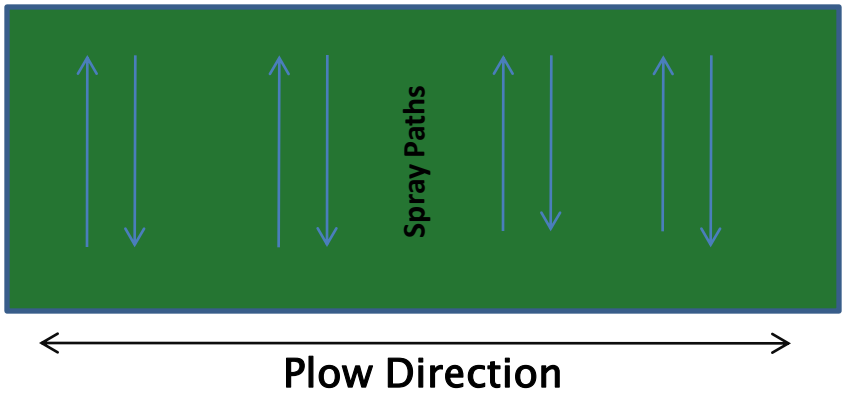
- Make sure there are no screens or filters.
- Wash sprayer with ammonium and water to clean out any chemical residues.

3- point hitch sprayer used by Mike Kiechle, Jeff. Co.

Gary Sullivan, Lewis Co., sprays with a gravity feed sprayer made from PVC pipe.

Apply the Nematodes

- Apply after 6:30pm to avoid damage from UV radiation.
- Multiple options:
  - Spray the entire field (requires many more tubs and costs more).
  - Spray paths across the field that are perpendicular to the way the field will be plowed, which can facilitate the spread of the nematodes throughout the field.



Contact Information

Wax Moth Larvae Suppliers	
Morning Dew II 1-800-430-3899 1-607-387-4059	King's Wholesale Bait 765-458-6968
County Extension Agents	
Jefferson Michael Hunter meh27@cornell.edu 315-788-8450 St. Lawrence & Franklin Stephen Canner src93@cornell.edu 315-379-9192 ext 233	Lewis Joe Lawrence jrl65@cornell.edu 315-376-5270

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