



Teresa Rusinek/NEFV

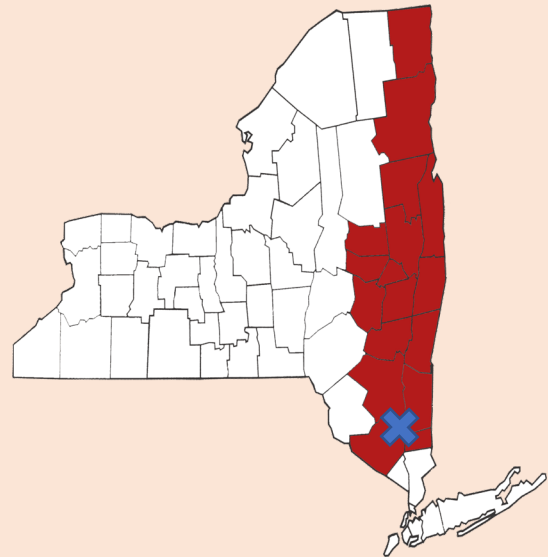


# Teresa Rusinek

*Vegetable Production Specialist*



The **Eastern New York Commercial Horticulture Program** is a Cornell Cooperative Extension partnership between Cornell University and the CCE Associations in 17 counties.



# Biology: Wireworm (larva) / Click Beetle (adult)

- Order :Coleoptera (beetles)  
Family: *Elaterridae*
- ~30 species in Northeast- **primarily wheat (*Agriotes*), corn (*Melanotus*) and eastern field wireworm (*Limonius*)**
- Lay eggs in grassy fields **May thru late- June**
- Up to **5 yrs** in soil as wireworm



## High Risk Fields

- Long-term grass- pasture, or grass hay (timothy/legume mix)
- Planted after small grains ( wheat, barley)
- Weedy cultivated fields
- Poorly drained & irrigated soils favorable for certain wireworm species, *Ctenicera* do better in drier soils
- Red/sweet clover rotations more than one year promote millipede populations often found with wireworms, similar damage to wireworms



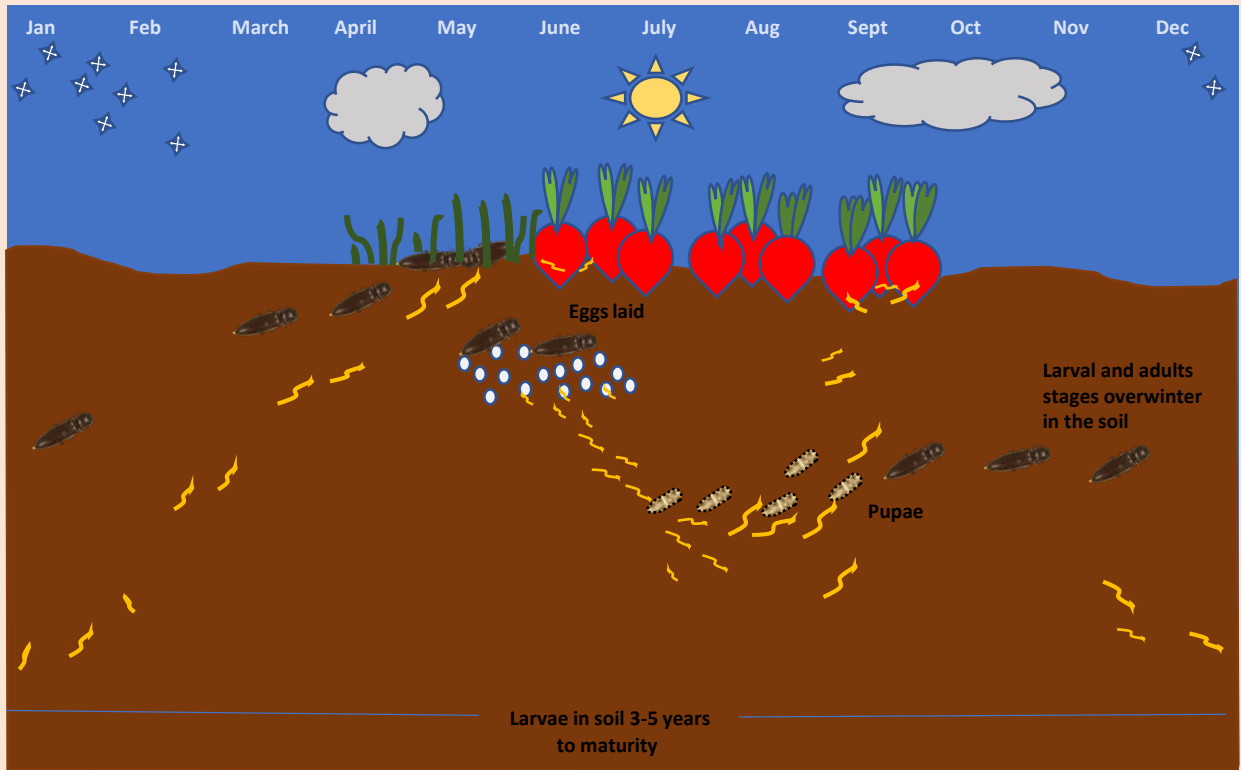
## High Risk Crops

- Root Crops: carrots and potatoes, sweet pots, beets, rutabagas
- Germinating seeds of cucurbits, sweet corn, beans and peas (warm soil /fast germination)



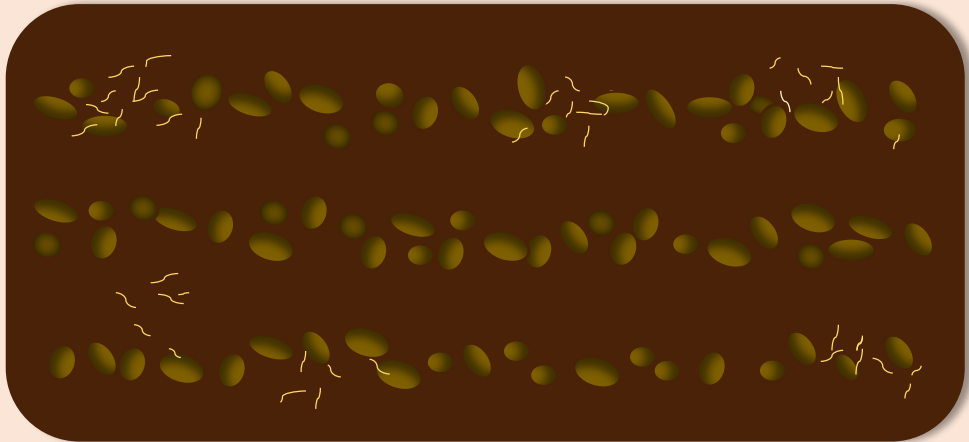
Wireworm tunneling in corn seed on left and in a cucurbit stem on right.  
Photo credit John Obermeyer. Perdue University

# Biology: Lifecycle of the Click Beetle/Wireworm



# Damage

- Wireworms have an aggregated distribution
- Damage to crops may be spotty

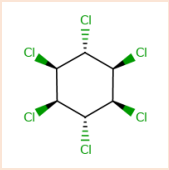


# Monitoring Bait Traps

- Baits are most effective when crops or decaying crop residues are not present to release CO<sub>2</sub>



- Set Bait traps in the spring when soil temps exceed 45 F in top 2"
- Different types of bait traps, they all work about the same
- Pre-soaking cereals, cut up potatoes, carrots in mesh bags/pots
- Bury ~ 7"
- ~ 2 weeks
- At least 4 traps per field <30 acres (more is better)
- Don't Forget to flag bait traps
- Sift 1 square foot soil to 14" depth (6-12 samples) low wet areas
- Potato Threshold- if more than half bait traps + then treat soil or don't plant



# Management Options

**Chemical:**                      **No Rescue Treatments!**

Seed treatments, pre-plant, or planting time applications



Neonics- under scrutiny

Labeled for Seed Piece and Soil App. for Wireworm on potato, NOT sweet potato

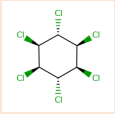
- Imidacloprid Admire pro, Macho- has SP on label **but** only for Aphids, Flea beetles Leafhoppers Thrips, Whiteflies. Soil app and foliar.

Labeled on Sweet pots for Wireworm

- *Bifenthrin 2EC* [Sniper] - max. 0.5 lb AI /a /season (at plant) (lay-by) ( foliar)
- *Ethoprop* [Mocap 15% Granular] – banded \*( not LI Nassau/Suffolk County)



# Management Options



Chemical

Broadcast Application:

Diazinon- carrots, beets, onions, radish, beans, lettuce,  
broadcast just before planting and incorporate into top  
4-8 inches (soil should be 50 F)

..... Sweet pots not on label !

# Management Options

## Cultural:

### **Crop rotation strategies: *complex & poorly understood***

- Rotations with crops such as onions, lettuce, alfalfa, sunflowers and buckwheat may reduce wireworm populations.
- mustard crops, canola? Isocyanates (Agriculture Canada)
- Survive two years summer fallow rotation
- Wireworm/click beetle populations drop significantly after several years **cultivation**

# Management Options

## Cultural:

- Knowing the cropping history of fields and **avoiding rotations with grasses and pastures**
  - **Keeping land free of grass during the egg-laying period** (May through mid July) will greatly reduce the potential for infestation.
    - Control weeds in cultivated fields**
    - Cover crops**
  - ***Carbon dioxide attracts wireworms***: decomposing residue, recently broken sod, germinating seeds
  - **Cultivation**, late summer, long term management, only pupae susceptible
-

# Management Options

## Biological:

- Ground beetles study (Agriculture Canada)
- *Beauveria Bassiana*- (Netherlands , Ester and Huiting 2007)
- Entomopathogenic nematodes or EPNs



Entomopathogenic Fungi



Nematodes are reared in waxworms

## Biologicals:

### Entomopathogenic Nematodes EPNs

Combo of two nematodes strains is recommended, reared separately.

- *Steinernema carpocapsae* (SC): SC can be found on the **upper two inches** of the soil and **remain in that location**.
- *Steinernema feltiae* (SF): **stays in one location- below the top two inches**
- *Heterorhabditis bacteriophora* (HB): **wander and hunts** out prey



SC turns waxworm brown color



SF turns waxworm a dark gray color



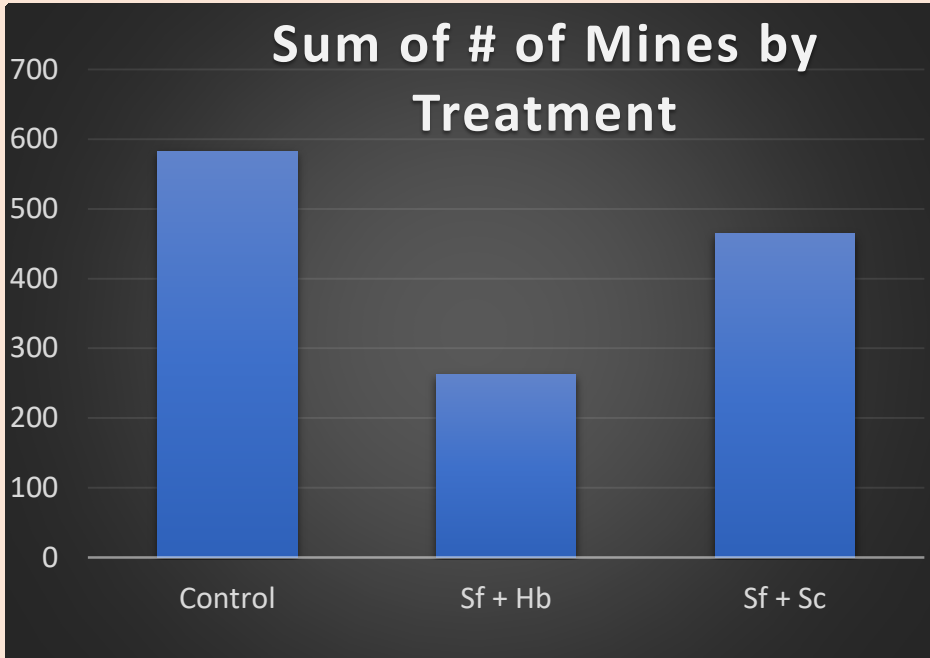
HB nematode turns waxworm brick-red



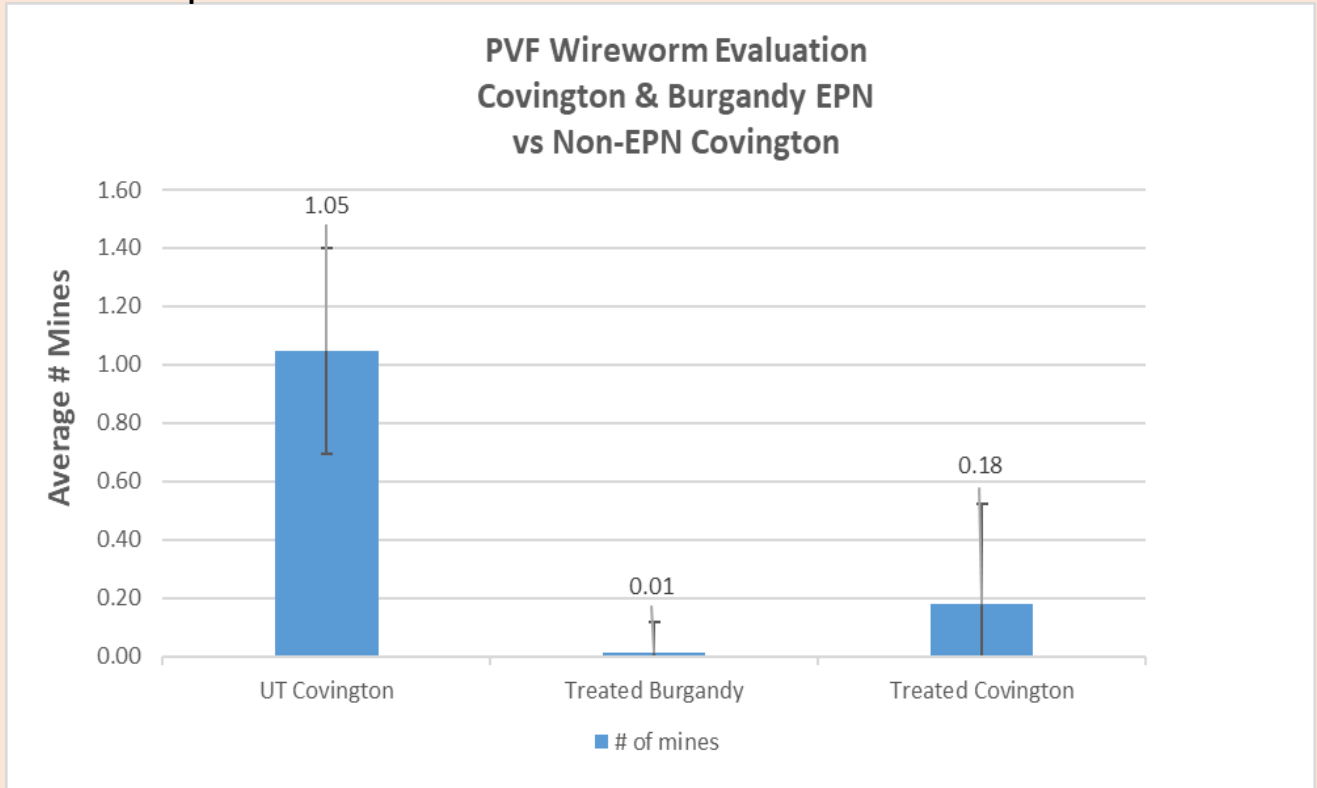
Spring 2017- Professor Elson Shields of Cornell University applies NY Native entomopathogenic (EPN) nematodes to the plots at HV Farm Hub. -

EPN treated plots overall had 36% less wireworm

Fall 2017 - HV Farm Hub -We evaluated 800 sweet potatoes per treatment were evaluated or 200 per rep



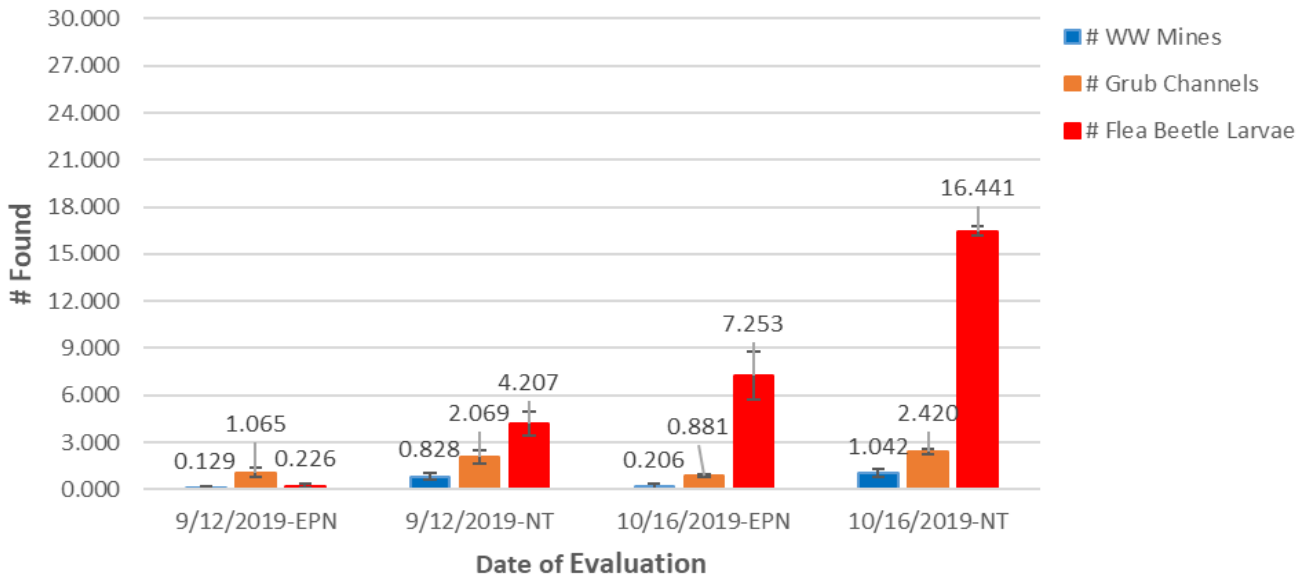
# EPNs applied Fall 2018 at PVF Sweet pots evaluated Fall 2019







## Diakon Radishes EPN vs NT



# Diakon Radish in EPN treated field







Used about 80 gal. acre  
2 gal/minute /6 foot swath  
2-3 mph.  
20 million IJ per cup / .5 acre ( use two strains)  
\$100 for Nematodes per acre

## For more info on Entomopathogenic Nematodes

<https://www.alfalfasnoutbeetle.org/>

My email: [tr28@cornell.edu](mailto:tr28@cornell.edu)



*Thanks to:*

Elson Shields, Tony Testa- Cornell University, Dept. Entomology

Chuck Bornt - ENYCHP

Hudson Valley Farm Hub

NY Farm Viability Institute /USDA SCBG Program