Cornell University
Cooperative Extension

NORTHEAST SARE
Sustainable Agriculture Research & Education

Integrated Phytophthora Blight Management in Vegetable Crops with Enhanced Soil Health From Cover Crops, Reduced Tillage, and Brassica Biofumigation.

Phytophthora capsici is a tenacious soil-residing crop pathogen that blights cucurbits and nightshade crops and requires an integrated approach to manage. Cornell Cooperative Extension is currently evaluating a combination of 1) brassica cover crops for soil biofumigation and 2) reduced tillage in an integrated management strategy in a 2-year research project. Biofumigation is intended to 1) directly reduce acute soil-borne pathogen inoculum loads, and cover crops and reduced tillage are intended to 1) improve soil water infiltration, 2) minimize contact between cash crops and soil-borne pathogens, and 3) further reduce soil pathogen loads due to improved soil health. Gathering data and feedback on these practices from multiple on-farm sites and growers across New York State will be invaluable to determining whether they are effective and practical for Phytophthora blight management. We currently are conducting on farm trials across NY using this approach, along with a more detailed plot-scale trial at Cornell's Long Island Horticultural Research and Extension Center.

Project overview/progress thus far:

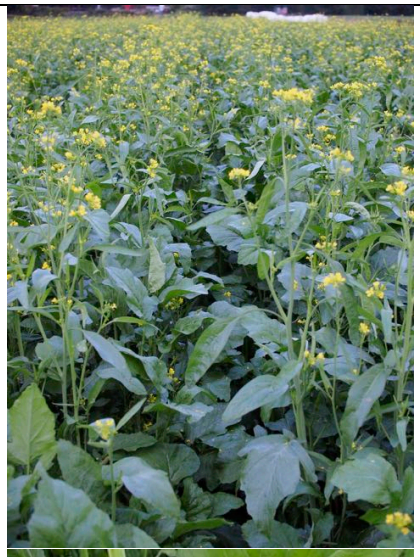
- 6-7 NY growers participating in on-farm trials (2 Long Island, 2-3 Hudson Valley, and 2 western NY sites)
- 4 growers trialed a fall-sown biofumigation brassica cover crop, 'Nemat' arugula, in 2014. The overwintering capacity of this variety was relatively unknown in NY then; the arugula did not survive the winter at any site.
- 4 growers trialed a spring-sown biofumigation brassica cover crop, 'Caliente 199' mustard. Biomass was lower than targeted at all sites due to a wet spring that delayed planting at the Hudson Valley sites, and drought conditions that occurred in Long Island.
- All growers planted cucurbit cash crops following biofumigation in 2015.
- 4 growers are also currently trialing a late summer-sown mustard and arugula mixed cover crop which was targeted to be turned under for biofumigation in late September - early October.
- All collaborating growers will use reduced tillage before their 2016 cucurbit crops on the plots that were biofumigated in 2015.
- Cornell will be continuously gathering data on cover crops (**organic matter and nitrogen returned to soils** in cover crop residues), **soil infiltration rates**, cucurbit **yields**, Phytophthora **blight incidence**, and **grower feedback** on the logistics of using biofumigation and reduced tillage in an integrated strategy.

Take home points thus far:

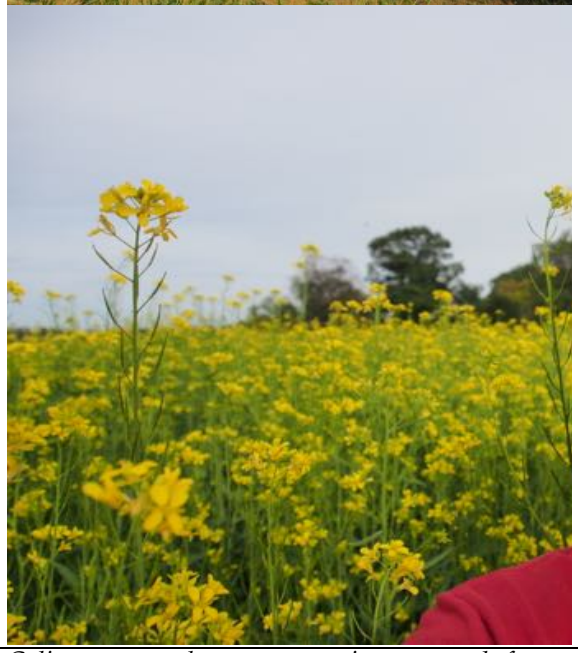
- 'Nemat' arugula is marketed as a winter-hardy biofumigation cover crop; it has overwintered well in eastern Washington State, but **'Nemat' has *not* overwintered successfully** in any NY-based Cornell trial thus far.
- Early planting of spring-sown mustards, **adequate water**, **good fertility**, and **good weed control** is important to maximize biomass production for brassica cover crops for maximum biofumigation potential. ***Treat your biofumigant cover crops like a cash crop*** *if you want them to be effective.* Also remember that much of the fertility given to these cover crops will be recycled to the following crop.
- Be aware of **potential residual herbicide effects** on brassica cover crops. Thus far, some fields sprayed with products containing Atrazine and/or Mesotrione (Callisto) the previous year have been observed to significantly impact these crops. Check labeled rotation restriction intervals on brassicas.
- A late summer planting timing is being tested for the first time in this project, and may be a good option for many growers if it proves to be logistical and effective. Thus far, potential looks promising- all cover crops performed well at each site, and growers were able to fit it in to their schedule.

Stay tuned!

This project is being funded by a Research and Education grant from the Northeast Sustainable Agriculture Research and Education (NESARE) program.



Weed free 'Caliente 199' mustard exhibiting adequate fertility for lush growth: 50-100 lbs. available N &, 20 lbs. S recommended.



Caliente mustard grown to maximum stage before biofumigation- 2-4 weeks after flowering begins (seeds still green), 3-5' tall.

Flail mowing to rupture plant cells, incorporating residue into soil surface, rolling the soil surface to help trap biofumigant gases, and irrigating (if soils are dry) to activate biofumigant compounds.

Simultaneous mow, incorporate, and pack operation in eastern WA.