



Disease Management for Vegetable Crops

Program Leader: Margaret Tuttle McGrath, Associate Professor
Department of Plant Pathology and Plant-Microbe Biology
Long Island Horticultural Research & Extension Center
3059 Sound Avenue
Riverhead, NY 11901-1098

Project Objectives:

Optimize management of diseases affecting vegetables grown on Long Island within organic as well as conventional production systems by:

- investigating pathogen biology, including sources.
- developing scouting protocols and action thresholds.
- evaluating control practices, including fungicides, resistant varieties, and integration of chemical and genetic control.

Examine impact on diseases of practices to improve soil health: annual compost amendments, reduced tillage, and clover living mulch.

Diagnose disease problems for growers.

Determine impact of ambient ozone on plant productivity.



Margaret T. McGrath
mtm3@cornell.edu
Ph: 631-727-3595
Fax: 631-727-3611

Project Summary:

The fungal pathogen that causes powdery mildew in cucurbits, which is the most important disease of this crop group, has proven itself adept at evolving to overcome management tools; therefore, to ensure management guidelines developed for growers are sound, efficacy of fungicides and resistant varieties, which are the only management tools for powdery mildew, needs to be examined regularly. Research conducted in 2009 included 1) evaluating registered conventional fungicides and experimentals, and also biopesticides suitable for organic production; 2) examining fungicide sensitivity of the pathogen population in commercial and research fields, and its impact on disease control and management; 3) determining fungicide sensitivity of pathogen isolates; and 4) assessing performance of resistant varieties of melon, pumpkin, and squash (acorn, butternut, yellow summer and zucchini).

Biopesticides and resistant varieties were evaluated for managing downy mildew in organically-produced cucumber. A sentinel plot was maintained for the national downy mildew forecasting program.

Biopesticides approved or being developed for organic production were tested for Septoria leaf spot, an foliar disease that is especially important in organically-produced tomato.

Heirloom tomatoes were evaluated for their susceptibility to foliar diseases as a component of a larger study that included evaluation of yield and fruit quality.

Fungicides were evaluated for a new disease, downy mildew of basil, to support their registration.

Impact on plant productivity of ambient ozone was examined by monitoring damage to commercial pumpkin crops and conducting research with snap bean and clover bioassay systems developed to assess impact for a national research project.

An epidemic of late blight starting on tomato plants for sale to home gardeners in the northeastern US necessitated extensive outreach activities to minimize the impact on commercial production of tomatoes and potatoes.



Sporulation of the basil downy mildew pathogen.

Project Justification:

Powdery mildew is the most important disease affecting cucurbit crops every year throughout LI. Fungicide resistance is a major concern. A new strain of the downy mildew pathogen occurring since 2004 has been causing more significant losses than previously. Cucurbits, especially pumpkin, are very important crops on LI. Ambient ozone reaches concentrations causing acute foliar injury to many crops each year on LI. Recognized need for practices to improve soil health. Basil downy mildew is a new disease in the US first observed in October 2007 in FL. It occurred in NY in 2008 and 2009. Basil was affected in commercial field and greenhouse crops plus gardens.

Impact to Industry:

Research conducted in 2009 generated information influencing management guidelines for 2010.

Resistance in the cucurbit powdery mildew pathogen to FRAC Code 1 fungicides (Topsin M) and to Code 11 fungicides (e.g. Flint) were detected in all spring squash plantings where a bioassay was conducted on 30 Jul. Therefore fungicides in these classes were not recommended in 2009. Growers were provided this information at the start of fungicide use in main season crops. Pathogen strains were detected able to tolerate higher concentrations of Code 3 and 7 fungicides (Rally, Procure, and Pristine) than Code 13 (Quintec). Strains were detected at the end of the season resistant to boscalid (an ingredient in Pristine). Pristine was effective when tested alone at LIHREC but not in a fungicide evaluation in NJ. Isolates from the NJ research field were all found to be resistant when tested at LIHREC. Code 3 and 7 fungicides Rally and Inspire were ineffective while Procure was effective in the LIHREC evaluation.

Evaluations of powdery mildew resistant cucurbit varieties revealed a range in ability to suppress disease severity among varieties as well as crop types. Best control was achieved with melons resistant to both races 1 and 2 of the pathogen. Least control was achieved with pumpkin. Resistant squashes appeared to be less effective than in previous years suggesting the pathogen is adapting. Generally varieties with two copies of the major resistant gene, one from each parent, were more effective.

Some biopesticides were found to be effective for managing foliar diseases in organically-produced tomato and for downy mildew in cucumber.

Participation in the national downy mildew forecasting program lead to timely information on occurrence of this important cucurbit disease and educational materials for growers.

Project Team Members:

George Miller Fox, Research Support Specialist
Melissa Berger, Summer Research Assistant
Michael Finck, Summer Research Assistant
Annette Gerani, Summer Research Assistant
Stephanie Hayes, Summer Research Assistant
Peter Priolo, Summer Research Assistant
Allison Waring, Summer Research Assistant
David Waring, Summer Research Assistant



Symptoms of late blight on tomato leaves and fruit.