



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 2007 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 baseline sensitivity of the pathogen to new fungicides; and 4) assessing performance of resistant varieties of melon, pumpkin, winter squash, yellow summer squash and zucchini.

Research was conducted on *Phytophthora* blight and downy mildew, the other two important cucurbit diseases on LI. Currently-registered fungicides and those expected to be registered soon were evaluated in combination programs, which is the standard recommendation for managing fungicide resistance while managing these diseases. Biopesticides and hard-rind pumpkin varieties were also evaluated for *Phytophthora* blight. Occurrence of the pathotypes of the downy mildew pathogen was monitored.

In addition to conducting replicated experiments, several commercial pumpkin fields were routinely scouted for the three primary diseases to improve our understanding of their occurrence and how well they are being managed with currently available tools. Clover-planted sprayer driveways were tested.

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

Additional studies were conducted to examine a reduced tillage production system for pumpkin and a clover living mulch seeded between strips of black plastic mulch for improving soil health and suppressing weeds.



Cucurbit downy mildew (dark spores) and powdery mildew.

Project Justification:

Powdery mildew is the most important disease affecting cucurbit crops every year throughout LI. Fungicide resistance is a major concern. Phytophthora blight is a devastating disease causing extensive losses in several crops on LI, especially pepper and cucurbits. Downy mildew has been developing much earlier in crop production and thus can cause 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.

Impact to Industry:

Research conducted in 2007 generated information influencing management guidelines for 2008.

Resistant varieties are an important management tool. Varieties of zucchini, acorn, and summer squash with resistance to powdery mildew generally did not exhibit as good disease suppression in 2007 as they had in 2006, suggesting the pathogen has evolved a new strain able to overcome the one major gene for resistance that all these varieties have. The single variety of each squash type tested with resistance from both parents performed better.

Strains of the powdery mildew fungus were detected able to tolerate higher concentrations of the active ingredients in the mobile fungicides currently in use, Pristine (175 ppm boscalid) and Procure or Nova (120 ppm), than a new fungicide, Quintec (5 ppm), registered in 2007 for use in melon. This finding may account for variable, sometimes only moderate control obtained with Pristine, Procure and Nova in fungicide evaluations and commercial fields compared to consistent excellent control provided by Quintec.

The two biopesticides tested for powdery mildew were more effective applied to butternut squash than pumpkin. Milstop (potassium bicarbonate) was only effective on squash. Organocide (sesame oil) was effective on both. These products are OMRI listed and thus are acceptable for organic production.

The cucurbit downy mildew pathogen population evidently had a sufficient level of resistance to mefenoxam and to QoI fungicides that the products tested with these fungicides were ineffective. Newer fungicides tested were effective for downy mildew.

Phytophthora fruit rot was effectively managed with two new hard-rinded pumpkin varieties and several fungicide programs with new and currently-registered products.

Project Team Members:

George Miller Fox, Research Support Specialist

Monica M. Miazzi, Fulbright visiting scientist

Hanna Senesac, Summer Research Assistant

Lucy Senesac, Summer Research Assistant

David Waring, Summer Research Assistant

Allison Waring, Summer Research Assistant

Jacob Sisson, Summer Research Assistant

Jennifer Velleman, Summer Research Assistant

Robert Caruso, Summer Research Assistant

Mathias Stauffiger, Summer Research Assistant

Melodie McMillen, Summer Research Assistant



Severe ozone injury on pumpkin leaves in commercial production field on 14 August 2007.