



Disease Management for Vegetable Crops

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

Program Objectives

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

- studying pathogen biology, including sources.
- investigating fungicide resistance and impact on control.
- 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 biofumigation with mustard cover crop and practices to improve soil health with focus on reduced tillage.

Diagnose disease problems for growers.



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

Program 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 2016 included 1) testing registered and new, conventional and organic fungicides used alone and in combinations; 2) evaluating fungicides suitable as alternatives for chlorothalonil; 3) examining fungicide sensitivity of pathogen isolates from commercial and research fields; and 4) evaluating Halloween pumpkin varieties resistant to powdery mildew grown with or without fungicides.

Conventional and organic fungicides also were evaluated for basil downy mildew. Focus was products in development. Experimental organic fungicides were tested for downy mildew in cucumber.

Results from fungicide evaluations provide growers information on efficacy to assist with selection of registered products and are used by companies to make development decisions about new products.

A seedling bioassay was used to survey for fungicide resistance in cucurbit downy mildew pathogen.

Tomato varieties and experimentals developed by Cornell tomato breeder with resistance or tolerance to Septoria leaf spot, early blight, and late blight were evaluated for horticultural characteristics.

A sentinel plot was maintained for the national cucurbit downy mildew forecasting program.

A monitoring program was conducted for basil downy mildew (national) and late blight in tomato.

Sources, placement, and timing of N fertility (compost and bloodmeal; broadcast, banded or side-dressed) were examined for organic, reduced-till acorn squash. Winter-kill cover crops (tillage radish and/or oats) were compared preceding organic reduced-till-planted spring peas. Legume winter-hardy cover crops and rye were compared preceding organic fall cabbage transplanted using reduced tillage.



Organic reduced-till acorn squash transplanted in dead oat and pea cover crop.

Program Justification

Powdery mildew is the most important disease affecting cucurbit crops every year throughout LI. Fungicide resistance is a major concern. Downy mildew of cucurbits also can cause significant losses, especially in organically-managed crops. It occurs sporadically varying greatly year to year in date of first observation and crop types affected. Cucurbits, especially pumpkin, are very important crops on Long Island. Tomato is another important crop impacted regularly by foliar diseases. Basil downy mildew is an important disease occurring in NY every year since 2008 in commercial field and greenhouse crops plus gardens. Need for efficacy data for organic and conventional fungicides. Recognized need for practices like reduced tillage to improve soil health in organic and conventional cropping systems.

Impact to Industry

Research conducted in 2016 yielded information useful to growers producing vegetables and basil.

Research on efficacy of fungicides with targeted activity for cucurbit powdery mildew and sensitivity (resistance) of the pathogen to these fungicides added to the knowledge base about product efficacy and fungicide resistance in this pathogen. This information is needed to provide sound recommendations to growers about managing this disease. Pristine provided limited control; its efficacy has varied year to year. It was effective in 2015. Effective control was achieved with Quintec, Vivando, and a grower recommended program (later 2 in alternation along with Torino, another new fungicide), suggesting there was a high percent of pathogen strains resistant to Pristine present in 2016. Testing during spring 2016 of pathogen isolates collected in fall 2015 revealed that most from fungicide-treated research plots and 2 commercial pumpkin crops were resistant to the active ingredients in Pristine and tolerated a dose of Quintec high enough to impact control, and most were also resistant to FRAC code 1 and 11 fungicides plus were more tolerant of DMI fungicides than sensitive isolates. This is first known US occurrence of resistance to Quintec. Isolates from plots not treated with these fungicides were sensitive, documenting use of resistant-prone fungicides can select multi-fungicide-resistant strains during a season.

Resistant pumpkin varieties were shown to vary in ability to suppress powdery mildew with only two providing significant level of control compared to a susceptible variety in absence of fungicides for powdery mildew. Achieving a commercially-acceptable degree of control necessitated applying fungicides. An integrated program (fungicides applied to resistant varieties) was most effective.

As a result of monitoring work, growers knew when important diseases were occurring on LI, and thus when to apply fungicides. Late blight did not occur in 2016. Cucurbit downy mildew was first found in cucumber on 8 Aug and in cantaloupe 9 days later. No other crop types were affected.

The web-based monitoring program for basil downy mildew proved useful for tracking and sharing information about its occurrence, and contributed to recognition of its importance in the USA. 2016 was another important year for basil downy mildew with numerous reports from throughout most of the USA. Downy mildew in field-grown basil was effectively controlled with conventional fungicides applied on a preventive, weekly schedule but not with organic fungicides.

Program Team

Zack Sexton, Research Support Specialist
 Collin Downing, Research Assistant
 Mollie Cohen, Research Assistant
 Sean Halliwell, Research Assistant
 Stephanie Hayes, Research Assistant
 Xia Martinez, Research Assistant
 Anna Saum, Research Assistant
 Hans Spielmann, Research Assistant
 Rex Spielmann, Research Assistant
 CheyenneVoigt, Research Assistant

