



Disease Management for Vegetable Crops

Program Leader Margaret Tuttle McGrath
Associate Professor
Department of Plant Pathology & Plant-Microbe Biology
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 practices to improve soil health: reduced tillage, annual compost amendments, and clover living mulch.

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 2013 included 1) testing registered conventional fungicides and experimentals; 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 to currently registered products and fungicides in development; and 4) evaluating resistant melon varieties.

Varieties and experimentals were also evaluated with resistance to late blight in tomato and downy mildew in basil. Horticultural characteristics and resistance were assessed.

Fungicides were also evaluated for white mold in tomato, downy mildew in cucumber, and downy mildew in basil.

Biopesticides were evaluated for foliar diseases in tomato and downy mildew of basil.

Organic copper fungicides were compared for efficacy, crop safety, residue, and mixing ability.

Results from evaluations are used to justify labeling for new products and to provide growers information on efficacy to assist with selection of registered products.

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

A monitoring program was conducted for basil downy mildew.

Mustard biofumigation was used to manage *Phytophthora* blight.

Production of vegetables using reduced tillage was examined on farms. A goal of this multi-disciplinary project is to examine impact of improving soil health on disease occurrence.



Mt Fresh Plus with late blight in front of resistant variety Mt Magic.

Program 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 cucurbit downy mildew pathogen occurring since 2004 has been causing more significant losses than previously. Cucurbits, especially pumpkin, are very important crops on LI. Late blight has been occurring every year on LI since 2009 especially impacting tomato in commercial fields and gardens. This change is associated with appearance in the US of new pathogen strains. Basil downy mildew is a new disease that has occurred in NY every year since 2008 in commercial field and greenhouse crops plus gardens. Biopesticides and copper fungicides are used for organic disease control. Recognized need for practices to improve soil health.

Impact to Industry

Research conducted in 2013 yielded information useful to growers producing vegetables and basil. Growers were informed of occurrence on LI of downy mildew on different cucurbit crop types.

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 US.

Powdery mildew resistant melon varieties provided excellent suppression. Thus the pathogen has not evolved a new race. Several new specialty-type melons (including honeydew) were examined in 2013, which generated information growers need to select appropriate varieties for their operation.

Tomato with *Ph-2* and *Ph-3* genes exhibited excellent resistant to late blight pathogen genotype US-23, which was the primary one detected in the Northeastern US in 2013 as well as 2012. Conducting evaluations of fruit from this variety trial with public groups provided education opportunities.

Tomato fruit affected by late blight were shown to be a source of the pathogen for volunteer seedlings growing from the fruit for at least 6 weeks after the fruit were covered with potting mix.

Differences were documented among copper fungicides in efficacy for powdery mildew in zucchini, amount of residue especially on tomato fruit and lettuce, mixing ability, and damage to Brussels sprouts.

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 fungicide resistance in this pathogen. This information is needed to provide sound recommendations to growers about managing this disease with these fungicides. In sharp contrast with 2012 results, the fungicide Pristine (contains FRAC Code 7 and 11 ingredients) surprisingly was very effective in 2013. The strategy for managing resistance is to alternate among as many different chemistries as possible. Year-to-year variation in occurrence of pathogen strains resistant to Pristine indicates it can still be used on a limited basis. With some other chemistries, after resistance has developed in the pathogen the trait has remained common rendering the fungicide ineffective. Procure (Code 3) and Quintec (13) were effective in 2013 and thus will continue to be primary fungicides recommended for this disease. Isolates of the pathogen resistant to the Code 7 ingredient in Pristine were found to not be cross-resistant to one of three new fungicides in this group; therefore it will be recommended in place of Pristine once registered.

Program Team

Karen Lamarsh, Research Support Specialist

Geoff Griffiths, Research Assistant

Amanda Gardner, Research Assistant

Luke Sisson, Research Assistant

Joseph Pugliese, Research Assistant

Bobby Andrews, Research Assistant

Matt Mulvaney, Research Assistant

Dan Hersh, Research Assistant

Samantha Gader, Research Assistant

Courtney Lum, Research Assistant

