



## Disease Management for Vegetable Crops

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### 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.



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### 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 2015 included 1) testing registered conventional fungicides used alone and in combinations; 2) examining fungicide sensitivity of pathogen isolates from commercial and research fields; and 3) determining whether resistance to race 1 and race 2 of the pathogen bred into melon was continuing to provide effective suppression.

Fungicides also were evaluated for downy mildew in basil.

Biopesticides were evaluated for downy mildew of basil, bacterial speck of tomato and Phytophthora blight in pepper and pumpkin. Most products are suitable for organic production.

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.

Varieties and experimentals with resistance to downy mildew in basil and Septoria leaf spot, early blight, and/or late blight in tomato were evaluated for horticultural characteristics and resistance.

The Decision Support System for timing fungicide applications for late blight was evaluated for organically-produced tomato. It utilizes environmental conditions and other factors affecting this disease.

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.

Mustard biofumigation was used to manage Phytophthora blight.

Sources, placement, and timing of N fertility was examined for organic, reduced-till acorn squash.



*Powdery mildew isolate insensitive to Quintec.*

## 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 are used for organic and conventional disease control. Recognized need for practices like reduced tillage to improve soil health.

## Impact to Industry

Research conducted in 2015 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 was as effective as newer fungicides, Quintec and Vivando, and a grower standard program (later 2 in alternation along with Torino, another new fungicide), suggesting there were few pathogen strains resistant to Pristine present in 2015, in contrast with previous years. However, most pathogen isolates collected in fall 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. Isolates from plots not treated with these fungicides were sensitive. This documents that using fungicides prone to resistance can select tolerant strains during a season, but the shift may not occur fast enough to impact control. Using at-risk fungicides in alternation is expected to reduce selection pressure, compared to using one fungicide repeatedly,

As a result of monitoring work, growers knew when important diseases were occurring on Long Island, and thus when fungicide applications were needed. This information also furthered knowledge about these diseases. Late blight did not occur in 2015. Cucurbit downy mildew appeared in early August on cucumber. Cantaloupe, watermelon, squashes and giant pumpkin also became affected by the end of August, indicating additional pathotypes had been dispersed to LI.

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. 2015 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 when an application was delayed because of rain and not with organic fungicides although this program was done twice weekly. Effective resistance to this new disease was documented in crosses developed by breeders at Rutgers and in experimental varieties from Enza and PanAm seed companies.

## Program Team

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