



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 2017 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; 4) examining fungicide sensitivity of pathogen populations using a seedling bioassay; and 5) evaluating Halloween pumpkin varieties resistant to powdery mildew grown with or without fungicides.

Biopesticide programs were evaluated for Phytophthora blight in pepper and pumpkin.

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.

Cucumber varieties resistant to downy mildew were evaluated.

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

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.

Three experiments were conducted for an organic reduced-till project with researchers in Ithaca, ME, and MI. 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. Soil was covered with impermeable silage tarps ('tarping') to manage weeds for 3 weeks, 6 weeks, or overwinter before seeding beets.



Organic reduced-till beets seeded in dead oat cover crop following 6 weeks soil covered with silage tarp.

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. Phytophthora blight is an important disease occurring in NY every year. 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 2017 yielded information useful to growers producing vegetables in NY.

Research on efficacy of fungicides with targeted activity for cucurbit powdery mildew (PM) and sensitivity (resistance) of the pathogen to these fungicides added to the knowledge base about product efficacy and fungicide resistance in this pathogen. Pristine (FRAC code 7+11), Torino (U6), and Luna Sensation (7+11) all failed to control PM on the underside of leaves. Failure of Luna Sensation was surprising because in past laboratory bioassays conducted for this project, isolates resistant to boscalid, FRAC 7 active ingredient in Pristine, exhibited sensitivity to fluopyram, FRAC 7 ingredient in Luna Sensation. Failure of Torino was also surprising because this product has the most strict use restriction to manage resistance: only 2 applications, not consecutive, allowed to a crop. Resistance has not yet been documented in the U.S. Procure (3), Quintec (13), and Vivando (U8) all performed well. During spring 2017 pathogen isolates collected in fall 2016 from research plots and commercial pumpkin crops were tested for fungicide sensitivity. Boscalid resistance was detected in 43% of isolates; 3% of isolates were resistant to 200 ppm quinoxyfen (13); and 3% were resistant to 120 ppm myclobutanil (3). The most resistant isolate came from plot treated with only Quintec in the fungicide efficacy experiment: it was resistant to boscalid, 120 ppm myclobutanil, and 200 ppm quinoxyfen (Quintec would be ineffective), documenting use of one fungicide can select for isolates resistant to it and other fungicides not used.

Resistant pumpkin and cucumber varieties varied in ability to suppress powdery and downy mildews, respectively. Cornell bred cucumber was best. Homozygous resistant pumpkin varieties were better than heterozygous. PM was controlled best with integrated program (fungicides applied to resistant varieties). Sulfur and mineral oil proved to be effective alternatives to chlorothalonil.

Biopesticide programs were ineffective for Phytophthora blight in pepper and pumpkin. Disease pressure was high due to an intense rainfall providing very favorable conditions for the pathogen.

As a result of monitoring work, growers knew when important diseases were occurring on LI, and thus when to apply fungicides. Late blight was detected in Sept. Cucurbit downy mildew was first found in cucumber on 31 July 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. 2017 was another important year for basil downy mildew with numerous reports from throughout most of the USA.

The 3 organic reduced-till experiments were successful.

Program Team

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Organic reduced-till snap peas seeded in winter-killed tillage radish cover crop.