Disease Management for Vegetable Crops

Program Leader: Margaret Tuttle McGrath
Department of Plant Pathology
Long Island Horticultural Research & Extension Center
3059 Sound Avenue
Riverhead, NY 11901-1098

Project Objectives:

Optimize management of diseases affecting vegetable crops 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.

Diagnose disease problems for growers.

Determine impact of ambient ozone on plant productivity

Margaret McGrath

mtm3@cornell.edu

631-727-3595 ext 20

Project Summary:

Research has been conducted to address the following diseases and topics:

Powdery mildew of cucurbits: Fungicides, action thresholds, resistant varieties, and integration of chemical and genetic control. Pathogen race occurrence. Ability of the pathogen to survive locally overwinter. Alternatives to conventional chemical fungicides, including compost tea and biofungicides. Fungicide resistance occurrence, impact on disease control and management.
Bacterial wilt of cucurbits: Susceptibility to wilt of crop types and varieties, their attractiveness to cucumber beetles, and efficacy of insecticides.
Phytophthora blight of cucurbits: Fungicides, crop rotation, compost soil amendments, mulches, and soil solarization. Susceptibility of varieties and breeding lines.
White rust of spinach: Fungicides, resistant varieties, and integrated management.
Bacterial leaf spot of pepper: Bactericides, action thresholds, resistant varieties, and chemical and genetic control used together.
Powdery mildew, early blight and Septoria leaf spot of tomato: Fungicides, weather-based disease forecasting system (Tom-Cast) for scheduling fungicide applications.
Black rot of crucifers: Bactericides, action thresholds, rotation, and resistant varieties.

Research is also being conducted to determine the impact on plant productivity of ambient ozone, which reaches concentrations that cause acute foliar injury to many crops each summer on Long Island.

Over

Powdery mildew develops best on lower leaf surfaces of pumpkin and other cucurbits.

Some Recent Publications:

Krupa, S., McGrath, M. T., et. al. 2001. Ambient ozone and plant health. Plant Disease 85:4-17. (Feature article).

McGrath, M. T. 2001. Fungicide resistance in cucurbit powdery mildew: Experiences and challenges. Plant Disease 85:236-245. (Feature article).

McGrath, M. T., and Shishkoff, N. 2000. Control of cucurbit powdery mildew with JMS Stylet-Oil. Plant Disease 84:989-993.

McGrath, M. T., and Shishkoff, N. 1999. Evaluation of biocompatible materials for managing cucurbit powdery mildew. Crop Protection 18:471-478.

Impact to Industry:

An action threshold was identified for initiating fungicide applications for cucurbit powdery mildew.

Relative efficacy was determined for various individual fungicides and fungicide programs applied to susceptible and powdery mildew resistant varieties of cucurbits.

Strains of the cucurbit powdery mildew fungus resistant to fungicides in 3 chemical groups (benzimidazoles, demethylation inhibitors, and strobilurins) were detected and shown to affect fungicide efficacy. Frequency of resistant strains can increase greatly during a growing season. This work has been used to modify control recommendations and justify requests for Section 18 registration of new fungicides.

Phytophthora blight has proven difficult to control with several practices, including fungicides, rotation, and compost added to soil before planting. Minimizing disease favorable conditions is thus the focus of management recommendations. A potential source of resistance has not been found, but hard-rinded pumpkin varieties were less susceptible than conventional ones.

Cucurbit crop types and varieties were shown to vary in their susceptibility to bacterial wilt and their attractiveness to cucumber beetles which vector the pathogen.

Powdery mildew in tomato was controlled effectively by applying fungicides according to Tom-Cast, which required fewer sprays than using a weekly calendar schedule.

Growing pepper varieties resistant to bacterial leaf spot was more effective than applying copper fungicides for controlling this disease.

Ozone was shown to reach high enough concentrations every year on Long Island to significantly reduce growth and yield of sensitive plants by using white clover and snap bean bioindicator plants.

Bacterial wilt affecting a pumpkin variety shown to be more susceptible to wilt than others.

Project Funding:

Friends of Long Island Horticulture
NYS Integrated Pest Management Program
Northeast Regional IPM Program
USDA Northeast Pesticide Impact Assessment Program
USDA Pest Management Alternatives Program
IR-4 Program
Company and industry gifts and donations

Phytophthora blight affecting pumpkin fruit.