



Disease Management for Vegetable Crops

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Project Objectives:

Optimize management of diseases affecting vegetables 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.

Examine impact on diseases of practices to improve soil health: annual compost amendments, reduced tillage, and clover living mulch.

Diagnose disease problems for growers.

Determine impact of ambient ozone on plant productivity.



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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 and pepper: Fungicides, crop rotation, compost soil amendments, mulches, reduced tillage, 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, bacterial speck and Septoria leaf spot of tomato: Fungicides, compost tea, weather-based disease forecasting system (Tom-Cast) for scheduling fungicide applications, vetch mulch, and amendments of mycorrhizal fungi.

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 killing pumpkin leaves in foreground where ineffective product used.

Some Recent Publications:

McGrath, M. T. 2004. Diseases of cucurbits and their management. *In Diseases of Fruits and Vegetables, Volume I*, pages 455-510. Kluwer Academic Publishers.

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.

Impact to Industry:

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

Relative efficacy was determined for various individual fungicides (conventional and organic), and for 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. Baseline sensitivity has been determined for new fungicides.

Evaluation of fungicides and other management practices for Phytophthora blight enabled developing a management program for growers and provided data for new product registration. Managing soil moisture found to be critical. 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 copper fungicides.

Clover living mulch demonstrated to be a successful production system for cucurbits.

Yearly compost amendments shown to be effective as source of crop fertility and soil organic matter but not for suppressing Phytophthora blight.

Ozone 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.



Ozone injury on snap bean.

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 summer squash.