

Developing Management Practices for Phytophthora Blight in New York

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Phytophthora blight, caused by the pathogen *Phytophthora capsici*, is a devastating disease of many solanaceous (pepper, eggplant and tomato) and cucurbit (squash, melon, cucumber, gourd and pumpkin) crops. In 2007, New York State partnered with Cornell University to begin a ten year program to develop and implement strategies that will enable vegetable growers to continue to be a vibrant part of the State economy. Exciting advances, described below, are occurring because of this partnership.

In New York, approximately 1/3 of the vegetable acreage and 40% of the farm-gate value is susceptible to Phytophthora blight.

- Fresh Market total acreage and value
 - 88,000 acres
 - \$ 397,000,000
- Processing total acreage and value
 - 66,200 acres
 - \$ 39,300,000
- Susceptible to Phytophthora blight
 - 50,000 acres
 - >\$170,000,000



Funding provided by New York State has enabled us to develop a small farm dedicated to Phytophthora blight research.

- This is the **only facility** exclusively dedicated to Phytophthora blight research in the world.
- This farm is used for applied research to test vegetable varieties, disease control options, cover-crop options, crop-rotation and irrigation management strategies.
- The first field day was held at the farm in 2008.



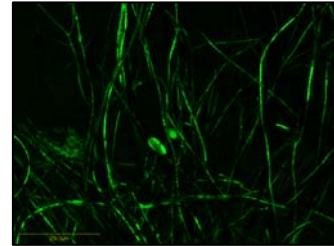
In 2008, Phytophthora blight was detected in a **snap bean** crop on Long Island for the first time in New York.

- New studies in 2009 will look at the susceptibility of bean varieties to blight; snap beans are a \$65,000,000 industry in New York.
- Studies on integrated control strategies will continue on Long Island.
- The pumpkin industry on Long Island has been hard hit, and continued studies on management strategies are crucial for this vital industry.
- Results of control strategy studies from Long Island are used by vegetable growers throughout New York.



We have developed methods to detect, identify and characterize strains of the pathogen from New York.

- Based on DNA analysis, the pathogen population in Western NY is different from that on Long Island.
- We can detect Phytophthora in plant tissue, soil and irrigation water using DNA-based methods developed in our program (DNA extraction shown at right).
- Collaborations with scientists in other states are increasing our understanding of pathogen spread.
- We have tagged New York strains of the pathogen with fluorescent proteins so that we can study why some vegetables are more susceptible than others. The image on the right shows a green fluorescence- tagged strain.

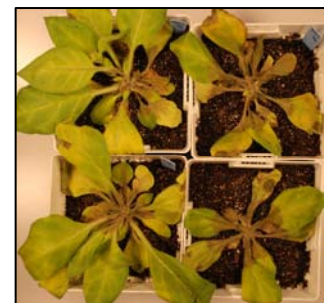


Basic research towards engineering disease resistant plants made great advances in 2008.

- To our knowledge, we are the only group that is currently utilizing this technology to control Phytophthora blight.
- Resistant wild species that are closely related to tomato and pepper are being used as a source of resistance.
- A technology called “gene silencing” is being used to find genes that allow these resistant plants to naturally combat Phytophthora blight (shown at right).
- We have identified a class of genes that confer resistance to Phytophthora blight and are identifying the individual members that are most effective.
- Genes identified in these experiments will be moved into tomato, pepper and eggplant.



Resistant Plants



Gene silenced plants
(now susceptible)

This project is unique in the nation for combating Phytophthora blight. The contributions from basic and applied scientists with expertise in plants, pathogens and vegetable production have enabled very rapid progress. Already, the project has i) provided information (cultivar resistances, management practices) immediately useable by growers; ii) has discovered geographic differences in the pathogen population; iii) and has developed biotech possibilities for creating highly resistant plants. However, much more work remains to convert these possibilities into the useful technologies that will support a vibrant, successful New York vegetable industry.

To learn more about this project, feel free to contact any of the participants.

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