



Northern NY Agricultural Development Program 2015-2016 Project Report

Diagnosis and Assessment of Diseases of Corn and Soybean in Northern New York

Project Leader:

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Collaborator(s):

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Cooperating Producers:

- **Clinton County:** Adirondack Farms Miner Institute, Lance Rovers, Hidden View Farm
- **Essex County:** Lee Garvey, George Sayward,
- **Franklin County:** Dick Eakins, Jason Fox, Steve Gokey, Hutchins Farm, Gary Monica, Randy Ooms
- **Jefferson County:** Cobb Crest, Dodge Farms, Fairlawn Farm, Dennis Forrester, Gerber Farm, Mike Gracey, Haggerty Farm, Hayes Farm, Henderson Farm, Ives Farm, C. Kingsley, Lucki 7 Ranch, Morning Star Farm, Dale Morse, Murcrest Farm, Murrock Farms, North Harbor Farms/Ron Robbins, Parker Family Farm, Plessis Farm, Reedhaven Farm, Jeff Rudd, Jeff Sullivan, Windsong Farm, H. Wood Farm
- **Lewis County:** Ernie Beyer, Rob Domagala, Mike Hoppel, Scott Markham, Bob Martin, Mike Nemeth, Silvery Falls Farm, Williams Farm, Nate Yousey
- **St. Lawrence County:** Steve Carr, Conrad Cook, Mark Decker, Mapleview Dairy, Greenwood Dairy Farm, Andy Hurlbut, Doug Lowry, River Breeze Farms, Jim Putman, Stauffer Farms, D. Stout

Background:

Corn for silage and grain is a foundational crop for the economic wellbeing of Northern NY dairy and cash grain farms. Soybean shows great economic promise in NNY and the acreage in the region is expanding rapidly. Emerging and re-emerging plant diseases are a continual threat to the sustainability of these crops and the profit margin for crop producers is often a narrow one.

Production of both corn and soybean is expanding to include more marginal, poorly drained soils in NNY and this raises questions about the impact of diseases in stressful environments. New diseases arise and formerly minor diseases become more damaging on a regular basis. Frogeye leaf spot, sudden death syndrome, brown stem rot, and *Soybean vein necrosis virus* were each confirmed in individual soybean fields in NNY in 2012, and northern stem canker in 2014 for the first time, yet we have no idea how widespread or severe these diseases may be across the breadth of NNY farms.

Gray leaf spot has become a highly damaging disease of corn in humid valleys in the Southern Tier and Hudson Valley Regions of New York State; there are similar environments in parts of NNY yet gray leaf spot occurrence and potential have not been assessed in NNY.

In 2013-2016, northern corn leaf blight was the dominant disease in cornfields throughout NNY, indicating that it is widespread and undermanaged on many farms.

Corn head smut is a re-emerging disease of concern, which was identified in 2014 and 2015 in Jefferson County for the first time in the region since the 1980s.

Fusarium root rot and wilt of soybeans was identified for the first time in 2015 and again in 2016.

Potentially serious soilborne diseases of soybean, including Phytophthora root rot and charcoal rot were each confirmed for the first time in Northern NY in 2016.

Prior to the inception of this survey with funding from the farmer-driven Northern New York Agricultural Development Program in 2013, no systematic assessment of corn and soybean diseases has been made in NNY in recent decades and was long overdue.

Continuing this proactive disease assessment program will help protect the security and profitability of corn and soybean production in NNY. Results of this research are being used to map the distribution of corn and soybean diseases across New York State and will be made available to NY growers through extension outreach to aid in their management decisions. Results of the surveys in NNY are posted at www.nnyagdev.org; all educational materials are posted in the disease management section of fieldcrops.org.

Increased local knowledge of crop diseases is the main benefit expected from this project. Northern NY farmers are increasingly faced with important management decisions that require knowledge of plant diseases such as:

- 1) What corn hybrids and soybean varieties should I grow? What diseases do I need genetic resistance to and at what levels in the hybrid or variety?
- 2) Should I apply a foliar fungicide(s)? Does the disease pressure in my field or in the general area warrant a chemical application?
- 3) What crop rotation sequences and tillage practices makes most sense for my farm? Are plant disease organisms building up in my soil or crop debris that suggests I need to change my cropping sequence or tillage practices in particular fields?

The greatest needs for disease assessment and proper disease identification concern leaf blights, ear rots, and stalk rots of corn; and foliar blights, stem and root rots, pod rots, viruses and other systemic diseases of soybean.

Methods:

Disease symptoms were noted and quantified, and representative diseased samples were collected and submitted to the Bergstrom Lab at Cornell University, by CCE field crop educators whenever found during routine visits to farms by Mike Hunter in Jefferson and Lewis and St. Lawrence counties, and by Kitty O'Neil in Clinton, Essex, Franklin, and St. Lawrence counties.

In addition, an intensive field survey/assessment was conducted for disease detection and diagnosis in 10 sentinel fields of corn and 36 sentinel fields of soybean, chosen to maximize diversity of environment and cropping practices in each county. Each sentinel field was assessed one to three times during the growing season to include various growth stages of the crop.

In the Bergstrom Lab, samples were cultured for pathogen isolation, examined microscopically, and pathogens were identified. Results have been collated and summarized and will be shared with individual producers via CCE educators and extension meetings. Important new disease findings will be published through national databases and publications; pathogen isolates archived in the Cornell University Field Crop Pathogen Culture Collection; and DNA sequences submitted to GenBank.

Results:

One corn disease and four soybean diseases in total were identified and diagnosed among farm fields from the five counties surveyed in 2016. No disease occurred at high severity in 2016. Due to the extraordinary drought conditions of 2016, soybean soilborne diseases such as white mold and brown stem rot were not observed. However, *Phytophthora* root rot, northern stem canker, *Fusarium* root rot and charcoal rot of soybean were each observed in some fields in Jefferson County.

Conclusions/Outcomes/Impacts:

The unusually dry conditions of the 2016 growing season resulted in very low disease pressure for corn and soybeans across the region. However, these **drought conditions provided a unique environment that favored the development of some soybean**

soilborne diseases never before confirmed in the region. This underscores the need for multiyear surveys to better understand the breadth of diseases potentially available to affect growers in NNY.

Corn Disease

Northern corn leaf blight was observed, though not universal and at relatively low levels, in northern New York cornfields in 2016. Some BMR cornfields, which are more susceptible, were sprayed with foliar fungicides for northern corn leaf blight, though the economic return on those investments were questionable in 2016. The amount of fungal inoculum in corn debris continues to be elevated in the region, so farmers are urged to plant corn hybrids with moderate resistance to NCLB in 2017.

Head smut was not observed in 2016. However, NNY growers should be aware of a potential resurgence of this disease which hasn't been a major concern for northern NY growers in almost three decades.

Soybean Disease

None of the soybean fields surveyed in 2016 showed significant foliar disease development and therefore foliar fungicides would not likely have contributed to economical yield enhancement in those fields.

Charcoal rot and Fusarium root rot and wilt were both identified for the first time in NNY in 2016, though they have been found elsewhere in the state in previous years (Fig 1). The dry conditions of 2016 favored the development of these two soilborne diseases.

Surprisingly, despite the drought, Phytophthora root rot was also confirmed on soybean for the first time since the inception of this survey (Fig 2).

Though not observed during the dry 2016 growing season, white mold and brown stem rot are potentially serious soilborne diseases with long-term implications for crop rotation sequence and these diseases deserve further assessment in the region.

If soybean cyst nematode is confirmed in the region, this will have important implications for soybean production in NNY. More intense nematode assay survey will be warranted and affected farms will need to plant soybean varieties with resistance to the nematode if it is discovered.



Figure 1. Charcoal rot discovered in Jefferson County, NY, by CCE Field Crops Educator Mike Hunter with diagnosis confirmed in the Bergstrom Laboratory at Cornell University for the corn and soybean disease survey funded by the farmer-driven Northern New York Agricultural Development Program; photo: Jaime Cummings.



Figure 2. Phytophthora root rot encountered in Jefferson County, NY, by CCE Field Crops Educator Mike Hunter while scouting sentinel fields for the corn and soybean disease survey funded by the farmer-driven Northern New York Agricultural Development Program; photo: Mike Hunter

Outreach:

Results of the survey are being shared with growers and CCE educators via extension meetings in the region. A database of corn and soybean diseases diagnosed by county is available at fieldcrops.org.

Next steps:

Multiyear surveys better capture the reality of disease occurrences in the region due to the variation in weather from year to year, because each disease may be favored by specific weather conditions. We will continue the corn and soybean disease survey in 2017 to expand our database of which diseases occur in the counties of northern NY.

Acknowledgments:

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Reports and/or articles in which results of this project have been published:

Cummings, J.A., and G.C. Bergstrom. 2014. Northern stem canker: A new challenge for New York soybean producers. *What's Cropping Up?* Volume 24, No. 5:47-48 (<http://css.cals.cornell.edu/extension-outreach/whats-cropping-up>)

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