Northern NY Agricultural Development Program
2015 Project Report

Project Title: Diagnosis and Assessment of Diseases of Corn and Soybean in Northern New York

Project Leader(s):

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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 NNY 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 2013-2015, northern corn leaf blight was the dominant disease in corn fields throughout northern NY, indicating that it is widespread and undermanaged on many farms.

Prior to the inception of this Northern New York Agricultural Development Program-funded survey in NNY in 2013, no systematic assessment of corn and soybean diseases had been made in NNY in recent decades and was long overdue. This project in 2015 continues this proactive disease assessment program that will help protect the security and profitability of corn and soybean production in NNY. Results of this research will be used to start mapping the distribution of corn and soybean diseases in NY and will be made available to NY growers through extension outreach to aid in their management decisions. All educational materials will also be posted on 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 for the best disease resistance? To what diseases does my seed 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 to suggest 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 they were found during routine visits to farms by Mike Hunter in Jefferson and Lewis counties, and by Kitty O'Neil in Clinton, Essex, Franklin, and St. Lawrence counties in 2015.

In addition, an intensive field survey/assessment was conducted for disease detection and diagnosis in 21 sentinel fields of corn and 46 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. Soil samples were collected at the end of the season from 13 fields across the region and analyzed for presence of the soybean cyst nematode in Dr. Wang's USDA Laboratory at Cornell.

In the Bergstrom Lab, samples were cultured for pathogen isolation, examined microscopically, and pathogens were identified. Results were collated and summarized and shared with individual producers via CCE educator 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:

Figure 1 illustrates the locations of the fields inspected for the 2015 survey, and Table 1 summarizes the diseases found in each county. Five corn diseases and 11 soybean diseases in total were identified and diagnosed among farm fields from the five counties surveyed. No disease occurred at high severity in 2015.

Northern corn leaf blight (Figure 2) was observed in most of the corn fields surveyed during August through October, though only at moderately low levels. The other corn foliar diseases, common rust and eyespot, are fairly common and widespread and only occurred at low levels in the fields they were found. The important finding on corn in 2015 was head smut in Jefferson County, which was identified in NY in the 2014 survey for the first time since the 1980's (Figure 3).

White mold wasn't as widespread in 2015 as it had been in previous years in soybean crops. The foliar soybean diseases identified are common and only occurred at low levels. The important findings on soybean in 2015 included northern stem canker and brown stem rot, which were identified in NY for the first time in 2014 and 2012, respectively (Figure 2). Soybean cyst nematode was not confirmed to be present in any of the 14 soil samples collected in the region. Nematode scouting will continue in 2016.

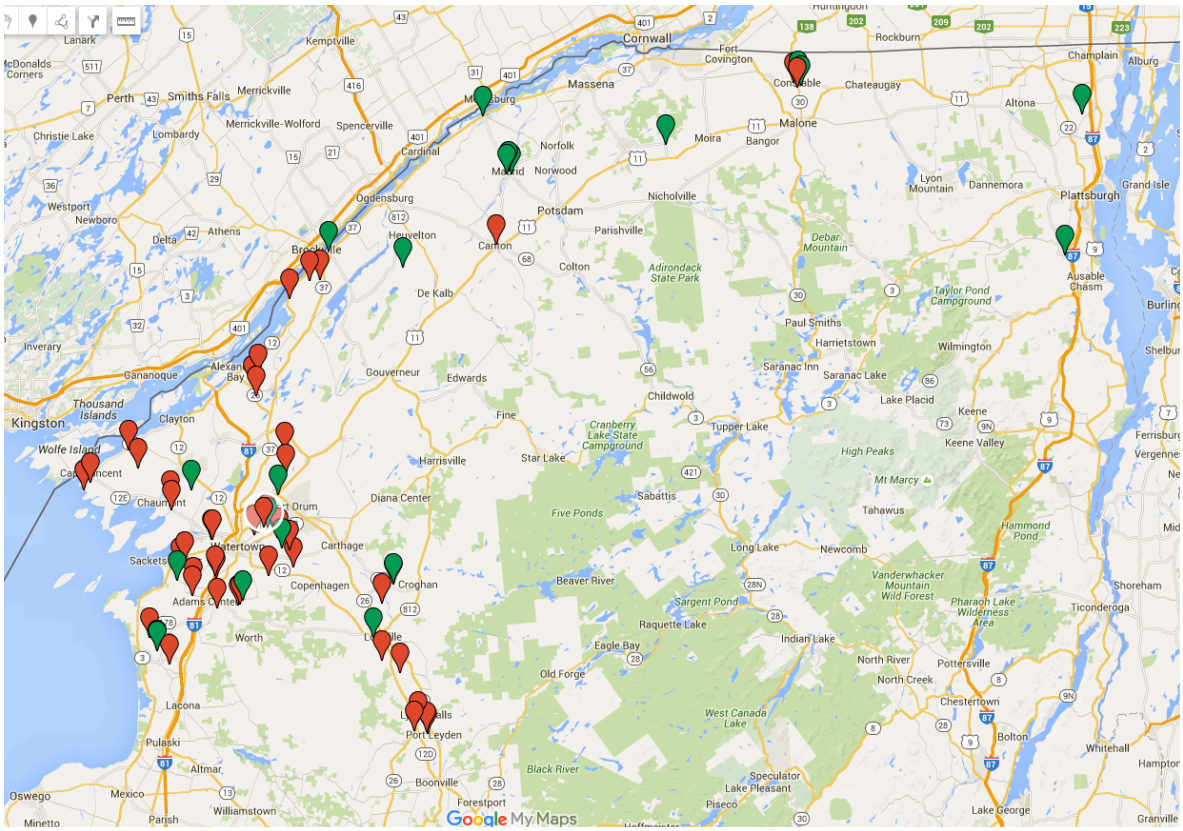

Figure 1. Locations of fields scouted during 2015 NNYADP Corn and Soybean Disease survey. Green balloons represent corn fields; red balloons represent soybean fields. Individual balloons may represent multiple fields at that location.

Table 1. Diseases identified by county, 2015 NNYADP soybean and corn disease survey.

County	Crop	Disease
Jefferson	soy	bacterial blight
Jefferson	soy	bacterial pustule
Jefferson	soy	downy mildew
Jefferson	soy	Cercospora leaf blight
Jefferson	soy	frogeye leaf spot
Jefferson	soy	Septoria brown spot
Franklin	soy	bacterial blight
Franklin	soy	downy mildew
Franklin	soy	Fusarium root rot
Franklin	soy	**northern stem canker**
Franklin	soy	soybean mosaic virus
Franklin	soy	white mold
St. Lawrence	soy	**brown stem rot**

County	Crop	Disease
Clinton	corn	northern corn leaf blight
Clinton	corn	eyespot
Clinton	corn	common rust
Clinton	corn	northern corn leaf spot
Franklin	corn	common rust
Jefferson	corn	northern corn leaf blight
Jefferson	corn	eyespot
Jefferson	corn	**head smut**
St. Lawrence	corn	eyespot
St. Lawrence	corn	Purple leaf sheath
St. Lawrence	corn	northern corn leaf blight

Figure 2. Northern stem canker identified in Jefferson County in 2014 and Franklin County in 2015. This soilborne soybean disease had never previously been identified in NY. Photo: J. Cummings

Figure 3. Corn head smut identified in Jefferson County in 2014 and Franklin County in 2015. Photo: J. Cummings

Conclusions/Outcomes/Impacts:

Northern corn leaf blight (NCLB) was widespread, though not universal, in northern New York corn fields in 2015. Because of the lateness of the epidemic, significant yield losses were unlikely and application of foliar fungicides at tassel emergence would not likely have resulted in an economical return on investment. 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 2016. Brown midrib corn hybrids were not included among the fields surveyed in 2015, yet some BMR hybrids showed severe damage from NCLB in the region.

Head smut continued to show up in some corn fields in the same region it was identified in 2014, indicating a potential resurgence of this disease which hasn't been a major concern for northern NY growers in almost three decades.

None of the soybean fields surveyed in 2015 showed significant foliar disease development and therefore foliar fungicides would not likely have contributed to economical yield enhancement in those fields. We have no indication that the bacterial pustule or downy mildew observed warrant altered management practices for control. Septoria brown spot and frogeye leaf spot can cause yield losses if they are severe during early pod-filling, which was not the case in 2015. White mold, brown stem rot and northern stem canker 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 will be warranted and affected farms will need to plant soybean varieties with resistance to the nematode if it is discovered.

Outreach:

Results of the survey are being shared with growers and CCE educators via extension meetings. Results of this project were presented to growers and discussed at meetings hosted by the NNYADP board in Canton and Malone (January 2016). A database of corn and soybean diseases diagnosed by county will be made available via fieldcrops.org as we map out the occurrences of various corn and soybean diseases in the region.

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 NNYADP corn and soybean disease survey in 2016 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)

For More Information:

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