Northern NY Agricultural Development Program
2019 Project Report

Diagnosis and Assessment of Diseases of Field Crops in Northern New York

Project Leader:

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Collaborators:

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- Kitty O'Neil, Cornell University Cooperative Extension, North Country Regional Ag Team

Cooperating Producer(s):

- **Clinton County:** Lance Rovers, Jon Rulfs
- **Essex County:** George Sayward, Lee Garvey
- **Franklin County:** Harry Fefee, Alan Poupore, Dick Eakins
- **Jefferson County:** Murrock Farm, North Harbor Dairy Farm, Sheland Farm, H. Wood Farm, Dale Morse, Fairlawn Farm, Goodnough Farm, Freeman Farms
- **Lewis County:** Hancor Farms, Bob Martin, Conway Farms, Mike Nemuth, East View Grain, Emmanuel Widrick, Earl Nolt and Son
- **St. Lawrence County:** Chambers Farm, Scott Nichols, Steve Carr, Pierce Farm, Dave Stout, Ken Wilson, Ben Stauffer, Jon Greenwood

Background:

Corn for silage and grain is a foundational crop for the economic wellbeing of Northern New York (NNY) dairy and cash grain farms. Soybean shows great economic promise in NNY and the acreage of soybean in the region has expanded over the last decade. 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 how widespread or severe these diseases may be across the breadth of NNY farms is unknown.

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 has not been detected. In 2013-2016, **northern corn leaf blight** was the dominant disease in corn fields throughout northern NY, indicating that it is widespread and undermanaged on many farms. However, in 2017, **northern corn leaf spot** was more commonly found than northern corn leaf blight. **Corn head smut** is a re-emerging disease of concern, which was identified in 2014, 2015, 2017 and 2018 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. In 2018 and 2019, **downy mildew** and **septoria brown spot** were the most commonly identified diseases of soybeans throughout the region.

Prior to the inception of this survey in 2013, no systematic assessment of corn and soybean diseases had been made in NNY in recent decades and was long overdue. In 2020, the Northern New York Agricultural Development Program provided funding to continue this proactive disease assessment program to 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 in NY and are made available to NY growers through extension outreach to aid in their management decisions. Educational materials on disease management are posted at fieldcrops.org. Important new disease findings are published through national databases and publications; pathogen isolates are archived in the Cornell University Field Crop Pathogen Culture Collection; and DNA sequences submitted to GenBank.

This project has led to increased local knowledge of crop diseases by NNY growers. Northern NY farmers are increasingly faced with important management decisions that require knowledge of plant diseases, including:

1) What corn hybrids and soybean varieties should I grow? For what diseases do my crops need genetic resistance 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?
4) Are plant disease organisms building up in my soil or crop debris such that 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 and other systemic diseases of soybean.

Methods:

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

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 educators and extension meetings. Important new disease findings are published through national databases and publications; pathogen isolates are archived in the Cornell University Field Crop Pathogen Culture Collection; and DNA sequences submitted to GenBank.

Results:

In 2019, two corn diseases, seven soybean diseases, two alfalfa and two industrial hemp diseases in total were identified and diagnosed among farm fields from the six counties surveyed.

Many growers are successfully growing varieties and hybrids with some level of disease resistance and have adopted fungicide programs to combat a number of foliar diseases. The variability of weather conditions from year to year underscores the need for multiyear surveys to better understand the breadth of diseases potentially present to affect growers in NNY.

CORN

Northern corn leaf blight was observed, though not universally and at very low levels, in Northern New York corn fields in 2019.

Eyespot, caused by the fungus *Kabatiella zeae*, is a common corn disease and was observed in NNY corn fields.

SOYBEAN

Northern Stem Canker (NSC), first found in NNY in 2014, is a fungal disease of soybean caused by the fungus *Diaporthe phaseolrum* var. *caulivora*. There have been significant yield losses reported in the Midwestern states; however, to date, no yield losses have been documented in New York State. In 2019, NSC was confirmed in several more fields across NNY. As NSC becomes more prevalent in the state, selection of resistant varieties may become more important for NNY soybean growers.

Cercospora Leaf Blight is another fungal disease that was found in a number of soybean fields in NNY. The warm, wet weather conditions during pod fill fostered the

development of this non-yield limiting disease. This is the same pathogen that causes Purple Seed Stain. High amounts of purple-stained seed can lead to grain dockage or rejection. Fortunately, we did not encounter high levels of this disease that resulted in any docked loads of grain.


White mold in soybeans. Photo: Michael Hunter

Other soybean diseases identified in 2019 in NNY **include downy mildew**, **white mold**, **frogeye leaf spot, septoria brown spot** and **anthracnose.**

ALFALFA

In 2019, the cool, wet weather in the spring favored the growth and development of leaf spot diseases of alfalfa. The two common foliar diseases favored by high moisture conditions were Leptosphaerulina **Leaf Spot** (a.k.a Lepto leaf spot) and **Stemphylium Leaf Spot**. Both diseases were confirmed in NNY growers' fields this season. The incidences of these diseases were not severe or widespread. Neither of these diseases resulted in lower forage quality or lead to a reduction in overall yield.


White mold on industrial hemp. Photo: Michael Hunter.

HEMP

Both **White mold** and **Botrytis gray mold** are common molds that can cause serious damage to industrial hemp. White mold is caused by a fungus, *Sclerotinia sclerotiorum that* can also attack soybeans and forage legumes. Botrytis gray mold is the most frequently encountered disease of hemp in New York State in both fields and greenhouses. Both of these molds were found on industrial hemp grown in Northern New York.

Outreach:

The results from this on-farm research trial are being disseminated to crop growers, crop consultants, agribusinesses, and extension field crops staff members throughout Northern New York; through the CCE NCRAT agricultural newsletter and local crop meetings/webinars hosted by Cornell Cooperative Extension and agribusinesses; and via the NNYADP website at www.nnaygdev.org. Outreach includes resources to help farmers prevent and treat crop diseases based on yearly survey and the tracking of year-to-year disease trending made possible by this research.

For More Information:

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