DEPARTMENT OF AGRICULTURE

Status of Invasive Field Crop Pests in Minnesota

2024 Annual Report

3/24/2025

Minnesota Department of Agriculture

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Surveys for Field Crop Invasive Pests

Several emerging and invasive insects and plant pathogens threaten Minnesota commodities. These pests have the potential to cause problems for both production and export if they become established. The Minnesota Department of Agriculture (MDA), along with partners at the United States Department of Agriculture (USDA) and the University of Minnesota (U of M), conducts an annual review of invasive pests that pose the greatest threat to crops in Minnesota. Many of these pests have not been found in Minnesota, while others are present but not yet widely established. Survey efforts aim to detect these organisms as early as possible by targeting high-risk areas. Commodity crops represent a large portion of the Minnesota's agricultural industry, and surveys focus on counties with the highest number of acres of the commodity being monitored.

Corn, Small Grains, and Soybean Surveys

The MDA monitored corn, small grains, and soybean fields in 2024 for several invasive pests that are not currently known to occur in Minnesota or have limited distributions within the state. These surveys were jointly funded by the USDA Animal and Plant Health Inspection Service (APHIS) Plant Protection and Quarantine Program (PPQ) and the MDA. Table 1 shows the target pests and survey methods for each of the surveys.

Table 1: Survey target pests and survey methods.

Survey	Scientific Name	Common Name	Survey Method
Corn	*Helicoverpa armigera*	Old World bollworm	Trap and pheromone lure
Corn	*Autographa gamma*	Silver Y moth	Trap and pheromone lure
Corn	*Diabrotica speciosa*	Cucurbit beetle	Visual observation
Corn	*Halyomorpha halys*	Brown marmorated stinkbug	Visual observation
Corn	*Magnaporthiopsis maydis*	Late wilt of corn	Visual observation
Corn	*Peronosclerospora philippinensis*	Philippine downy mildew	Visual observation
Corn	*Phyllachora maydis*	Tar Spot	Visual observation
Corn	*Popillia japonica*	Japanese beetle	Visual observation
Corn	*Puccinia polysora*	Southern corn rust	Visual observation
Small Grains	*Tilletia controversa*	Dwarf bunt	Visual observation
Small Grains	*Urocystis agropyri*	Wheat flag smut	Visual observation
Small Grains	*Anguina tritici*	Wheat seed gall nematode	Visual observation

Survey	Scientific Name	Common Name	Survey Method
Small Grains	High Plains Virus	High Plains Virus	Visual observation
Small Grains	*Oulema melanopus*	Cereal leaf beetle	Visual observation
Soybean	*Macrosaccus morrisella*	Soybean tentiform leafminer	Visual observation

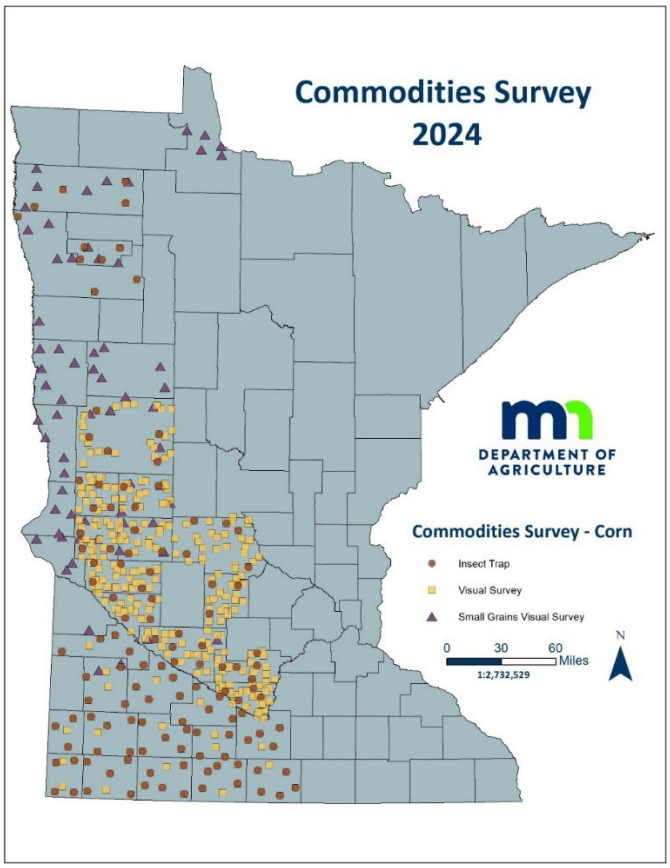
Visual Survey

Corn and small grain plants were visually inspected for the presence of target pests. Each field was surveyed at four locations, with 10 plants randomly selected for observation, for a total of 40 plants per field. Fields were objectively selected for survey, but an effort was made to space out sampled fields within counties (Figure 1). Corn fields were scouted for target pests (Table 2) from mid-June through mid-September. Small grain fields were observed for four pests from mid-July to early August. No target pests were found in small grains in 2024. Southern corn rust, caused by *Puccinia polysora*, was the only target disease identified in corn in 2024.

Table 2 : Number of fields visually surveyed and number of counties by survey.

Survey	Number of Counties	Number of Fields Surveyed
Corn	29	412
Small Grains	17	65
Soybean	29	139

Figure 1: Corn and small grain fields surveyed in 2024.

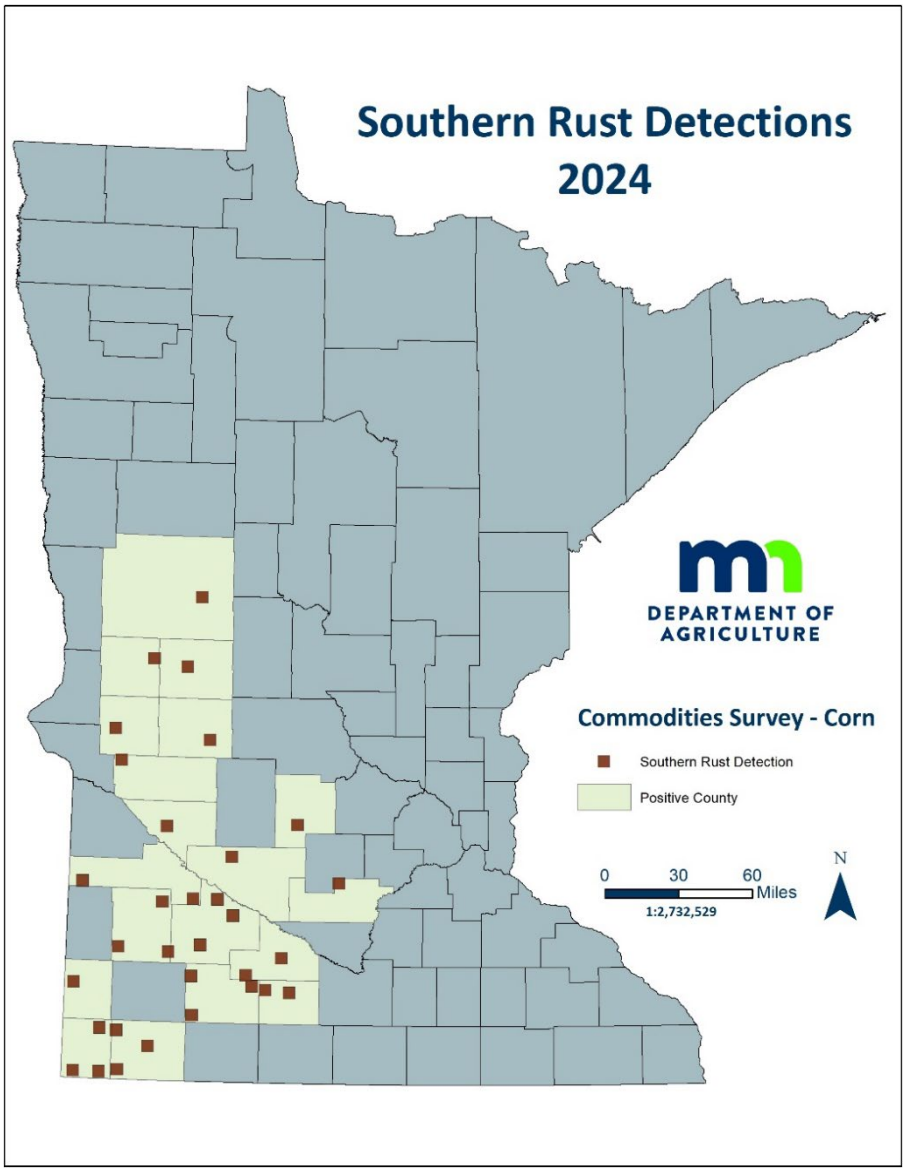


Southern Rust

Southern rust, caused by the fungus *Puccinia polysora*, can reduce corn yield by stealing nutrients from the crop and causing premature dry down. This plant pathogen prefers temperatures over 80°F and needs a live plant to survive. Although it is unlikely to overwinter in Minnesota, southern rust produces thousands of airborne spores that are carried north on wind currents each year. Spores need high temperatures and high humidity to infect. Once an infection starts, new spores are produced in as little as 7 days, resulting in new infections in the crop. In 2024, southern rust was found at 32 sites in 19 counties. The first infections were detected at the end of July.

Figure 2: Orange pustules of southern rust on the upper surface of a corn leaf.

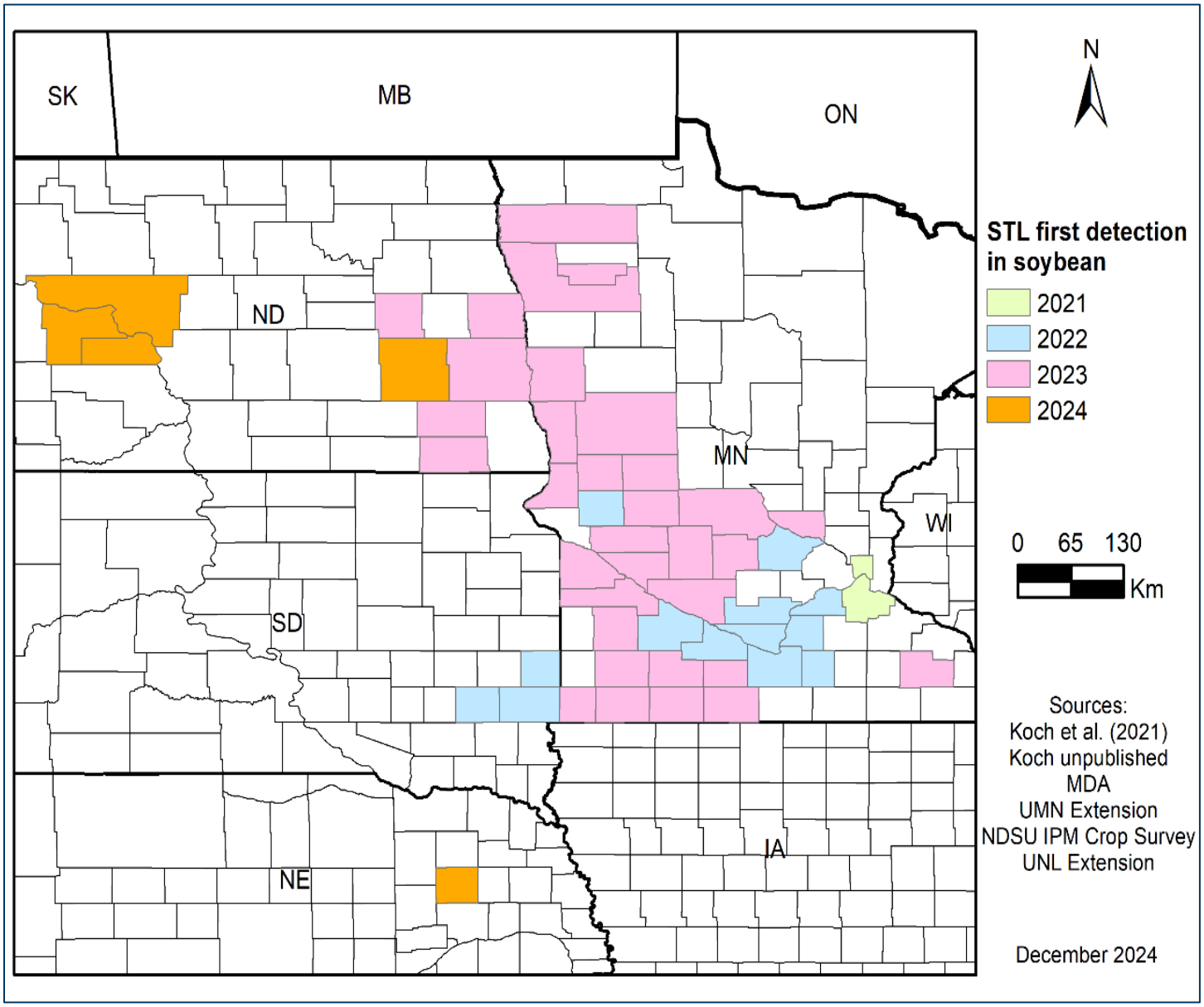
Figure 3: Southern rust corn detections 2024



Soybean Tentiform Leafminer

In collaboration with Dr. Bob Koch and Arthur Vieira Ribeiro with the U of M, soybean fields were scouted for soybean tentiform leafminer (*Macrosaccus morrisellato*) to better understand its presence in the state. This insect was previously known only to feed in forested areas on two plants related to soybeans, but not on cultivated soybeans. It appears there has been a host range expansion, so knowing its range within the state will be important information for growers. Observations consisted of 20 plants randomly selected within 50 feet of a field edge by tree windbreaks. The underside of the lower leaves were observed for mines. Soybean fields were visually surveyed from mid-August through mid-September. All data points were sent to the U of M partners for follow-up confirmation. The U of M project has been observing this insect since 2021 to better understand its occurrence throughout Minnesota and neighboring states (Figure 4).

Figure 4: First detections of soybean tentiform leafminer in soybean fields by year. Map courtesy of the U of M.



Trapping Survey

Plastic bucket traps (Figure 5) with species-specific pheromone lures were placed for Old World bollworm (*Helicoverpa armigera*) and Silver Y moth (*Autographa gamma*) at 126 sites in 29 counties. Each site had a trap set for both insects, and the traps were placed at least 65 feet apart along field edges. Traps were checked, and lures were refreshed midseason. Trap samples were screened, and specimens that could not be eliminated as target species were submitted to the MDA Laboratory Services Division. Specimens that could not be eliminated as suspects by the MDA were submitted to the USDA for final identification. No target pests were found in 2024.

Figure 5: Plastic bucket trap hanging next to corn field.

Potato Survey

Potatoes grown for seed are at high risk for moving certain soil-borne pathogens. Unlike potatoes grown for other uses, seed potatoes are not washed at any time and are planted back into the soil. Some of the most important soil-borne pathogens that could affect seed potatoes are nematodes that produce cysts. Nematodes are microscopic worms that feed on the roots of plants, causing reductions in growth and yield. Female cyst nematodes attach to roots of the potato plant to feed. When the female dies, she can have 200 to 600 eggs inside her. Her body then becomes a tough protective casing called a cyst. This cyst protects the eggs and allows them to survive for many years in the field. One cyst moved on a seed potato can introduce hundreds of plant parasitic nematodes to the field where the seed is planted. Several cyst nematodes are considered quarantine pests, meaning severe long-term restrictions would be placed on the movement of plant material and equipment from an area found to contain one of them.

To export seed potatoes to Canada, a grower must have documentation to confirm that the field from which the seed potatoes were harvested was free of potato cyst nematodes (PCN) based on a survey following USDA guidelines. The MDA surveys Minnesota seed potato fields for two species of PCN: pale cyst nematode (*Globodera pallida*) and golden nematode (*Globodera rostochiensis*). Both are quarantine pests in potato growing areas around the world, including the United States.

The Minnesota PCN survey has been conducted every year since 2009. As a result of the longevity of this project and careful record keeping, the MDA can identify fields that qualify for exemption from sampling based on the 2014 USDA guidelines. Minnesota was the first state in the nation to have a field qualify for exemption based on this survey.

Survey Procedure

After harvest, samples are taken from the surface soil of the seed potato crop at the rate of one five-pound sample per acre. Samples are collected by hand and with a mechanical sampler.

Table 3: Potato pest targets and survey methods in 2024.

Scientific Name	Common Name	Survey Method
Globodera pallida	Pale cyst nematode	Soil sample
Globodera rostochiensis	Golden nematode	Soil sample
Heterodera ciceri	Chickpea cyst nematode	Soil sample
Heterodera schachtii	Sugar beet cyst nematode	Soil sample

Survey Results

In 2023, soil samples were collected from 600 acres in Clay, Kittson, and Lake of the Woods counties at the request of seed potato growers. One 78-acre field in Lake of the Woods County qualified for exemption in 2023 and did not require sampling. All soil samples were sent to the USDA pale cyst nematode lab in Idaho for processing and identification of cyst nematodes. No target cyst nematodes were detected in 2023.

In 2024, soil samples were collected from 405 acres in Clay, Kittson, Itasca, Lake of the Woods, Red Lake, Sherburne, and Wadena counties at the request of seed potato growers. Three fields totaling 595 acres in Lake of the Woods County qualified for exemption in 2024 and did not require sampling. All soil samples were sent to the USDA pale cyst nematode lab in Idaho for processing and identification of cyst nematodes. Results are pending.

More information on potato cyst nematodes can be found on the MDA PCN webpage.

For More Information

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