



2023 Disease Survey Results & Overview

Disease Surveillance Results in Soybeans, Peas and Dry Beans

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Photo credit: MSPG

Phytophthora root rot in soybeans.

EACH YEAR, DISEASE surveys are conducted across Manitoba to assess root, foliar and stem diseases in a representative sample of soybean, field pea and dry bean fields. These surveys are a collaborative effort between Agriculture and Agri-Food Canada (AAFC), Manitoba Agriculture, and Manitoba Pulse & Soybean Growers (MPSG).

The annual surveillance of crops allows us to monitor and follow diseases each year and over time. This keeps us informed on

any emerging issues to help update research priorities and identify areas that may need further support.

SOYBEAN DISEASE SURVEY

In 2023, 67 soybean fields in Manitoba were surveyed for foliar and stem diseases during late July to late August at the R4 (full pod) to R5 (beginning seed) stages. Roots were collected from 58 fields and submitted to AAFC for root disease analysis. New this

year, soils were also collected from soybean fields for *Phytophthora* root rot (PRR) pathotype identification. Soybeans were visually assessed for infection by bacterial blight, septoria brown spot, downy mildew, frogeye leaf spot, northern stem canker, white mould, phomopsis pod/stem blight and anthracnose.

Bacterial blight and septoria brown spot continue to be the most common foliar diseases found in soybeans, infecting 76 per cent and 85 per cent of fields surveyed in 2023, respectively (Figure 1). Severity levels of these two diseases were below 1.0 (scale 0–5), indicating that only trace symptoms of disease were found. Fusarium root rot was found in every field surveyed, the severity of infection ranged from 2.2 to 5.6 and was 4.0 on average (scale 0–9). A root rot severity above 4.0 signifies where we anticipate yield loss to occur. This represents when symptoms are present on half of the root system and plants have visible stunting. Although Fusarium root rot prevalence was at a threshold of impacting yield, the growing season conditions supported good

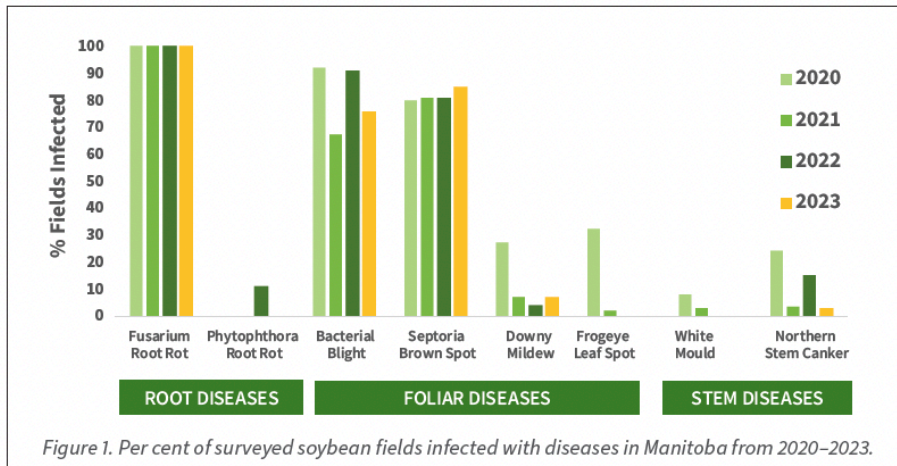


Figure 1. Per cent of surveyed soybean fields infected with diseases in Manitoba from 2020–2023.

In 2023, 100 per cent of dry bean fields tested positive for *Fusarium* root rot.



Photo credit: MSPSG

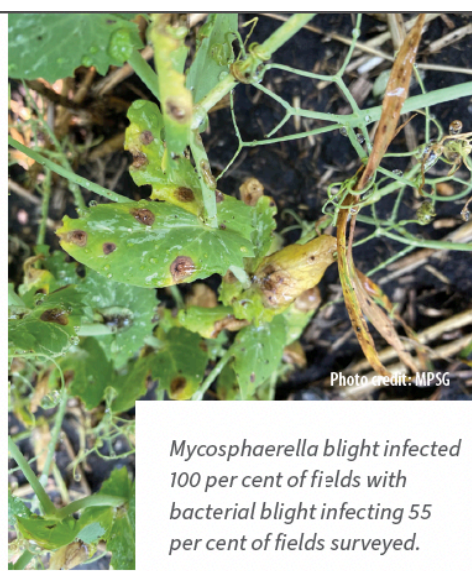


Photo credit: MSPSG

Mycosphaerella blight infected 100 per cent of fields with bacterial blight infecting 55 per cent of fields surveyed.

soybean yields in areas where adequate rain was provided during seed fill. PRR was not found in 2023.

Northern stem canker was the most prevalent stem disease found in 2023, infecting only three per cent of fields. White mould was found at trace levels in a single field and otherwise stem diseases weren't found. Frogeye leaf spot, phomopsis pod/stem blight and anthracnose weren't found in 2023.

PHYTOPHTHORA ROOT ROT SOIL SAMPLING FOR PATHOTYPE IDENTIFICATION

Soybean varieties have major gene resistance as a tool to help combat PRR. However, the missing link is testing the soil in each field to understand what pathotypes are present. This will help farmers select a variety based on the major gene resistance it carries. Currently there are no commercial labs in Manitoba that offer this test, however, a lab in Quebec offers this service.

2022 was MSPSG's first year piloting a commercial soil test to identify PRR pathotypes in farmers' fields. Twelve fields with suspected PRR presence were tested. In 2023, we tested 24 fields that were part of the On-Farm Network program, regardless of if PRR was suspected or not. The summary of both years is found in Table 1.

These results show that in 2022, of the 11 fields where PRR was confirmed, 100 per cent had PRR pathotypes that overcame soybean Resistance to *Phytophthora sojae* (Rps) genes 1a and 1c. Rps genes 1k and 3a were defeated at 55 per cent and 64 per cent of the fields tested, respectively, and Rps gene 6 was defeated at 27 per cent of these fields.

In 2023, 100 per cent of the fields had PRR pathotypes that overcame soybean

Rps gene 1a. The second highest resistant gene defeated was Rps 6 with 92 per cent of fields affected. Rps genes 1c, 1k and 3a were defeated at 67 per cent, 67 per cent and 29 per cent, respectively. Rps genes 8 and 11, which aren't commercially available, were tested in 2023 resulting in 29 per cent and 83 per cent of fields being resistant.

The differences between 2022 and 2023 results show how specific PRR pathotypes are to each field. This highlights the

importance of having soil tested to properly identify the PRR pathotypes present in each field planned for soybeans. This will support farmers in making informed decisions on variety selection to choose the right Rps genes to combat the PRR pathotype(s) in their field. Research is ongoing to improve our understanding of PRR, including testing varieties for field tolerance, also called partial resistance. These are controlled by minor genes that allow soybeans to better withstand infection to PRR without incurring severe symptoms or death. Work is on-going and more information is to come!

DRY BEAN DISEASE SURVEY

In 2023, 41 dry bean fields were surveyed for root, foliar and stem diseases. Surveying for root diseases occurred during mid-July to early August and foliar and stem diseases were surveyed late August (Figure 2).

Common bacterial blight (CBB) was the most common foliar disease found,

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Table 1. Summary of soybean Resistance to *Phytophthora sojae* (Rps) genes defeated by *Phytophthora* root rot pathogens identified in 11 fields in 2022 and 24 fields in 2023.

YEAR	% of Rps Gene Defeated					Other (research lines)	
	1A	1C	1K	3A	6	8	11
2023	100%	67%	67%	29%	92%	29%	83%
2022	100%	100%	55%	64%	27%	N/A	N/A

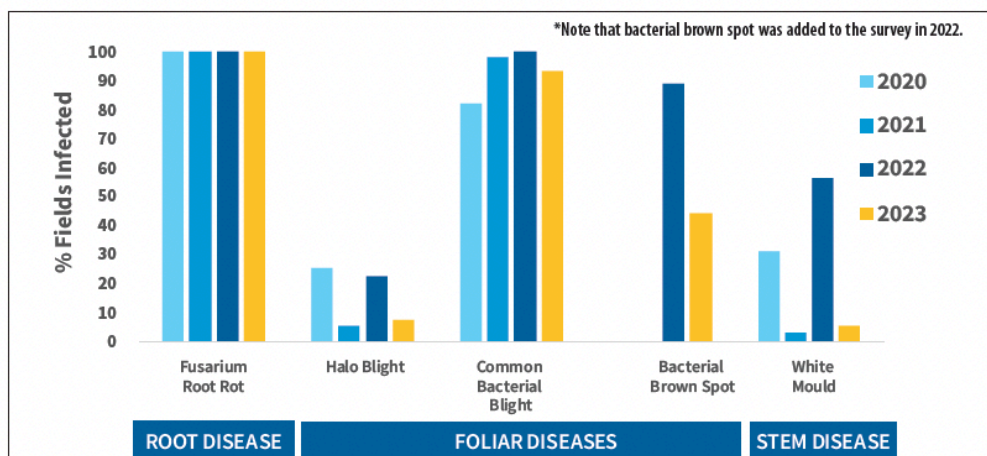


Figure 2. Per cent of surveyed dry bean fields infected with diseases in Manitoba from 2020–2023.

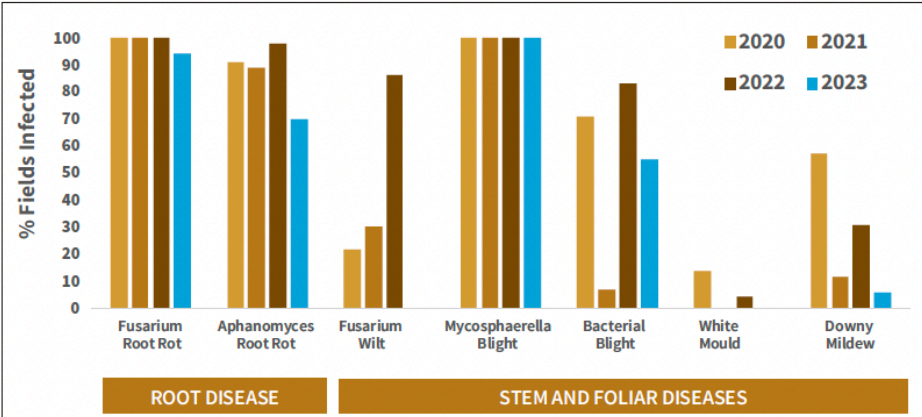


Figure 3. Per cent of surveyed pea fields infected with diseases in Manitoba from 2020 – 2023.

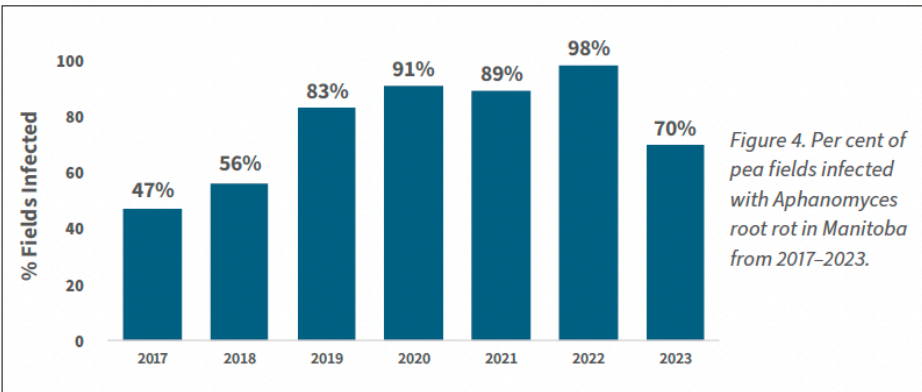


Figure 4. Per cent of pea fields infected with Aphanomyces root rot in Manitoba from 2017–2023.



GROWING PEAS IN 2024? THINK BACK TO THE LAST TIME YOU GREW THEM

Aphanomyces root rot is a significant risk to field peas and is prevalent across Manitoba (Figure 4). Each year, more and more fields are found to have this devastating root disease lurking in the soil. Aphanomyces is a long-lived soil-borne pathogen. Its resting oospores have incredibly thick cell walls that are extremely resilient to environmental conditions. They can also remain dormant more than 10 years in the absence of host plants. A significant investment has been made towards Aphanomyces root rot research as management options are limited. Currently, the only effective tool is through crop rotation and taking a longer break between susceptible host crops like peas.

Although soil moisture conditions are fairly dry entering the upcoming growing season, it’s important to have Aphanomyces as a top consideration for pea crops. Farmers growing field peas this year, should take into consideration what the environment was like the last time peas grew on that field. Was there root rot in the pea field, what was the level of root rot like and how wet were conditions? Aphanomyces is a water mould that thrives in wet conditions, in wet years, such as 2020 and 2022, your level of oospore build-up is higher. A longer rotation away from peas and other susceptible crops will be needed. To walk through considerations before returning a field to pea production following a positive Aphanomyces diagnosis, consult Saskatchewan Pulse Growers Aphanomyces Risk Checklist. ■

infesting 93 per cent of the fields surveyed, severity ranged from 0.3 to 3.7 and was 1.9 on average (scale 0–5). CBB infects wounds from environmental damage such as hail or strong winds as well through natural leaf openings. Bacterial brown spot was added to the survey in 2022. In 2023, it was the second most common foliar disease, infecting 44 per cent of fields, with an average severity of 0.9 (scale 0–5). White mould and halo blight were also found in five per cent and seven per cent of fields, respectively, however, both were at low severity levels.

Fusarium root rot was found in every field surveyed. Severity ranged from 1.4 to 5.4 and was 2.9, on average (scale 0–9). Rhizoctonia and pythium root rot have not been found in the survey since 2016.

FIELD PEA DISEASE SURVEY

In 2023, 47 pea fields were surveyed for root, foliar and stem diseases. Surveying for root diseases occurred at R1-2 (early to mid-flower), and foliar and stem diseases were surveyed at R4 (full pod). Field peas were visually assessed for infection of

mycosphaerella blight, bacterial blight, white mould, powdery mildew, downy mildew, anthracnose, rust and septoria leaf blotch. Soil and root samples were also collected for Aphanomyces root rot testing at AAFC-Brandon.

Root rots were found in every pea crop surveyed; ranging in severity from 1.3 to 6.8 with an average severity of 3.3 (scale 0–9). Fusarium root rot was the most common root rot, found in 93 per cent of the fields surveyed. Aphanomyces root rot was found in 70 per cent of the fields tested in 2023 (Figure 3).

Mycosphaerella blight continues to be the most common foliar disease found in field peas, it has been found in 100 per cent of the fields surveyed at varying levels of severity in recent years. In 2023, severity ranged from 1.4 to 5.8 with an average severity of 3.0 (scale 0–9). Bacterial blight was present in 55 per cent of fields and downy mildew was found in six per cent of fields. Rust, anthracnose and white mould were not seen in any of the fields surveyed in 2023.

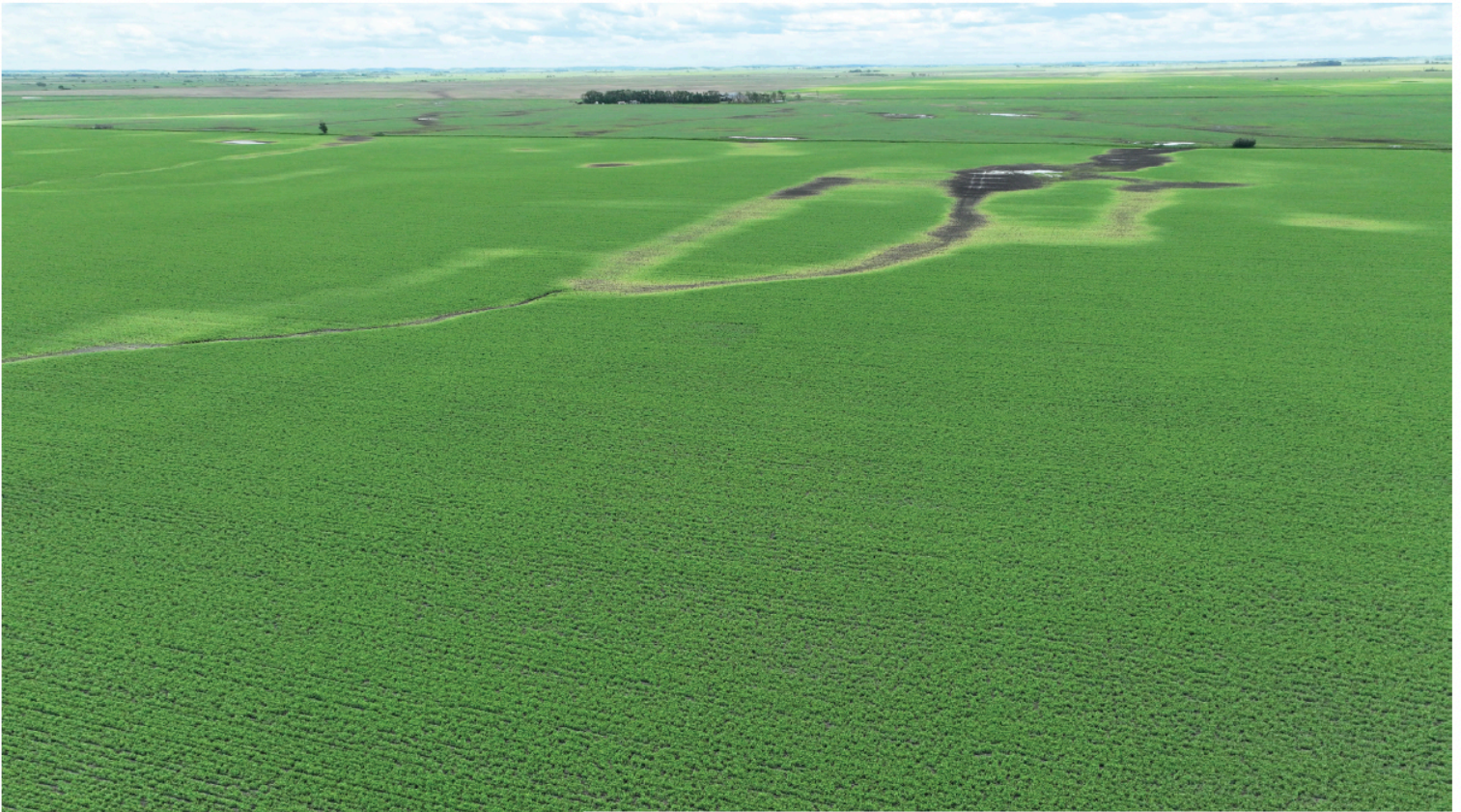


Photo credit: MPSG

A positive infection of Aphanomyces with a healthy-looking pea field, infection was low overall but higher in heavier moisture areas of drains and water runs.



Photo credit: MPSG

In 2023, 100 per cent of soybean fields surveyed were infected with Fusarium root rot.



Photo credit: MPSG

Fusarium infection of the main stem and taproot in soybeans.