

2023 Wheat Disease Survey



Overview

A wheat disease survey is conducted in spring wheat across Manitoba each year in late July and early August. Crop disease surveys are important for documenting the severity and geographical distribution of various diseases. Results from disease surveys provide warning about new diseases and help to prioritize where future research is needed.

The wheat survey is conducted by Manitoba Agriculture in collaboration with Dr. Maria Antonia Henriquez from the Agriculture and Agri-Food Canada - Morden Research and Development Centre (AAFC - MRDC).

Method

In 2023 a total of 129 fields were surveyed across Manitoba to document fusarium head blight (FHB) and leaf spot diseases. Fields were surveyed at the early milk to soft dough stage, approximately 21 days after anthesis. Surveyors collected 50 spikes and flag leaves per field, 10 at each of five locations along a “W” pattern in the field, where surveyed locations were at least 50 paces apart and 100 m from field edges. Samples from each field were sent to Dr. Henriquez.

For the FHB survey, spikes were assessed for incidence (proportion of infected spikes per field) and severity (proportion of infected spikelets in each spike) of FHB, and the FHB index (overall percent severity) was determined for each field surveyed. In addition, spikes from each field were processed for pathogen isolation and identification in the laboratory. *Fusarium* species were identified by microscopic examination and morphological characterization.

The percentage of leaf area affected by leaf spot diseases (severity) was assessed on 50 flag leaves per field using a scale from 1 (slightly affected) to 50 (leaves dead) (Fernandez 1998). Bacterial leaf streak (BLS) was recorded on a 1-4 rating scale where 1=absent, 2=trace, 3=moderate, and 4=severe (Harding et al. 2023). Ten flag leaves from each field were processed in the laboratory for pathogen identification. 1 cm² surface-disinfected leaf pieces were plated on water agar to promote pathogen sporulation. Leaf spot pathogens were identified by microscopic examination and morphological characterization.

Fusarium Head Blight Results

Provincially, FHB was detected in 11 fields for a prevalence of 8.5%. The average incidence of disease across all fields was 0.23%. The average severity was 0.5% across all fields. The provincial mean FHB index was 0.002% (Table 1). Levels of FHB were lower in 2023 than levels observed in 2022 and 2021 (Table 2).

Table 1. Prevalence, Incidence, and, Severity, and FHB Index in Spring Wheat Fields in Manitoba in 2023

Region	# Fields Surveyed	Prevalence ^a %	Average incidence ^b %	Average severity ^c %	Average FHB Index ^d %	Average FHB Index % (Range)
Central	40	5	0.61	0.005	0.005	0.0 – 0.003
Eastern	11	10	0.36	0.03	0.001	0.0 – 0.012
Interlake	8	0	0.0	0.0	0.0	0.0 – 0.0
Northwest	24	8	0.25	0.17	0.007	0.0 – 0.16
Southwest	46	13	0.35	0.05	0.001	0.0 – 0.02
MANITOBA	129	8.5	0.23	0.05	0.002	0.0 – 0.16

^a Prevalence (%) = Number of fields affected/total fields surveyed

^b Incidence: The proportion of infected spikes per field

^c Severity: The proportion of infected spikelets in each spike

^d Mean FHB Index: [Average % incidence * Average % severity]/100

Table 2. Results of the Manitoba Spring Wheat FHB Survey 2014-2023

Year	FHB Index
2023	0.002%
2022	0.03%
2021	0.005%
2020	0.02%
2019	0.3%
2018	0.5%
2017	0.3%
2016	2.4%
2015	0.3%
2014	1.0%
10 year average	0.49%

The distribution of the *Fusarium* species that cause FHB varies from year to year. However, *Fusarium graminearum* continues to predominate in Manitoba (Figure 1). *F. graminearum* and the other two common species, *F. poae* and, more recently, *F. sporotrichioides*, are all known to produce deoxynivalenol (DON).

Wheat *Fusarium* species - Surveys 2015-2023

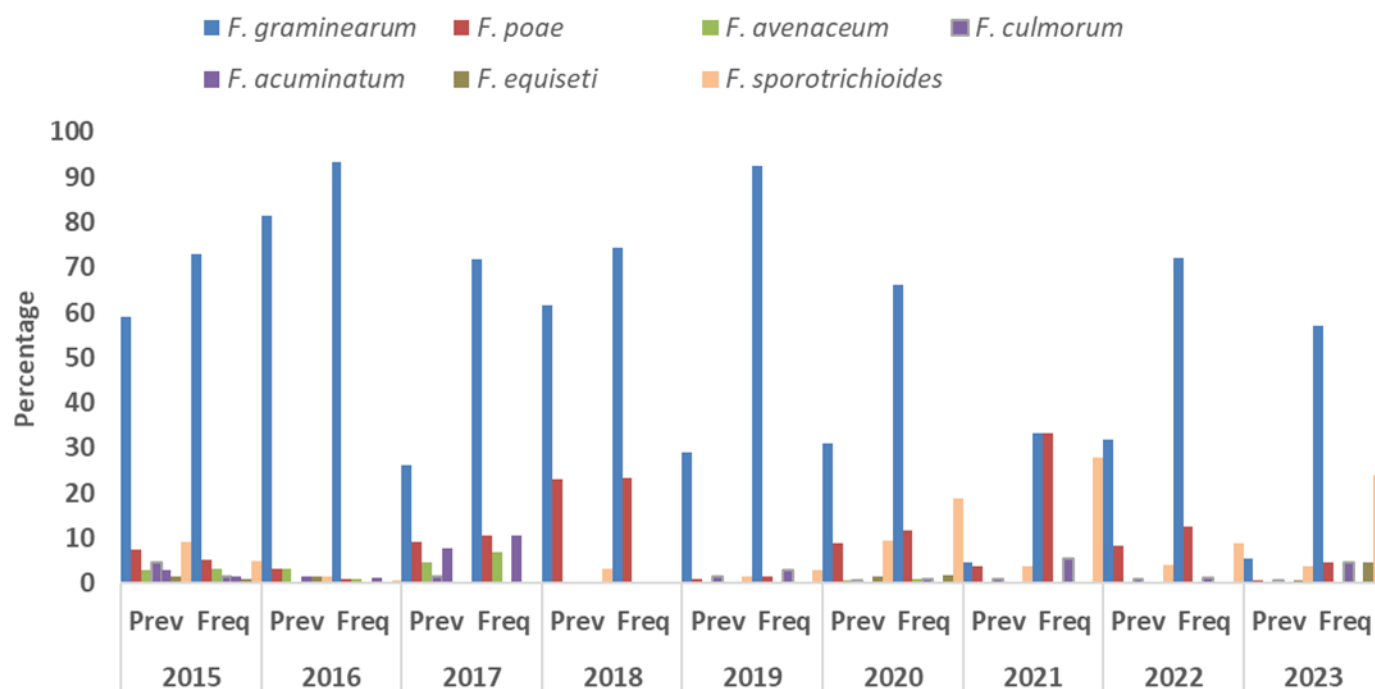


Figure 1. *Fusarium* species in spring wheat surveys 2015 to 2023. Provided by: Dr. Maria Antonia Henriquez, Agriculture and Agri-Food Canada.

Leaf Spot and Bacterial Leaf Streak Results

Leaf spot diseases were observed in 73% of the fields surveyed, with a provincial mean severity of 8.6% (Table 3). This severity was lower than 2022 (11.7%), but higher than in 2021 (6%) and 2020 (6.7%). *Pyrenophora tritici-repentis* was the most prevalent and widespread leaf spot pathogen in Manitoba in 2023, accounting for 88% of isolations. This species was detected in 66% of surveyed fields. This was followed by *Parastagonospora nodorum* (19%) detected in 13% of surveyed fields. Bacterial leaf streak (BLS), was found in 11 fields with an average disease severity of 2.5 (Table 4).

Table 3. Prevalence and Severity of Leaf Spot in Spring Wheat Fields in Manitoba in 2023

Region	# Fields Surveyed	Prevalence ^a %	Average severity ^b %	Leaf spot severity (range)
Central	40	80	6.3	1.0 – 37.5
Eastern	11	91	19.7	1.0 - 50.0
Interlake	8	100	8.0	1.0 - 20.0
Northwest	24	67	5.7	1.0 - 30.0
Southwest	46	61	3.2	1.0 - 30.0
MANITOBA	129	72.8	8.6	1.0 - 50.0

^a Prevalence (%) = (number of fields affected/total fields surveyed)*100

^b Severity = percentage of leaf area affected on a scale of 1 (slightly affected) to 50 (leaves dead).

Table 4. Bacterial Leaf Streak (BLS) in Spring Wheat Fields in Manitoba in 2023

Region	# Fields Surveyed	# Fields Affected	Prevalence ^a %	Severity ^b
Central	40	4	10.0	2.7
Eastern	11	0	ND	ND
Interlake	8	1	12.5	2.0
Northwest	24	2	8.3	3.0
Southwest	46	4	8.7	2.2
MANITOBA	129	11	8.5	2.5

^a Prevalence (%) = (number of fields affected/total fields surveyed)*100

^b Severity = percentage of leaf area affected on a scale of 1 - 4 (where 1=absent, 2=trace, 3=moderate, 4=severe).

Acknowledgements

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References

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