2022 Provincial Seed Survey

Each year, the Saskatchewan pulse and cereal commissions partner with commercial seed testing laboratories to complete an annual survey of seed-borne pathogens measured on seed grown in Saskatchewan during the previous season. All labs that offer seed testing services to Saskatchewan growers are invited to participate in the annual survey with anonymous reporting of results amalgamated by crop district from all participating labs. Interim seed quality data, collected from the time of harvest to the end of December, are summarized and communicated to growers, agronomists, researchers, and industry during the winter months, ahead of the next crop season. These interim results provide insights into seed quality trends and identify potential hotspots for seed-borne pathogens across the province. A final summary of results, including data from seed samples analyzed after the interim results, is reported at the end of May. This final summary is submitted for publication in the Canadian Plant Disease Surveys. This publication of the provincial survey provides a record of seed-borne pathogen trends in pulse and cereal crops and allows for continued tracking of diseases over time.

Acknowledgments

The provincial seed survey would not be possible without the participation of 20/20 Seed Labs Inc., Discovery Seed Labs, Prairie Diagnostic Seed Labs, and Lendon Seeds. Thank you to all lab partners for their continued effort and support of this project. Brian Olson, independent contractor, is also gratefully acknowledged for his coordination of the seed quality survey and summarization of results. A special thanks is also extended to Dr. Randy Kutcher and Dr. Sabine Banniza from the University of Saskatchewan for their external review and pathology expertise. External review efforts of Alireza Akhavan, Provincial Plant Disease Specialist and Dale Risula, Provincial Special Crops Specialist, of the Saskatchewan Ministry of Agriculture (SMA) is also recognized with an extra note of appreciation to Alireza Akhavan and the SMA Geographic Information System (GIS) team for creating the seed-borne pathogen maps by crop district.









Thank You to our Long-Time Lab Partners Nisku, Alberta 1- 507-11 Avenue Nisku, AB T9E 7N5 O Seed Labs Inc. Phone: 1.877.420.1810 never stop growing www.2020seedlabs.ca Saskatoon, Saskatchewan 450 Melville Street Saskatoon, SK S7J 4M2 Phone: 1.306.249.4484 www.seedtesting.com Weyburn, Saskatchewan 1105 Railway Ave, Weyburn, SK S4H 3H5 Phone: 1.306.842.7375 www.pdsl.net Regina, Saskatchewan **Lendon Seeds** 147 Hodsman Road, Regina SK S4N 5W5 Phone: 1.306.585.7333 www.lendonseeds.com

Germination Results

Percent germination levels were documented during the 2022 provincial seed survey with interim results showing a general improvement of germination levels across all crops from reported levels in the 2021. High numbers of seed lots harvested in 2021, particularly field pea, were reported to have below acceptable levels of germination; however, results to date indicate that mean germination across all crop types is at or above 87.0%.

Although germination levels look quite favourable across all provincial crop districts and all crop types, testing of individual seed lots is still recommended prior to seeding in the spring of 2023.

Table 1. Average percent germination of Saskatchewan pulse and cereal seed samples analyzed by commercial labs as of January 9, 2023.

Туре	Crop	Number of	Mean Germination		
		Samples	(%)		
Pulses	Lentils	298	96.6		
	Peas	246	89.9		
	Chickpeas	35	87.0		
Cereals	Barley	178	96.1		
	Durum	205	92.4		
	Oats	76	96.1		
	Wheat	534	95.3		









Seed germination of lentil seed samples Average seed germination percentage ≤ 80.0 80.1 - 85.0 85.1 - 90.0 90.1 - 95.0 95.1 + Meadow Lake Not Tested 9**B** (2) Lloydminster Prince Albert **8A** Tisdale North Battleford 8B (3) **7B** (10)Humboldt Saskatoon 5B 6B Wynyard (51)Rosetown 6A **7A** Outlook (21) (52)Yorkton Elbow 5A (2) Leader **4B** 3BN (16) (31)Regina_●2B Indian Hea _©Broadview Swift Current 3AN (6) 1B Maple Creek 2A Assiniboia 4A 3BS (3) 1A 3AS Val Marie (41)Coronach *Crop District Labels: Crop District (all samples tested) 1:3,200,000 Saskatchewan 🙎

Figure 1. 2022 Interim Seed Test Result for Seed Germination in Lentil. *Source: Saskatchewan Ministry of Agriculture*









Seed germination of pea seed samples Average seed germination percentage ≤ 80.0 80.1 - 85.0 85.1 - 90.0 90.1 - 95.0 95.1 + Not Tested 9B (10) Lloydminster North Battleford 8B (13)**7B** (18)Humboldt Saskatoon 5B 6B (49)Rosetown 6A **7A** Outlook (24)(11)Yorkton Elbow 5A Leader **4B** 3BN (11)(10)Regina 2B Indian Head _oBroadview Swift Current 3AN **1B** (7) Maple Creek Assiniboia 4A 3BS 1A 3AS Val Marie (12)Coronach *Crop District Labels: Crop District (all samples tested) 1:3,200,000 Saskatchewan 🙎

Figure 2. 2022 Interim Seed Test Result for Seed Germination in Pea. *Source: Saskatchewan Ministry of Agriculture*









Seed germination of chickpea seed samples Average seed germination percentage ≤ 80.0 80.1 - 85.0 85.1 - 90.0 90.1 - 95.0 95.1 + Not Tested 9B Lloydminster Prince Albert 9A North 8B 7B Humboldt (2) Saskatoon Wynyard ⊙ 6B 5B (4) Rosetown **7A** Outlook 6A Yorkton Elbow 5A Leader **4B** 3BN (4)(5) Regina⊚2B Indian Hea Broadview Swift Current Moose Jaw 3AN (2) 1B Maple Creek 2A _{Weyburn} (3) ⊚ Assiniboia 4A 3BS 3AS 1A Val Marie (7) ⊙Coronach *Crop District Labels: Crop District (all samples tested)

Figure 3. 2022 Interim Seed Test Result for Seed Germination in Chickpea. *Source:* Saskatchewan Ministry of Agriculture

1:3,200,000









Seed germination of barley seed samples Average seed germination percentage ≤ 80.0 80.1 - 85.0 85.1 - 90.0 90.1 - 95.0 95.0 +Meadow Lake Not Tested 9B (21)Lloydminster 9A Prince Albert (1) Hudson Bay Tisdale North Battleford 8B (13)7B (12) Humboldt Saskatoon 5B **6B** (33)Rosetown 6A **7A** Outlook (19)(16)Yorkton Elbow 5A Leader **4B** 3BN (5)(5) Regina 2B Indian Head _oBroadview Swift Current 3AN **1B** (1) Maple Creek 2A Weyburn Assiniboia **4A** 3BS 1A 3AS Val Marie (5) Coronach *Crop District Labels: Crop District (all samples tested) 1:3,200,000 Saskatchewan 🙎

Figure 4. 2022 Interim Seed Test Result for Seed Germination in Barley. *Source:* Saskatchewan Ministry of Agriculture









Seed germination of durum seed samples Average seed germination percentage ≤ 80.0 80.1 - 85.0 85.1 - 90.0 90.1 - 95.0 95.1 + Not Tested 9B Lloydminster 9A North 8B (1) 7B Humboldt Saskatoon (2) 6B 5B Wynyard (10)Rosetown **7A** Outlook 6A (7) (4) Yorkton Elbow 5A ○Leader **4B** 3BN (11) (24)Regina 2B Indian Head _oBroadview Swift Current 3AN (8) **1B** (1) ⊙Maple Creek 2A Assiniboia 4A 3BS (2) 1A 3AS Val Marie (54)⊙Coronach *Crop District Labels: Crop District (all samples tested)

Figure 5. 2022 Interim Seed Test Result for Seed Germination in Durum. *Source:* Saskatchewan Ministry of Agriculture

1:3,200,000









Seed germination of oat seed samples Average seed germination percentage ≤ 80.0 80.1 - 85.0 85.1 - 90.0 90.1 - 95.0 95.1 + Not Tested 9B (20) Lloydminster Prince Albert Tisdale North Battleford **8B** (6) **7B** Humboldt 5B **6B** (8) Rosetown **7A** Outlook 6A (2) Elbow 5A __ ⊙Leader 4B 3BN Regina Indian Head _oBroadview Swift Current 3AN 2B **1B** (2) (1) Weyburn Assiniboia 4A 3BS 1A Val Marie 3AS Coronach *Crop District Labels: Crop District (all samples tested) 1:3,200,000 Saskatchewan 🙎

Figure 6. 2022 Interim Seed Test Result for Seed Germination in Oats. *Source: Saskatchewan Ministry of Agriculture*









Seed germination of wheat seed samples Average seed germination percentage ≤ 80.0 80.1 - 85.0 85.1 - 90.0 90.1 - 95.0 95.1 + Meadow Lake Not Tested 9**B** (80) Lloydminster Prince Albert North Battleford 8B (43)**7B** (49)Humboldt Saskatoon 5B 6B (97)Rosetown 6A **7A** Outlook (39) (44)Yorkton Elbow 5A (5) Leader **4B** 3BN (3) (19)Regina 2B Indian Head _oBroadview Swift Current 3AN (3) **1B** (7) Maple Creek Assiniboia 4A 3BS 3AS Val Marie (4)Coronach *Crop District Labels: Crop District (all samples tested)

Figure 7. 2022 Interim Seed Test Result for Seed Germination in Wheat. *Source:* Saskatchewan Ministry of Agriculture

1:3,200,000









Pulse Pathogen Results

The interim results of commercial plate tests for seed-borne pathogens of lentil, field pea, and chickpea samples reveal a relatively high number of pathogen-free seed samples from across the province, although this number is slightly down from 2021. Results to-date suggest a slight overall increase in mean infection levels of seed produced during the 2022 growing season compared to results from 2021.

- Greater than 76% of lentil samples were free of seed-borne pathogens; samples that did
 have detectable levels of Ascochyta, Anthracnose, or Botrytis had a mean infection level
 that did not exceed 1.1%.
- Seed-borne Anthracnose is showing up on more seed lots relative to previous seasons (except 2016) and has a higher mean infection level than the past seven-year average (0.86).
- Seed-borne Botrytis was detected on less than 2% of lentil and field pea samples.
- Seed-borne *Ascochyta* was detected on 63.7% of field pea samples but mean infection levels (1.5%) were well below critical threshold levels.
- 45.9% of chickpea samples had detectable levels of seed-borne *Ascochyta*. On average, the level of infection was 2.1% and exceeded the critical threshold of 0.3%.
- Seed-borne Sclerotinia and Botrytis was not detected on any chickpea samples.

Distribution of submitted samples and crop districts reporting seed-borne pathogens varies across the province. Although the maps created by the Saskatchewan Ministry of Agriculture can help identify areas of lower risk of seed-borne disease, testing of individual seed lots is still recommended.

Table 2. Average percent of pathogen-free pulse seed samples and average infection levels measured in samples with disease analyzed as of January 9, 2023.

Crop	Pathogen	Number of Samples _	Pathogen-free samples	Mean Infection ¹
			(%)	
Lentils	Ascochyta	297	98.3	0.3
	Anthracnose	296	76.4	1.1
	Botrytis	296	99.7	0.3
	Sclerotinia	297	97.3	0.4
Field Peas	Ascochyta	245	36.3	1.5
	Botrytis	233	98.3	0.7
	Sclerotinia	234	98.7	0.7
Chickpeas	Ascochyta	35	51.4	2.1
	Botrytis	35	100	0.0
	Sclerotinia	35	100	0.0

¹Mean infection level of samples with disease









Anthracnose infection of lentil seed samples No infected samples were identified

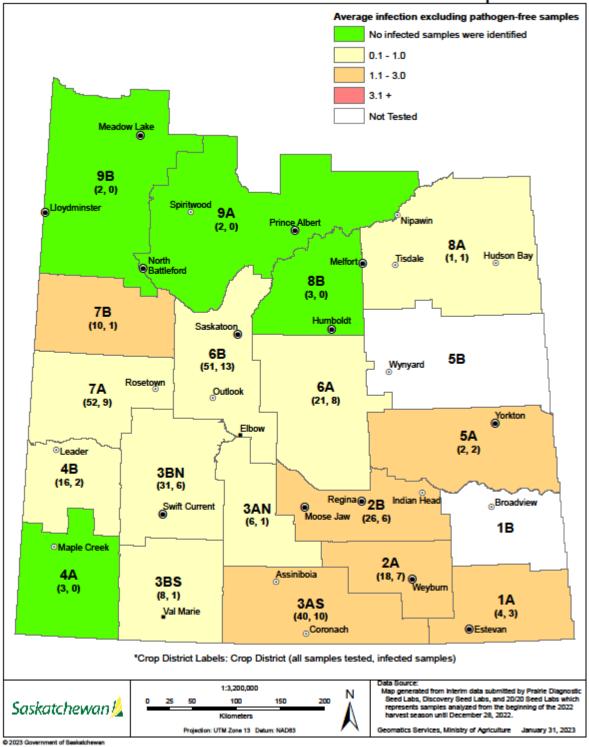


Figure 8. 2022 Interim Seed Test Result for Seed-Borne Anthracnose in Lentil. Source: Saskatchewan Ministry of Agriculture









Ascochyta infection of pea seed samples Average infection excluding pathogen-free samples No infected samples were identified 0.1 - 5.0 5.1 - 10.0 10.1 + Not Tested Meadow Lake 9B (10, 8) Lloydminster 9A (24, 16)Hudson Bay (9, 9)North Battleford 8B (13, 10) 7B Humboldt (18, 11) Saskatoon 5B 6B Wynyard (24, 20) (49, 34) Rosetown 6A **7A** Outlook (24, 11) (11, 8) Yorkton Elbow 5A (3, 3)Leader **4B** 3BN (11, 3)(10, 5)Regina_●2B Broadview Swift Current 1B 3AN (7, 2) Maple Creek 2A (9, 3) ₩eybum Assiniboia 4A 3BS (1, 0)1A 3AS Val Marie (5, 4)(12, 9)_©Coronach Estevan *Crop District Labels: Crop District (all samples tested, infected samples) 1:3,200,000

Figure 9. 2022 Interim Seed Test Result for Seed-Borne *Ascochyta* in Field Pea. *Source:* Saskatchewan *Ministry of Agriculture*









Ascochyta infection of chickpea seed samples Average infection excluding pathogen-free samples No infected samples were identified 0.1 - 0.3 0.4 - 0.9 1.0 +Not Tested Meadow Lake 9B Lloydminster Prince Albert 9A North 8A 8B **7B** Saskatoon Humboldt (2, 0) **6B** 5B Wynyard (4, 0) Rosetown 7A Outlook (2, 1)6A Yorkton 5A Leader 4B 3BN (4, 3)(5, 2)Regina 2B Indian Hear Broadview Swift Current 3AN (6, 2) (2, 1)1B Maple Creek Assiniboia 4A 3BS 3AS 1A Val Marie (7, 6)Coronach *Crop District Labels: Crop District (all samples tested, infected samples)

Figure 10. 2022 Interim Seed Test Result for Seed-Borne *Ascochyta* in Chickpea. *Source:* Saskatchewan *Ministry of Agriculture*

1:3,200,000









Cereal Pathogen Results

The interim results of commercial plate tests for seed-borne fusarium pathogens reveal very low mean infection levels barley, durum, oat, and wheat samples tested as of January 9, 2023. The percentages of total *Fusarium spp.* and *F.graminearum*-free samples are trending lower with higher mean infection levels across all cereal samples relative to the prior season.

- *F.graminearum* was detected on less than 34.1% of barley, oat and wheat samples, but was identified on 50.8% of durum samples; mean infection levels were 4.4% or lower for all cereal samples
- The highest percentage of total *Fusarium spp.*-free samples were in durum (29.7%), followed closely by wheat (20.5%); wheat and barley had the lowest mean infection levels of total *Fusarium spp.*, 3.0 % and 3.8%, respectively.
- Most oat samples (98.6%) had detectable levels of total *Fusarium spp*. with a mean infection level of 8.1%; 1.1% higher than that measured in 2021.
- 86% of barley samples reported a detectable level of total *Fusarium spp.*; however, the mean infection level to date is only 0.4% higher than in 2021.

Table 3. Average percent of pathogen-free cereal seed samples and average infection levels measured in samples with disease analyzed as of December 28, 2021.

	Total <i>Fusarium</i>			Fusarium graminearum		
Crop	Number of Samples	Pathogen Free Samples	Mean Infection ¹	Number of Samples	Pathogen Free Samples	Mean Infection ¹
	-	(%)			(%)	
Barley	172	14	3.8	176	65.9	1.3
Durum	202	29.7	4.8	193	49.2	4.4
Oats	71	1.4	8.1	79	83.5	1.3
Wheat	502	20.5	3	535	72.1	1.1

¹Mean infection level of samples with disease

Despite overall low levels of *Fusarium*-infected cereal seed lots being reported in interim results, seed quality does vary by crop districts as detailed by maps created by the Saskatchewan Ministry of Agriculture and it is recommended that seed lots should be tested on an individual basis.









Total Fusarium spp. infection of barley seed samples Average infection excluding pathogen-free samples No infected samples were identified 0.1 - 5.0 5.1 - 10.0 10.1 - 20.0 20.1+ Not Tested 9B (18, 18) Lloydminster 9A Nipawin (26, 26)North Battleford 8B (13, 12) **7B** Humboldt (12, 11) Saskatoon 6B 5B (33, 28) (11, 10)

Rosetown 6A **7A** Outlook (19, 15) (16, 11) Yorkton Elbow 5A (3, 3)○Leader **4B** 3BN (5, 2)(5, 3)Indian Head Regina_®2B Broadview Swift Current Moose Jaw 1B 3AN (1, 1) Maple Creek 2A Weyburn Assiniboia 4A 3BS (1, 0)1A 3AS Val Marie (3, 3)(4, 3)⊙ Coronach Estevan *Crop District Labels: Crop District (all samples tested, infected samples) 1:3,200,000 Saskatchewan 🛭

Figure 11. 2022 Interim Seed Test Result for Total Seed-Borne *Fusarium* in Barley. Source: Saskatchewan Ministry of Agriculture









Total Fusarium spp. infection of durum seed samples

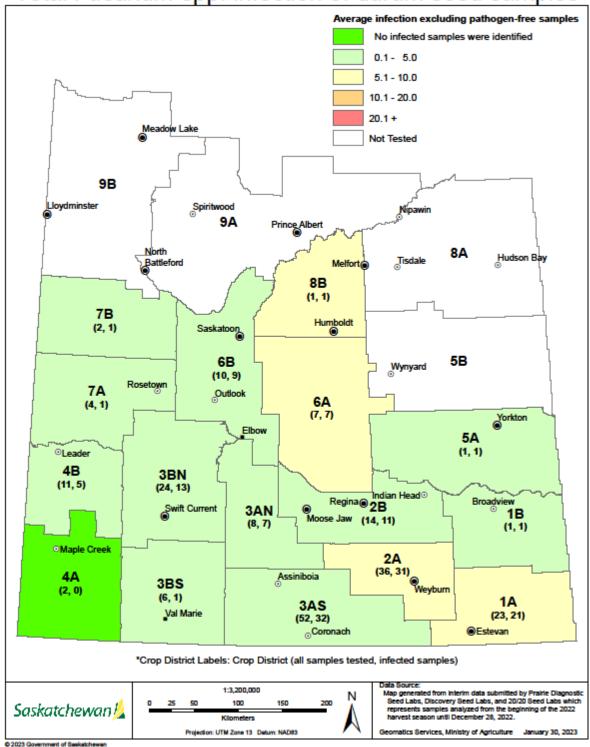


Figure 12. 2022 Interim Seed Test Result for Total Seed-Borne Fusarium in Durum. Source: Saskatchewan Ministry of Agriculture









Total Fusarium spp. infection of oat seed samples Average infection excluding pathogen-free samples ≤ 0.5 0.5 - 5.0 5.1 - 10.0 10.1 - 20.0 20.1+ Not Tested 9B (16, 16) Lloydminster 9A (22, 22)(4, 4)North Battleford 8B (6, 6) **7B** Humboldt Saskatoon 5B 6B (8, 7)Rosetown 7A Outlook 6A (2, 2) (2, 2)Yorkton Elbow 5A (2, 2)Leader 4B 3BN Regina_●2B Broadview Swift Current **1B** 3AN (2, 2)2A (1, 1) ⊗ Weyburn Assiniboia 4A 3BS 1A Val Marie 3AS (1, 1)Coronach Estevan *Crop District Labels: Crop District (all samples tested, infected samples)

Figure 13. 2022 Interim Seed Test Result for Total Seed-Borne *Fusarium* in Oat. Source: Saskatchewan Ministry of Agriculture

1:3,200,000









Total Fusarium spp. infection of wheat seed samples

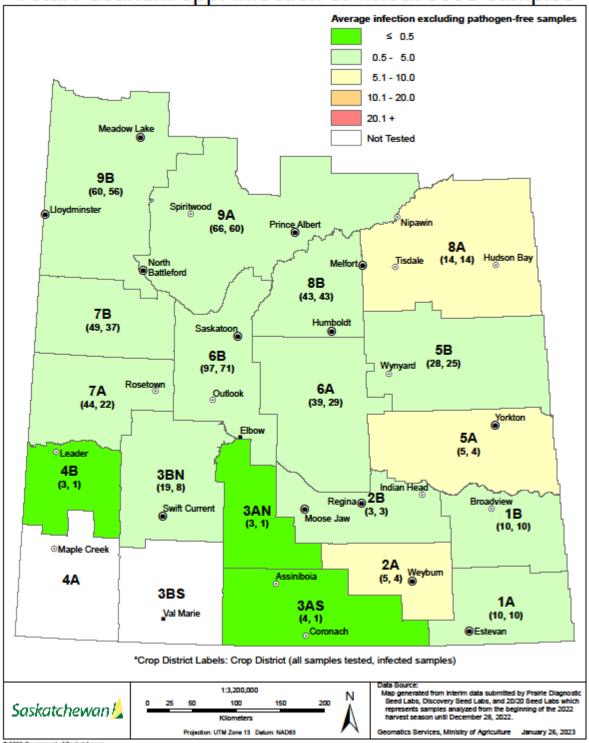


Figure 14. 2022 Interim Seed Test Result for Total Seed-Borne *Fusarium* in Wheat. Source: Saskatchewan Ministry of Agriculture







