

Post-registration Assessment of Fusarium Head Blight Resistance in Spring Wheat, Barley, and Winter Wheat

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The Manitoba Crop Variety Evaluation Team (MCVET) has been evaluating the effects of Fusarium Head Blight (FHB) on spring wheat, winter wheat and barley varieties under conditions of natural infection for a number of years. Varietal resistance ratings for FHB, as presented in Seed Manitoba, are determined through inoculated trials conducted during the period the variety is tested in the variety registration system. While this provides good information on resistance to FHB, the data generated provides limited comparisons with other registered varieties. Post-registration FHB analysis provides an opportunity to compare fusarium damaged kernels (FDK) and deoxynivalenol (DON) accumulation among registered varieties over a number of locations in Manitoba. Fungicides are not applied to MCVET trials, and FHB infection is the result of natural infection. Due to variety turnover in MCVET trials, on-going analysis is required to evaluate the response of newly registered varieties.

In 2023, DON accumulation was low at the majority of sites. At the spring wheat sites, mean DON accumulation was below the detection limit of 0.5 ppm at ten of the eleven sites tested; DON ranged from 0.5 to 1.2 ppm at the one site where DON was detected (Table 1). Mean DON accumulation at the barley sites was below detection limit at six of eleven sites, and ranged from 0.5 to 0.8 ppm at the remaining sites (Table 2). Mean DON accumulation in winter wheat was below detection limit at all sites tested (Table 3). Varieties with the highest FDK and DON levels were generally rated as susceptible (S), moderately susceptible (MS), or intermediate (I) for FHB resistance; however, there is variability in FDK and DON within each of the five resistance categories.

FHB infection is highly influenced by environmental conditions; however, there are management options that should be used to mitigate the risk of FHB. The first step is to select varieties with improved resistance to FHB. Resistance ratings published in Seed Manitoba are a good first place to look for disease resistance information. Caution must be used with one year of data, as presented in these tables. Other management strategies include crop rotation and fungicide application.

Thanks to Manitoba Crop Alliance for providing funding to conduct FDK and DON analysis and the Manitoba Crop Variety Evaluation Team and contractors who provided the harvested samples.



Table 1. Fusarium damaged kernel (FDK) and deoxynivalenol (DON) comparisons at 12 MCVET sites for spring wheat varieties in 2023.

Class/Variety (FHB Resistance level)	2023 FDK (%) and DON ¹ (ppm)																							
	Arborg		Beausejour		Brandon		Carberry		Dauphin		Hamiota		Melita		Rosebank		Souris		Ste Adolphe		Stonewall		Swan River	
	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON
Canada Western Red Spring																								
AAC Brandon (MR)	0.03	bdl	0.15	bdl	0.00	bdl	0.10	bdl	0.02	bdl	0.00	bdl	0.00	bdl	0.00	bdl	0.02	bdl	0.01	bdl	0.00	bdl	0.05	bdl
AAC Darby VB (I)	0.02	bdl	0.51	0.5	0.07	bdl	0.20	bdl	0.04	bdl	0.05	bdl	0.00	bdl	0.00	bdl	0.02	bdl	0.02	bdl	0.00	bdl	0.00	bdl
AAC Dutton (MR)	0	bdl	0.05	bdl	0.00	bdl	0.20	bdl	0.00	bdl	0.00	bdl	0.00	bdl	0.00	bdl	0.02	bdl	0.00	bdl	0.10	bdl	0.00	bdl
AAC Hassler (I)	0.06	bdl	0.68	bdl	0.30	bdl	0.20	bdl	0.12	bdl	0.01	bdl	0.03	bdl	0.05	bdl	0.05	bdl	0.01	bdl	0.00	bdl	0.37	bdl
AAC Spike (MR)	0	bdl	-	-	-	-	-	-	0.02	bdl	0.01	bdl	-	-	-	-	0.00	bdl	0.00	bdl	-	-	-	-
AAC Walker VB (MR)	0	bdl	-	-	-	-	-	-	0.02	bdl	0.01	bdl	-	-	-	-	0.00	bdl	0.01	bdl	-	-	-	-
AAC Westking (MR)	0.02	bdl	-	-	-	-	-	-	0.03	bdl	0.00	bdl	-	-	-	-	0.01	bdl	0.00	bdl	-	-	-	-
CDC Envy (I)	0.03	bdl	0.10	bdl	0.04	bdl	0.30	bdl	0.00	bdl	0.14	bdl	0.01	bdl	0.00	bdl	0.07	bdl	0.04	bdl	0.10	bdl	0.04	bdl
SY Cast (I)	0.02	bdl	0.18	bdl	0.01	bdl	0.10	bdl	0.09	bdl	0.00	bdl	0.00	bdl	0.00	bdl	0.00	bdl	0.03	bdl	0.30	bdl	0.03	bdl
Canada Prairie Spring Red																								
AAC Perform (MS)	0.02	bdl	0.36	1.2	0.02	bdl	0.10	bdl	0.06	bdl	0.09	bdl	0.01	bdl	0.03	bdl	0.05	bdl	0.00	bdl	0.10	bdl	0.03	bdl
AAC Rimbe VB (I)	0.02	bdl	0.94	0.9	0.10	0.5	0.40	bdl	0.06	bdl	0.01	bdl	0.01	bdl	0.03	bdl	0.04	bdl	0.05	bdl	0.10	bdl	0.03	bdl
AAC Westlock (MR)	0	bdl	-	-	-	-	-	-	0.04	bdl	0.01	bdl	-	-	-	-	0.05	bdl	0.02	bdl	-	-	-	-
Canada Northern Hard Red																								
Shelly (I)	0.02	bdl	0.43	1.1	0.09	bdl	0.20	bdl	0.06	bdl	0.00	bdl	0.01	bdl	0.00	bdl	0.01	bdl	0.00	bdl	0.20	bdl	0.03	bdl
Canada Western Special Purpose																								
Alotta (MS)	0.03	bdl	-	-	-	-	-	-	0.15	bdl	0.19	bdl	-	-	-	-	0.16	bdl	0.03	bdl	-	-	-	-
Canada Western Hard White Spring																								
AAC Tomkins (I)	0	bdl	0.30	bdl	0.02	bdl	0.20	bdl	0.02	bdl	0.12	bdl	0.00	bdl	0.00	bdl	0.01	bdl	0.01	bdl	0.00	bdl	0.05	bdl
AAC Whitehead VB (I)	0	bdl	0.40	0.6	0.00	bdl	0.00	bdl	0.02	bdl	0.01	bdl	0.01	bdl	0.03	bdl	0.06	bdl	0.00	bdl	0.00	bdl	0.13	bdl
Varieties supported for registration by the PRCWRT																								
BW5089 (MR)	0.04	bdl	-	-	-	-	-	-	0.08	bdl	0.01	bdl	-	-	-	-	0.02	bdl	0.00	bdl	-	-	-	-
BW5095 (MR)	0.03	bdl	-	-	-	-	-	-	0.03	bdl	0.00	bdl	-	-	-	-	0.00	bdl	0.01	bdl	-	-	-	-
HY2129 (I)	0.02	bdl	-	-	-	-	-	-	0.04	bdl	0.01	bdl	-	-	-	-	0.04	bdl	0.00	bdl	-	-	-	-
HY2136 (MS)	0.04	bdl	-	-	-	-	-	-	0.20	bdl	0.02	bdl	-	-	-	-	0.15	bdl	0.03	bdl	-	-	-	-
LAR17-7773 (I)	0.02	bdl	-	-	-	-	-	-	0.12	bdl	0.05	bdl	-	-	-	-	0.06	bdl	0.01	bdl	-	-	-	-
LAR18-03928 (I)	0	bdl	-	-	-	-	-	-	0.02	bdl	0.13	bdl	-	-	-	-	0.05	bdl	0.00	bdl	-	-	-	-
LAR18-04850 (I)	0.02	bdl	-	-	-	-	-	-	0.07	bdl	0.02	bdl	-	-	-	-	0.03	bdl	0.01	bdl	-	-	-	-
PT661 (MR)	0.02	bdl	-	-	-	-	-	-	0.06	bdl	0.00	bdl	-	-	-	-	0.00	bdl	0.00	bdl	-	-	-	-
Grand Mean²	0.02	bdl	0.37	0.86	0.06	bdl	0.18	bdl	0.06	bdl	0.04	bdl	0.01	bdl	0.01	bdl	0.04	bdl	0.01	bdl	0.08	bdl	0.07	bdl

¹Detection limit >0.5 ppm and <0.5 ppm. Entries reporting <0.5 ppm DON are reported as bdl (below detection limit).

²DON grand mean is the site average for entries where DON was detected.

No value (-) indicates that variety was not tested at that location.

Table 2. Fusarium damaged kernel (FDK) and deoxynivalenol (DON) comparisons at 11 MCVET sites for barley varieties in 2023.

2023 FDK (%) and DON ¹ (ppm)																						
Class/Variety (FHB Resistance level)	Arborg		Beausejour		Brandon		Dauphin		Hamiota		Melita		Roblin		Rosebank		Souris		Ste Adolphe		Stonewall	
	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON
Malting																						
AAC Prairie (I)	0.90	bdl	0.33	0.5	0.18	bdl	0.90	bdl	0.44	bdl	0.00	bdl	4.10	bdl	1.80	bdl	0.02	bdl	0.2	0.5	0.10	bdl
AAC Synergy (I)	1.00	0.8	0.69	0.5	0.17	bdl	5.60	bdl	1.12	bdl	0.00	bdl	3.20	bdl	2.30	0.5	0.50	bdl	0.1	bdl	0.10	bdl
AB Dram (I)	0.70	0.5	-	-	-	-	6.70	bdl	0.72	bdl	-	-	-	-	-	-	0.10	bdl	0.1	bdl	-	-
Torbellino (S)	1.70	bdl	1.60	bdl	0.14	bdl	0.70	bdl	2.00	bdl	0.05	bdl	7.30	bdl	1.70	bdl	1.48	bdl	1.1	bdl	0.00	bdl
Food and Feed																						
AAC Lariat (MS)	0.70	bdl	0.34	bdl	0.11	bdl	5.10	bdl	1.03	bdl	0.00	bdl	2.30	bdl	0.70	bdl	0.08	bdl	0.2	bdl	0.25	bdl
AAC Stockton (MR)	1.10	bdl	-	-	-	-	2.60	bdl	0.64	bdl	-	-	-	-	-	-	0.02	bdl	0.1	bdl	-	-
AB Hague (MR)	1.50	bdl	1.00	bdl	0.00	bdl	5.50	bdl	0.83	bdl	0.00	bdl	4.00	bdl	2.50	0.5	0.02	bdl	0.1	bdl	0.05	0.5
AB Maximizer (I)	0.80	0.6	0.00	0.6	0.00	bdl	2.60	bdl	0.17	bdl	0.00	bdl	1.80	bdl	0.70	bdl	0.04	bdl	0.0	bdl	0.00	bdl
AB Prime (I)	1.00	bdl	0.01	bdl	0.08	bdl	2.80	bdl	0.17	bdl	0.00	bdl	2.50	bdl	0.80	bdl	0.00	bdl	0.1	bdl	0.10	bdl
AB Standswell (S)	1.40	bdl	0.64	0.5	0.00	bdl	4.40	bdl	0.22	bdl	0.00	bdl	4.60	bdl	2.30	0.6	0.10	bdl	0.2	0.5	0.00	bdl
Bighorn (I)	1.40	bdl	2.10	bdl	0.12	bdl	5.20	bdl	1.50	bdl	0.05	bdl	5.40	bdl	3.60	bdl	0.44	bdl	0.1	bdl	0.10	bdl
Cantu (I)	1.60	bdl	0.49	0.5	0.04	bdl	1.70	bdl	0.81	bdl	0.03	bdl	3.30	bdl	2.40	bdl	0.06	bdl	0.2	bdl	0.00	bdl
CDC Austenson (I)	1.20	0.5	0.25	bdl	0.00	bdl	0.10	bdl	0.24	bdl	0.00	bdl	1.90	bdl	1.00	bdl	0.18	bdl	0.0	bdl	0.00	bdl
CDC Durango (I)	0.60	bdl	0.68	0.7	0.00	bdl	3.20	bdl	1.17	bdl	0.00	bdl	3.00	bdl	2.80	bdl	0.24	bdl	0.0	bdl	0.00	bdl
Ferguson (I)	1.70	bdl	0.23	bdl	0.00	bdl	2.10	0.6	0.82	bdl	0.00	bdl	2.70	bdl	2.00	0.8	0.08	bdl	0.1	bdl	0.00	bdl
Ibex (I)	1.80	bdl	0.45	0.6	0.05	bdl	8.80	0.5	2.74	bdl	0.00	bdl	7.10	bdl	1.20	bdl	0.46	bdl	0.1	bdl	0.00	bdl
Varieties being tested for adaptability in Western Canada																						
AS Lafleur	0.80	bdl	-	-	-	-	3.70	0.6	2.06	bdl	-	-	-	-	-	-	0.64	bdl	0.1	bdl	-	-
AS Manon	1.40	bdl	-	-	-	-	4.80	bdl	2.90	bdl	-	-	-	-	-	-	0.40	bdl	0.1	bdl	-	-
RGT Planet	1.30	bdl	1.01	0.8	0.15	bdl	4.80	bdl	2.23	bdl	0.07	bdl	9.10	bdl	2.60	bdl	0.58	bdl	0.3	0.8	0.00	bdl
Richer	0.60	bdl	0.27	bdl	0.07	bdl	5.30	bdl	0.39	bdl	0.04	bdl	2.40	bdl	1.50	0.5	0.30	bdl	0.1	bdl	0.00	bdl
Varieties supported for registration by the PRCOB																						
Malting																						
TR20661 (I)	0.90	bdl	-	-	-	-	4.50	bdl	0.22	bdl	-	-	-	-	-	-	0.02	bdl	0.1	bdl	-	-
Food and Feed																						
FB21106 (I)	1.50	bdl	-	-	-	-	7.30	0.5	2.40	bdl	-	-	-	-	-	-	0.78	bdl	0.3	bdl	-	-
TR20761 (MR)	1.90	bdl	-	-	-	-	4.00	bdl	0.31	bdl	-	-	-	-	-	-	0.54	bdl	0.0	bdl	-	-
Grand Mean²	1.20	0.6	0.63	0.6	0.07	bdl	4.02	0.6	1.09	bdl	0.02	bdl	4.04	bdl	1.87	0.58	0.31	bdl	0.16	0.60	0.04	bdl

¹Detection limit >0.5 ppm and <0.5 ppm. Entries reporting <0.5 ppm DON are reported as bdl (below detection limit).

²DON grand mean is the site average for entries where DON was detected.

No value (-) indicates that variety was not tested at that location.

Table 3. Fusarium damaged kernel (FDK) and deoxynivalenol (DON) comparisons at 6 MCVET sites for winter wheat varieties in 2023.

2023 FDK (%) and DON ¹ (ppm)												
Class/Variety (FHB Resistance level)	Arborg		Carberry		Hamiota		Melita		Roblin		Stonewall	
	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON	FDK	DON
Canada Western Red Winter												
AAC Coldfront (I)	0.30	bdl	0.20	bdl	0.00	bdl	0.02	bdl	0.02	bdl	0.10	bdl
AAC Goldrush (I)	0.30	bdl	0.20	bdl	0.00	bdl	0.02	bdl	0.02	bdl	0.10	bdl
AAC Network (I)	0.00	bdl	0.10	bdl	0.00	bdl	0.01	bdl	0.06	bdl	0.10	bdl
AAC Overdrive (MR)	0.10	bdl	0.10	bdl	0.00	bdl	0.01	bdl	0.05	bdl	0.10	bdl
AAC Wildfire (MR)	0.10	bdl	0.20	bdl	0.00	bdl	0.15	bdl	0.01	bdl	0.00	bdl
AAC Vortex (MR)	0.00	bdl	0.10	bdl	0.00	bdl	0.00	bdl	0.03	bdl	0.10	bdl
Emerson (R)	0.10	bdl	0.20	bdl	0.01	bdl	0.00	bdl	0.02	bdl	0.00	bdl
Grand Mean²	0.13	bdl	0.16	bdl	0.00	bdl	0.03	bdl	0.03	bdl	0.07	bdl

¹Detection limit >0.5 ppm and <0.5 ppm. Entries reporting <0.5 ppm DON are reported as bdl (below detection limit).

²DON grand mean is the site average for entries where DON was detected.

No value (-) indicates that variety was not tested at that location.