2025

Ontario Corn Hybrid DON Screening Trials
2025 Report

Conducted by the Ontario Corn Committee

OCC Hybrid Performance for DON 2025 Report

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Executive Summary

- This ongoing project evaluates how sensitive commercial corn hybrids are to accumulating deoxynivalenol (DON) in grain under high disease pressure. The goal is to provide growers with independent, third-party information that helps reduce the risk of high DON in years when conditions favour Gibberella ear rot and DON development.
- Before results are shared publicly, the data are reviewed by the OCC DON Sub-committee. This committee includes representatives from the seed industry, the Ontario Ministry of Agriculture, Food and Agribusiness (OMAFA), OSCIA and the University of Guelph. This review step helps ensure the work is interpreted appropriately and communicated clearly to end users.
- Seed companies participate voluntarily by entering hybrids each year. In 2025, the study included 64 hybrids submitted by seed companies, one hybrid known to be highly susceptible, and four check hybrids. For comparison, 65 hybrids were entered in 2024 and 45 in 2023. Seed companies were actively encouraged to enter hybrids to ensure results represented a broad, relevant set of products.
- Hybrids were evaluated in misted, inoculated disease nurseries at two locations, with three planting dates per location. These nurseries are designed to promote disease development, allowing differences among hybrids to be detected. The different planting dates intentionally expose hybrids to different weather patterns during silking and grain fill, which strongly influence ear infection and DON accumulation. Because each planting date creates a distinct set of weather conditions during these key stages, the planting dates are treated as distinct “environments” in the analysis.
- To support clear and consistent comparisons, DON–hybrid indices were calculated relative to the average DON concentration of two high-DON check hybrids. In other words, the high-DON checks provide a consistent benchmark, and each hybrid’s performance is assessed relative to that benchmark.
- When results were averaged across the environments included in 2025, 48 hybrids had DON concentrations that were statistically lower (better) than the high-DON checks. Another 16 hybrids were statistically similar to the high-DON checks. In addition, 28 hybrids were statistically similar to the low-DON check hybrids.
- Looking across multiple years, the analysis showed that hybrid rankings were generally consistent, with only a few exceptions. This consistency matters because DON is inherently variable from site to site and year to year, even with strong disease nurseries. Multi-year patterns are therefore more informative than any single environment or single year.
- Finally, it is important to recognize what these results represent and what they do not. This report provides a relative risk assessment of a hybrid’s tendency to accumulate DON under the conditions tested. It should be used as a decision-support tool, not as the only source of information. The best hybrid selection and positioning decisions come from considering additional data sources as well (for example, other trials, company information, and local experience). Using multiple sources helps growers reduce the risk of high DON levels in years when weather and disease pressure favour DON development.
- This project is possible because of strong collaboration among academic researchers, extension services, and industry partners, supported by funding from government and agricultural organizations. The outcome is a set of unbiased, third-party results that growers can use to compare hybrids and make more informed choices to manage DON risk.

Introduction and history of the OCC DON Trials

- Gibberella ear rot is of concern to the agricultural industry primarily because of mycotoxins. Deoxynivalenol (DON) is the main mycotoxin produced by the fungal pathogen *Fusarium graminearum*. DON is the most common mycotoxin in Ontario corn.
- It is well known that DON concentrations depend highly on interactions among hybrids, pathogens, and the environment. In 2019, the Ontario Corn Committee (OCC) approved a project to investigate and refine protocols for testing hybrid sensitivity to DON accumulation.
- Protocols continue to be refined as new knowledge emerges. The inherent variability in this work was sufficiently constrained to allow statistical separation among hybrid entries and confidence in the results. **It is important to emphasize that this is a relative risk assessment of hybrids, and that additional data sources (e.g., seed company information, field trial results) should be used to inform better hybrid decisions based on DON risk. Currently, there are no DON-resistant hybrids.**

Notes on the inoculation trials. Briefly, seed companies voluntarily submitted hybrids for testing. Hybrids were tested in misted, inoculated disease nurseries at the Ridgetown Campus and at the Huron Research Station (Exeter).

- The hybrid entries vary each year depending on seed company decisions and hybrid turnover in the marketplace. Some seed companies chose not to participate. In 2025, there were 64 hybrid entries plus 4 check hybrids (2 low-check and 2 high-check).

- In every year since 2020, hybrid entries were planted on three dates at each location to expose various hybrid maturities to different weather conditions around silking and during grain-fill. The first planting was relatively early (early to mid-May), then mid (late May), and finally a relatively late planting (mid-June), with three replications per planting date. Thus, each hybrid entry was exposed to five or six "environments" (two locations × two or three planting dates) with three replications for a total of 15-18 DON measurements per hybrid per year. All check hybrids were replicated at least four times in each planting date to reduce variability.

- From 2019 to 2023, the same "high DON check" or "high susceptible" hybrid was used every year. It was a hybrid that consistently had high DON levels in farm fields during the 2018 epidemic. In 2024, the seed supply of this hybrid was no longer available, so two new "high check" hybrids were suggested by seed company representatives. One of these high checks was deemed "too high" or too susceptible by the sub-committee in 2024, which made all hybrid entries look "good", so this hybrid was dropped as one of the checks. Only one high check hybrid was used in 2024 for relative hybrid comparisons. In 2025, another high-check hybrid was suggested by a seed company, so all hybrids were compared to the mean of two high checks (2950 and 3150 CHU). All high-check hybrid names are confidential at the company's request. Since 2022, the trials also included two low-DON check hybrids. Hybrid entries were always compared with the checks within each year, which is important to note when pooling data across years. None of the checks are known by the sub-committee, but the sub-committee has approved them based on seed industry representation.

- In all years, corn was planted in 30" rows with the goal of achieving a final stand of 34,400 plants per acre (see photo in Appendix Figure 1). Each hybrid was planted in a single row of approximately 25 plants. Ten plants were hand-spray-inoculated in each row at the optimal time for infection (first sign of silk browning). The trials were mist-irrigated on timers daily for approximately 4 weeks after inoculation (see Appendix Figure 2). At harvest, corn was hand-harvested, the ears were photographed, then dried, shelled, and finally the grain was ground and analyzed for DON using ELISA in the mycotoxin lab at Ridgetown Campus. The limit of detection (LOD) was 0.1 ppm.

- In 2023 and 2024, the late-planted block at the Huron Research Station was not inoculated and was subsequently discarded because of late silking during the end of August. In 2025, the late-planted block was not planted to conserve labour and financial resources during inoculation and during mycotoxin analysis.

- DON data were analyzed using PROC GLIMMIX in SAS. Because the variability in DON concentrations tends to increase with the DON level, a lognormal distribution was specified to stabilize variability for statistical analysis. DON values of zero were converted to 0.1 ppm before analysis.

- Hybrid indices were calculated based on the de-transformed log means relative to the average DON of the high-DON check hybrids within each environment and year. Statistical differences were identified at the p = 0.05 level using the Tukey-Kramer test. Hybrid entries were classified as statistically similar to the high-DON checks, statistically lower than the high-DON checks, or statistically equivalent to the low-DON checks. This is the first year that we have compared hybrid entries to the low checks. In 2025, single-year data were presented across each environment (i.e., planting date) and also averaged across environments. In the multi-year combined analysis, data were combined across all environments. Each combination of year, location, and planting date was treated as an “environment” in the analysis, with year, location, and planting date as random effects.

Results

- The purpose of this project is to provide a relative risk assessment of a relatively small number of hybrids available to corn growers across Ontario, as they were entered voluntarily by seed companies. For whatever reason, not all hybrids were entered by seed companies, and not all seed companies participated. Additional data sources (e.g., seed company information, field trial results) should be used to inform better hybrid decisions based on DON risk.
- The high-DON check hybrids provide the reference points for interpreting all results in these tables. The high-DON checks represent hybrids known to accumulate relatively high levels of DON under favourable disease conditions, and the indices are relative to the high checks. The average high check DON values (shown in ppm at the bottom of each table) indicate the severity of disease pressure in that year or environment.
- The low-DON checks represent hybrids with consistently low DON accumulation. Their values show what is realistically achievable when DON pressure is well managed through hybrid selection. Using statistics, we have found that some hybrid entries have DON levels similar to those of the low checks, and we have identified these low-DON hybrids in this report for the first time.
- The gap between the high and low checks is critical. A large gap indicates strong disease pressure and the trial's ability to separate hybrids by DON risk. A small gap suggests lower disease pressure or fewer differences among hybrids.
- **The data are presented as indices relative to the mean of the high-check hybrids.** For example, a hybrid with an index of 100 would have the same DON concentration, numerically, as the mean of the high-checks in a column. A hybrid with an index of 50 would indicate that the average DON was 50% of the high-check. Statistical analysis is important to determine whether the differences between each hybrid entry and the low and high checks were real, given the variability of DON in the field.

- The data were analyzed over multiple years (Table 1) if data were available. The 1-year column in Table 1 matches the last column in Table 2 (i.e., the 2025 data). Note that the hybrids were sorted by their CHU rating.
- Some seed companies decided not to enter certain hybrids in 2023 after testing in 2022, but they were re-entered in 2024. So thus two columns compared hybrids with three years of data.
- In general, hybrids with multi-year data ranked similarly across years using only 2 years of data, with only a few exceptions. Of the 64 hybrids tested in 2025, averaged across environments, DON concentrations were statistically lower (better) in 48 hybrids than in the high-check hybrid, and 16 hybrids were statistically similar to the DON in the high-checks (indicated by an "H" for relatively high risk). 28 hybrids were statistically similar to the low-DON checks (indicated by an "L" for relatively low risk). Other hybrids that were statistically lower than the high checks but higher than the low checks are indicated by "M" for moderate risk.
- Based on 2025 data, the relative DON risk is summarized by environment in Table 2. While DON levels varied across locations and planting dates, differences among hybrids relative to the high and low checks were consistent enough to be statistically meaningful.
- In 2025, DON concentrations in the high-check hybrids were substantially higher in the early-planted environments (Env 1 at Exeter: 14.2 ppm; Env 3 at Ridgetown: 31.2 ppm) than in the later environments, particularly Env 5 (2.0 ppm). Growth of *Fusarium graminearum* following silk inoculation is strongly temperature-dependent, with an optimum near ~28 °C, declining to a maximum near ~31 °C, and becoming minimal below ~15 °C. Silk susceptibility to infection is also the greatest within a narrow window, several days after silk emergence. Because inoculation was timed at silking, temperatures during the 1–2 weeks following silking likely explain the differences in DON among the high-check hybrids across Environments. Therefore, the earlier silking dates associated with Env 1 (≈Aug 1) and Env 3 (≈July 22) coincided with a greater number of days within the favourable temperature range for fungal growth and DON accumulation during this critical post-silking window, resulting in elevated DON in the high checks. The post-silking period in the later environments (Env 2 and especially Env 5) experienced cooler temperatures that were less optimal for fungal growth; this probably constrained fungal growth, resulting in substantially lower DON levels in the high checks.
- Hybrid results should always be interpreted relative to these checks, not as absolute DON guarantees.
- Due to natural variability in DON, multi-year data are highly recommended for comparing hybrids compared to single-year results.

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Seed Company Sponsors (2025):

CROPLAN, Winfield United	NK Brand, Syngenta Seeds Inc.
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DEKALB, Bayer CropScience Inc.	PRIDE Seeds, AgReliant Genetics Inc.
Maizex, Maizex Seeds Inc.	

Appendix

Figure 1. Precision planting the OCC DON experiment at Ridgetown.

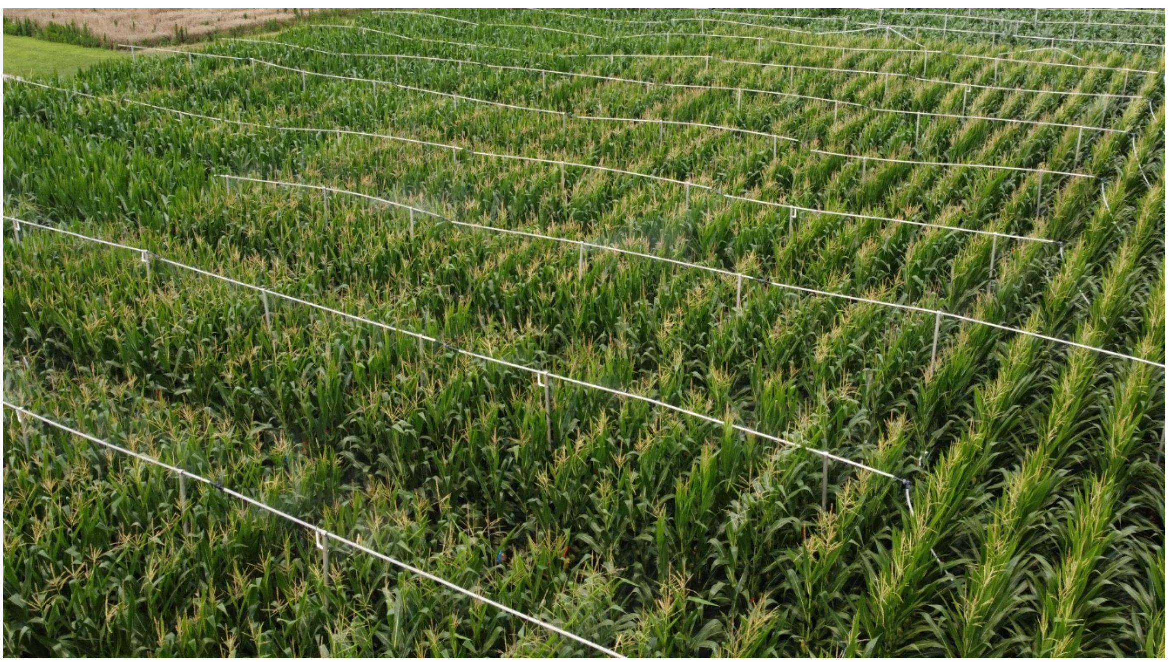

Figure 2. Overview of the OCC DON trial showing the overhead misting lines at Ridgetown.

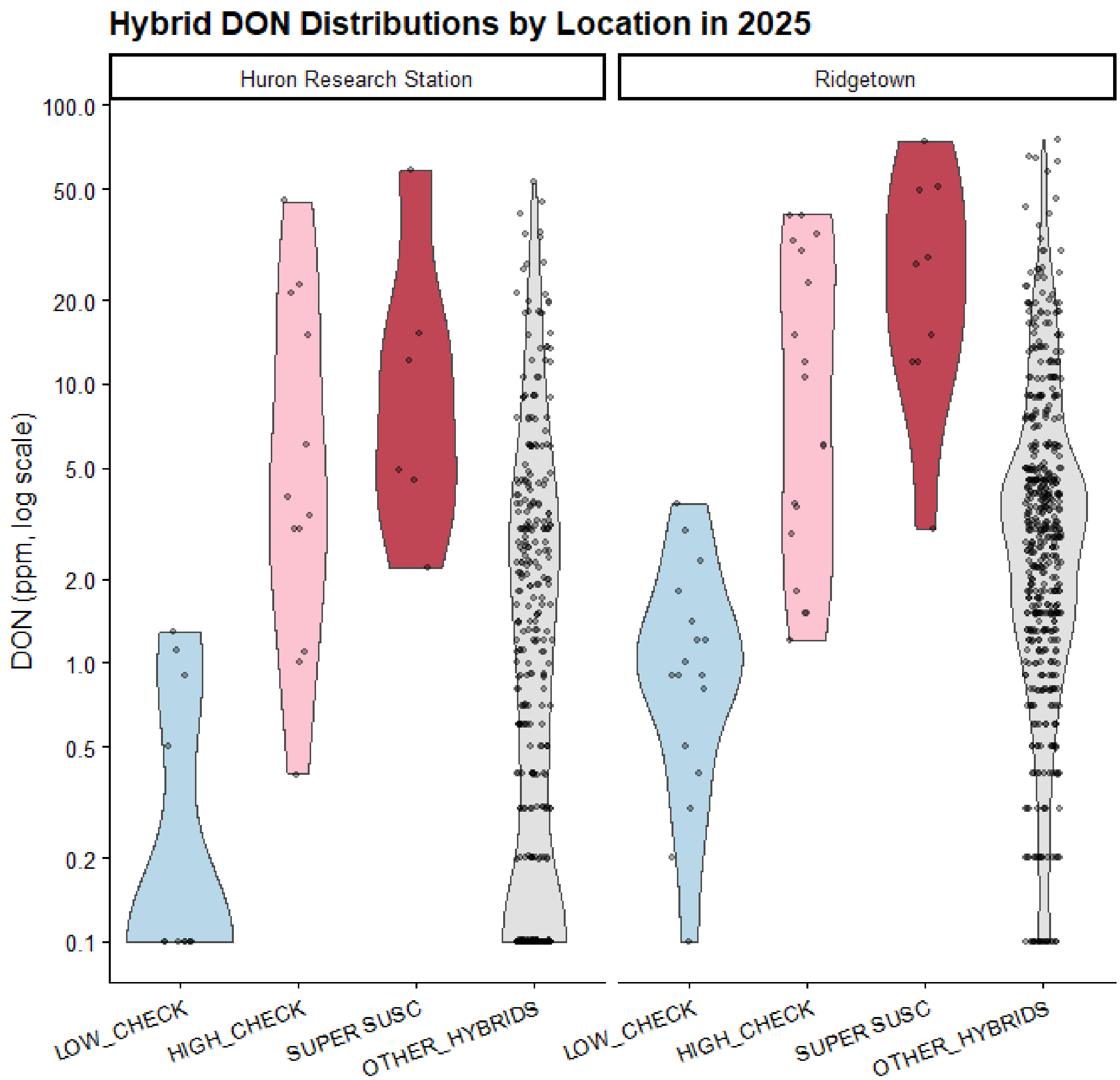

Figure 3. The distribution of DON concentrations in checks and corn hybrid entries at Huron Research Station (Exeter) and Ridgetown Campus in 2025. These violin plots illustrate the variability of DON concentrations (ppm, log scale) for the low-DON check, high-DON check, the "Super Susceptible", and all hybrid entries in all environments at each location. Each dot represents a single corn sample. The "up and down" of each "violin" = highest and lowest datapoints; wide = lots of datapoints there, and narrow = very few datapoints.

- The high-check hybrids produced substantially higher DON levels ranging from 0.5 to 50 ppm, while the low-DON checks ranged from only 0.1 to 4.5 ppm.
- As expected, DON concentrations were variable within each check, but the variability is mainly due to the environment, as each plot represents 2-3 different environments.
- Note that the y-axis DON concentration is on a log scale, so equal vertical distances represent multiplicative differences.
- The "Super Susceptible" hybrid ranged from 2.5-75 ppm; this hybrid was identified in 2024 as unusually susceptible, so we decided to include it in 2025 as an indicator of favourable conditions for DON development.

Table 1. Relative DON risk assessment indices by hybrid relative to high-checks (not shown) from 2022-2025. Hybrids are sorted by CHU rating. **Indices are not DON (ppm). Always interpret one-year data with caution, as environmental effects can be large.** It is best to use multi-year data. Always use one-year data with caution. Several hybrids were entered by companies in 2022 and 2024, but not in 2023, hence the "2022, 2024-25 not 2023" column.

Hybrid	Hybrid CHU	2022-2025 (4 years)		2022, 2024-25 not 2023 (3 years)		2023-25 (3 years)		2024-25 (2 years)		2025	See legend in footer
DON, high checks (ppm)		**4.4**		**2.7**		**5.4**		**3.2**		**7.4**	
DON, low checks (ppm)		**0.8**		**0.5**		**1.1**		**0.7**		**0.2**	
A5175G2RIB	2400									51	H
DKC36-48RIB	2600	33	M	36	M	38	M	44	M	32	M
A5424G2RIB	2625					51	M	55	M	56	H
A5775G2	2650									16	L
A5580G4	2650									31	M
DL3007	2700							19	L	8	L
DL3220	2725									3	L
A5959G2RIB	2725									12	L
P9466AML	2800	71	M	88	H	67	H	86	H	47	H
NK9400-V	2800							78	H	46	H
MZ3432TRE	2800									15	L
DKC42-90RIB	2800									56	H
A6226G2	2800									60	H
DL3751	2825									28	M
A6566G8RIB	2850					53	M	59	M	42	M
MZ3528DBR	2850							41	M	21	M
MZ3505DBR	2850			51	M			75	H	66	H
DKC094-94RIB	2850									10	L
P96567Q	2850									17	L
CP3490VT2P	2850									43	H
DKC45-74RIB	2875	45	M	39	M	45	M	34	L	16	L
DKC46-40RIB	2900	39	M	41	M	40	M	40	M	24	M
MZ3717SSP	2900							39	M	22	M
CP3790VT2P	2900							54	M	27	M
P9823Q	2925									29	M
MZ3930DBR	2950			101	H			95	H	100	H
P9845PCE	2950					65	H	52	M	14	L
DKC48-08RIB	2950							31	L	13	L
CP3980VT2P	2950			127	H			136	H	106	H
MZ4026SSP	2950									16	L
A6846G6	2950									28	M
NK9805-DV	2950									71	H
A6975G2	2975							32	L	12	L
P0035Q	2975							33	M	23	M
MZ4049SMX	2975			28	M			34	M	19	L
DL4910	2975									8	L
NK9908-AA	2975									22	M
DL5021	3000							12	L	3	L
P0075Q	3000							15	L	4	L

NK0123-AA	3025							26	L	11	L
DKC50-30RIB	3050	22	L	23	L	23	L	23	L	7	L
DKC101-33RIB	3075							42	M	18	L
MZ4158DBR	3100			58	M			46	M	21	M
NK0252-D	3100							78	H	37	M
CP4377TRE	3100							156	H	113	H
DKC102-02RIB	3100									26	M
P0404Q	3125							72	M	40	M
DKC103-07RIB	3125							169	H	166	H
P04922Q	3125									52	H
P0529Q	3150	34	M			26	L	29	L	11	L
CP4615TRE	3150							203	H	98	H
A7275G2	3175							34	M	17	L
NK0604-DV	3175									6	L
MZ4608SMX	3200	17	L	19	L	20	L	22	L	8	L
CP4757VT2P	3200							46	M	23	M
A7599G9RIB	3200							55	M	34	M
DKC56-26RIB	3200									12	L
NK0880-V	3225									22	M
P0806AM	3250	36	M	39	M	28	M	27	L	8	L
MZ4799SMX	3250					19	L	23	L	10	L
MZ4703DBR	3250							17	L	6	L
P0720Q	3250							42	M	11	L
DKC110-10RIB	3300									43	H
P1136AM	3400							45	M	21	M
Hybrid diff (P-value)		<0.0001		<0.0001		<0.0001		<0.0001		<0.0001	
DON, high checks (ppm)		**4.4**		**2.7**		**5.4**		**3.2**		**7.4**	
DON, low checks (ppm)		**0.8**		**0.5**		**1.1**		**0.7**		**0.2**	
No. environments		30		18		18		10		5	
No. obs per hybrid		90		36		36		30		15	

The colour scheme highlights relative hybrid effects within column. Indices = relative to the mean of the high checks within column (example, index 100 = same DON as high checks, index 50 = 1/2 DON as high checks).

"H" = hybrid not sig different than the high checks (*P* =0.05)

"M" = hybrid sig lower DON than high checks, but still sig higher than low checks (P=0.05)

"L" = hybrid DON similar to the low checks (P=0.05)

Table 2. Relative DON risk assessment indices by hybrid and environments in 2025 are sorted by CHU rating. Indices are relative to high-checks. They are not ppm. **Always interpret one-year data with caution, as environmental effects can be large, as observed in this table across environments. It is best to use multi-year data from Table 1**.

Hybrid	Hybrid CHU	Exeter environments		Ridgetown environments			Overall mean	See legend in footer
		1	2	3	4	5		
DON, high checks (ppm)		**14.2**	**5.8**	**31.2**	**4.2**	**2.0**	**7.4**	
DON, low checks (ppm)		**0.2**	**0.4**	**0.9**	**1.4**	**0.6**	**0.2**	
A5175G2RIB	2400	3	191	20	178	186	51	H
DKC36-48RIB	2600	14	71	8	86	49	32	M
A5424G2RIB	2625	19	170	8	69	299	56	H
A5580G4	2650	17	29	7	124	63	31	M
A5775G2	2650	5	35	10	33	18	16	L
DL3007	2700	2	15	2	26	18	8	L
A5959G2RIB	2725	1	17	4	69	78	12	L
DL3220	2725	1	2	1	3	26	3	L
A6226G2	2800	69	20	46	98	126	60	H
DKC42-90RIB	2800	16	325	12	92	95	56	H
MZ3432TRE	2800	3	10	9	44	67	15	L
NK9400-V	2800	36	22	34	49	163	46	H
P9466AML	2800	19	36	18	81	248	47	H
DL3751	2825	14	48	7	39	107	28	M
A6566G8RIB	2850	26	127	5	60	134	42	M
CP3490VT2P	2850	14	35	12	180	144	43	H
DKC094-94RIB	2850	2	10	3	27	56	10	L
MZ3505DBR	2850	23	245	49	47	94	66	H
MZ3528DBR	2850	3	13	13	66	116	21	M
P96567Q	2850	7	2	69	22	54	17	L
DKC45-74RIB	2875	10	3	10	59	66	16	L
CP3790VT2P	2900	4	7	10	87	506	27	M
DKC46-40RIB	2900	87	5	26	24	30	24	M
MZ3717SSP	2900	18	34	6	26	51	22	M
P9823Q	2925	11	17	50	36	60	29	M
A6846G6	2950	13	13	13	85	90	28	M
CP3980VT2P	2950	157	19	42	324	322	106	H
DKC48-08RIB	2950	3	5	19	32	40	13	L
MZ3930DBR	2950	138	277	107	70	71	115	H
MZ4026SSP	2950	12	10	87	5	19	16	L
NK9805-DV	2950	104	41	31	152	94	71	H
P9845PCE	2950	8	3	12	12	169	14	L
A6975G2	2975	8	5	5	27	60	12	L
DL4910	2975	1	8	2	25	37	8	L
MZ4049SMX	2975	2	13	9	50	202	19	L
NK9908-AA	2975	2	4	55	45	196	22	M
P0035Q	2975	15	55	15	10	53	23	M
DL5021	3000	2	2	2	3	8	3	L
P0075Q	3000	1	2	5	10	9	4	L

NK0123-AA	3025	5	2	21	10	71	11	L
DKC50-30RIB	3050	2	2	16	6	50	7	L
DKC101-33RIB	3075	1	5	50	124	76	18	L
CP4377TRE	3100	44	73	141	176	231	113	H
DKC102-02RIB	3100	19	19	14	38	68	26	M
MZ4158DBR	3100	2	5	15	122	209	21	M
NK0252-D	3100	27	17	14	67	175	37	M
DKC103-07RIB	3125	177	64	143	178	433	166	H
P0404Q	3125	14	14	24	103	218	40	M
P04922Q	3125	5	53	46	108	290	52	H
CP4615TRE	3150	30	22	109	241	527	98	H
P0529Q	3150	2	4	8	35	79	11	L
A7275G2	3175	2	10	8	49	136	17	L
NK0604-DV	3175	1	3	3	11	96	6	L
A7599G9RIB	3200	2	9	35	216	256	34	M
CP4757VT2P	3200	5	17	19	24	167	23	M
DKC56-26RIB	3200	1	3	15	58	91	12	L
MZ4608SMX	3200	1	7	3	32	30	8	L
NK0880-V	3225	6	3	45	32	185	22	M
MZ4703DBR	3250	1	2	8	32	27	6	L
MZ4799SMX	3250	2	2	12	27	64	10	L
P0720Q	3250	3	3	7	26	133	11	L
P0806AM	3250	1	2	3	109	85	8	L
DKC110-10RIB	3300	16	12	26	132	213	43	H
P1136AM	3400	1	5	17	52	829	21	M
Hybrid difference (P-value)		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	
DON, high checks (ppm)		**14.2**	**5.8**	**31.2**	**4.2**	**2.0**	**7.4**	
DON, low checks (ppm)		**0.2**	**0.4**	**0.9**	**1.4**	**0.6**	**0.2**	
No. observations per hybrid		3	3	3	3	3	15	

The colour scheme highlights relative hybrid effects within column. Indices = relative to the mean of the high checks within column (example, index 100 = same DON as high checks, index 50 = 1/2 DON as high checks).

"H" = hybrid not sig different than the high checks, pooled across environments (P=0.05)

"M" = hybrid sig lower DON than high checks, but still sig higher than low checks, pooled (P=0.05)

"L" = hybrid DON similar to the low checks, pooled across environments (P=0.05)

Interpretation of DON levels across environments -- note the DON across the high-checks.

In 2025, DON in the high-check hybrids was highest in the early-planted environments (Env 1 Exeter: 14.2 ppm; Env 3 Ridgetown: 31.2 ppm) and lowest in the later environments, especially Env 5 (2.0 ppm). Growth of *Fusarium graminearum* after silk inoculation is strongly temperature dependent, with optimal growth near ~28 °C and reduced growth under cooler or hotter conditions. Earlier silking in Env 1 and Env 3 probably aligned with more favourable temperatures post-silking, resulting in higher DON, whereas later environments constrained fungal growth. In contrast, the relatively low DON in the high checks in Env 5 inflated relative hybrid indices, which reflects more about high variability at low DON concentrations rather than elevated DON expression in some hybrids.