

2024-25 Report for the Winter North American Barley Scab Evaluation Nurseries
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INTRODUCTION

Fusarium head blight (FHB), commonly referred to as scab, is a destructive fungal disease of barley caused primarily by *Fusarium graminearum*. One of the most harmful consequences of FHB infection is the accumulation of deoxynivalenol (DON), a trichothecene mycotoxin that contaminates grain and renders it unfit for food and feed uses. Developing winter barley varieties with inherent resistance to DON accumulation is therefore an important aspect for North American breeding programs.

The Winter North American Barley Scab Evaluation Nursery (Winter NABSEN) was established to support this goal by providing a multi-environment platform for screening winter barley lines under high disease pressure. Lines from participating breeding programs are grown at multiple locations each season, allowing breeders to identify entries with consistent resistance. This report presents the data and findings from the 2024-25 nursery season.

MATERIALS AND METHODS

Cooperators and Locations

Eric Stockinger at The Ohio State University is a coordinator of the winter NABSEN. All seed was received at the Stockinger lab and treated with NipsIt™ SUITE Cereals OF Seed Protectant (Valent, <https://www.valent.com/>) according to the manufacturer's directions. Treated seed was allowed to dry before being packaged and shipped to each nursery site. Names, institutions, and nursery locations of collaborators are listed in Table 1.

Check Lines

Eight check lines were included in the nursery to serve as performance benchmarks. Checks were selected collectively by nursery participants based on historical performance data (Brooks, 2020; Cowger, 2021; Cowger et al., 2019). Four checks were 6-row types, and four were 2-row types (Table 2).

Experimental Entries

The 2024-25 nursery included 59 entries in total. These comprised experimental lines submitted by breeding programs, as well as the eight check varieties. Entry and line names are listed in Table 3.

Disease Nursery Format and Inoculum

Lines were planted in two or three replications at each location, generally in a headrow format. Inoculation and irrigation methods varied by site. At Wooster, OH, and Ithaca, NY, plots were inoculated with both corn cob spawn and conidial spore suspension and irrigated overhead with mist systems in the morning and evenings. At College Park, MD, and Lincoln, NE, corn cob spawn inoculation was used with overhead mist irrigation. The Raleigh, NC, site relied on corn spawn inoculum alone, applied in three batches to each plot according to entry maturity, with misting conducted in the mornings and afternoons. At Blacksburg, VA, plots were grown in two replications.

Disease assessments varied by cooperator and included one or more of the following: FHB incidence (INC), diseased-head severity (SEV), disease index (IND), Fusarium damaged kernels (FDK) following Paul et al. (2005), and FHB index as defined by Sneller et al. (2010). At maturity, plots were hand-harvested by rep or as a composite, threshed, and ground to a fine powder. Ground samples were shipped to an analytical laboratory for DON quantification. A target sample mass of 100 g was used for DON analysis.

Data, Data Analysis, and Interpretation

DON data from six locations were submitted to the coordinator and are presented in Tables 4-9. RelDON was calculated by dividing each line's DON by VA15H-73's DON at the same location, allowing comparison of line performance relative to a standard resistant check across sites with different overall disease pressure levels. A RelDON below 1.0 means the line outperformed VA15H-73; a value of 1.0 means equivalent performance; and a value above 1.0 means the line accumulated more DON than VA15H-73.

To examine whether line performance was consistent across environments and years, Pearson correlation analysis was conducted on a subset of lines with data spanning multiple seasons. Ranking analysis was also performed by assigning within-environment ranks (rank 1 = lowest DON) and computing average ranks across all environments with available data for each line.

Additional data collected by the nursery participants, including heading date, FHB head severity, FHB index, FHB incidence, and Fusarium damaged kernels was uploaded to The Triticeae Toolbox, T3 (<https://wheat.triticeaetoolbox.org/>).

RESULTS AND DISCUSSION

Disease Pressure Across Locations

Disease and DON accumulation differed substantially among sites for the 2024-25 season. The highest DON levels were recorded at Ithaca, NY, and Wooster, OH, where wide ranges of values were observed across lines. The remaining four locations produced lower DON (Tables 4-9).

In Ithaca, NY, DON ranged from 18.2 ppm in VA15H-73 to 210.9 ppm in NB18406. At Wooster, OH, DON ranged from 22.9 ppm in VA15H-73 to 90.8 ppm in NB22260. Both locations showed wide spreads between the best and worst-performing lines.

At Blacksburg, VA, DON ranged from 1.32 to 11.60 ppm. At Lincoln, NE, values ranged from 0.2 to 17.8 ppm, with MTWF6(F2)_50-1 accumulating the least and Hirondeella the most. In Raleigh, NC, DON ranged from 0.34 to 10.24 ppm. At College Park, MD, DON ranged from 1.20 to 22.0 ppm, with NB17401 lowest and Endeavor highest. Although some lines at these four locations had RelDON values above 1.0, the absolute DON values were low, and the environments offered limited power to discriminate among lines.

DON Accumulation and Line Performance by Location

At locations that showed substantial variation (NY and OH), VA15H-73 accumulated the lowest DON at both sites. Lines such as RIL0201-088 and TM18.236-020 in Ohio, and 2011-725-02 and RIL02WI-013 in New York had the next-lowest DON values. Line rankings by DON and RelDON for each location are provided in Tables 4-9.

Multi-Year Cross-Location Comparison of DON Performance

To assess whether relative line performance was consistent across years and locations, correlation analysis was conducted on 12 lines evaluated in Ohio and Virginia during 2021-22 and 2022-23, in New York during 2023-24, and again in New York and Ohio during 2024-25.

Correlation analysis showed that DON performance in NY 2024-25 was not significantly associated with DON in any of the environments tested (Table 11a). In contrast, DON performance in OH 2024-25 was significantly associated with DON in VA 2021-22, OH 2021-22, and NY 2023-24, but not with OH 2022-23 or VA 2022-23 (Table 11b).

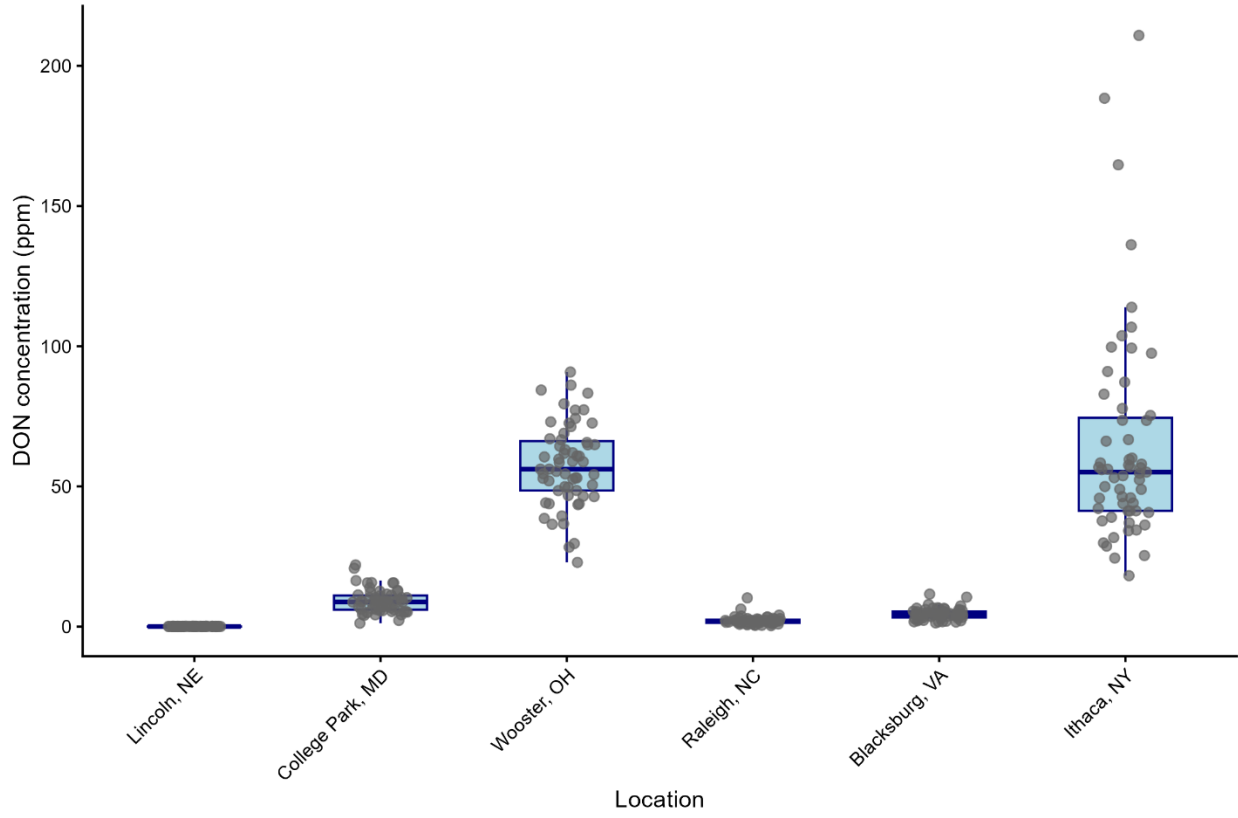
These results indicate that line performance was not uniformly stable across all environments and that environmental conditions likely influenced the expression of resistance.

Line Rankings Across Environments

Ranking analysis of the 12 lines across seven environments is shown in Table 10. VA15H-73 had the lowest average rank (1.0), confirming its consistent resistance. RIL02FL-029 ranked second overall lowest with an average rank of 3.7. Hirondeella had the highest average rank (11.1).

Figures

Figure 1. Distribution of DON concentrations (ppm) across six locations in the 2024-25 Winter NABSEN.



TABLES

Table 1. Cooperator, institution, and nursery location

Cooperator	Institution	Location
Christina Cowger	North Carolina State University	Raleigh, NC
Katherine Frels	University of Nebraska	Lincoln, NE
Nidhi Rawat	University of Maryland	College Park, MD
Nicholas Santantonio	Virginia State University	Blacksburg, VA
Mark E. Sorrells	Cornell University	Ithaca, NY
Eric J. Stockinger	The Ohio State University	Wooster, OH
Juliet Marshall	University of Idaho	Idaho Falls, ID
Joe Jenson	Montana State University	Creston, MT

Table 2. Lines selected as checks (controls)

Line	Row Type
Thoroughbred	6-row
Hirondella	6-row
Atlantic	6-row
Secretariat	6-row
Endeavor	2-row
VA15H-73	2-row
Calypso	2-row
Wintmalt	2-row

Table 3. Entries for the 2024-25 NABSEN

Entry	Line
NABSEN-2024-25-001	11ARS652-7
NABSEN-2024-25-002	12ARS777-2
NABSEN-2024-25-003	13ARS526-8
NABSEN-2024-25-004	16ARS622-248
NABSEN-2024-25-005	16ARS627-037
NABSEN-2024-25-006	18ARS509-4
NABSEN-2024-25-007	18ARS517-5
NABSEN-2024-25-008	2MW19_3013-004
NABSEN-2024-25-009	2MW19_3346-014
NABSEN-2024-25-010	6MW18_4374-049
NABSEN-2024-25-011	6MW19_3346-024
NABSEN-2024-25-012	TM17.167-008
NABSEN-2024-25-013	TM18.236-016
NABSEN-2024-25-014	TM18.236-020
NABSEN-2024-25-015	MTWF5(F2)_21

NABSEN-2024-25-016	MTWF6(F2) 50-1
NABSEN-2024-25-017	MTWF6(F2) 50-7
NABSEN-2024-25-018	MTWF6(F3) 24
NABSEN-2024-25-019	MTWF6(F3) 50-11
NABSEN-2024-25-020	MTWF6(F4) 13-01
NABSEN-2024-25-021	MTWF7 19-7
NABSEN-2024-25-022	NB17401
NABSEN-2024-25-023	NB17411
NABSEN-2024-25-024	NB18406
NABSEN-2024-25-025	NB22240
NABSEN-2024-25-026	NB22260
NABSEN-2024-25-027	NYBS811-31
NABSEN-2024-25-028	NYBS811-33
NABSEN-2024-25-029	NYBS811-34
NABSEN-2024-25-030	NYBS811-43
NABSEN-2024-25-031	2011-725-02*
NABSEN-2024-25-032	DH0214-007
NABSEN-2024-25-033	GHRIL0201-103
NABSEN-2024-25-034	MOB2549-NT074-012
NABSEN-2024-25-035	RIL0201-088
NABSEN-2024-25-036	RIL0257-01-011
NABSEN-2024-25-037	RIL02FL-029*
NABSEN-2024-25-038	RIL02WI-013
NABSEN-2024-25-039	DH141947
NABSEN-2024-25-040	DH171854
NABSEN-2024-25-041	DH180676
NABSEN-2024-25-042	GN0-Vivar (DH170472)
NABSEN-2024-25-043	Lightning*
NABSEN-2024-25-044	Thunder*
NABSEN-2024-25-045	Top Shelf (DH162310)
NABSEN-2024-25-046	VA21BFHB-19DH0015
NABSEN-2024-25-047	VA21M-14
NABSEN-2024-25-048	VA21M-20
NABSEN-2024-25-049	VA22M-160
NABSEN-2024-25-050	VA22M-205
NABSEN-2024-25-051	VA22M-47
NABSEN-2024-25-052	Thoroughbred*
NABSEN-2024-25-053	Hirondella*
NABSEN-2024-25-054	Atlantic*
NABSEN-2024-25-055	Secretariat*
NABSEN-2024-25-056	Endeavor*
NABSEN-2024-25-057	VA15H-73*
NABSEN-2024-25-058	Calypso*
NABSEN-2024-25-059	Wintmalt*

An asterisk () indicates lines evaluated in the 2021-22, 2022-23, 2023-24, and 2024-25 seasons*

Symbols and definitions used in Tables 4-9:

‡ = value is an average of three replications

† = value is an average of two replications

Relative DON (ReIDON) was calculated as:

DON of a line ÷ DON of VA15H-73 (resistant check)

ReIDON < 1.0 = better than VA15H-73

ReIDON = 1.0 = same as VA15H-73

ReIDON > 1.0 = worse than VA15H-73

Table 4. DON concentration (ppm) and relative DON (RelDON) of winter barley lines evaluated at the Wooster, OH, in the 2024-25 Winter NABSEN season

Entry	Line	‡DON (ppm)	RelDON
NABSEN-2024-25-001	11ARS652-7	60.5	2.64
NABSEN-2024-25-002	12ARS777-2	38.6	1.69
NABSEN-2024-25-003	13ARS526-8	46.8	2.04
NABSEN-2024-25-004	16ARS622-248	58.5	2.55
NABSEN-2024-25-005	16ARS627-037	54.5	2.38
NABSEN-2024-25-006	18ARS509-4	67.0	2.93
NABSEN-2024-25-007	18ARS517-5	73.0	3.19
NABSEN-2024-25-008	2MW19_3013-004	46.4	2.02
NABSEN-2024-25-009	2MW19_3346-014	48.5	2.12
NABSEN-2024-25-010	6MW18_4374-049	61.8	2.70
NABSEN-2024-25-011	6MW19_3346-024	50.5	2.21
NABSEN-2024-25-012	TM17.167-008	60.9	2.66
NABSEN-2024-25-013	TM18.236-016	43.5	1.90
NABSEN-2024-25-014	TM18.236-020	29.6	1.29
NABSEN-2024-25-015	MTWF5(F2)_21	44.1	1.93
NABSEN-2024-25-016	MTWF6(F2)_50-1	36.5	1.59
NABSEN-2024-25-017	MTWF6(F2)_50-7	49.7	2.17
NABSEN-2024-25-018	MTWF6(F3)_24	58.8	2.57
NABSEN-2024-25-019	MTWF6(F3)_50-11	43.8	1.91
NABSEN-2024-25-020	MTWF6(F4)_13-01	48.6	2.12
NABSEN-2024-25-021	MTWF7_19-7	39.5	1.72
NABSEN-2024-25-022	NB17401	60.8	2.66
NABSEN-2024-25-023	NB17411	72.6	3.17
NABSEN-2024-25-024	NB18406	52.9	2.31
NABSEN-2024-25-025	NB22240	77.3	3.38
NABSEN-2024-25-026	NB22260	90.8	3.97
NABSEN-2024-25-027	NYBS811-31	59.7	2.61
NABSEN-2024-25-028	NYBS811-33	84.4	3.68
NABSEN-2024-25-029	NYBS811-34	83.3	3.64
NABSEN-2024-25-030	NYBS811-43	65.7	2.87
NABSEN-2024-25-031	2011-725-02	64.8	2.83
NABSEN-2024-25-032	DH0214-007	58.9	2.57
NABSEN-2024-25-033	GHRIL0201-103	55.4	2.42
NABSEN-2024-25-034	MOB2549-NT074-012	49.9	2.18
NABSEN-2024-25-035	RIL0201-088	28.3	1.24
NABSEN-2024-25-036	RIL0257-01-011	56.2	2.45
NABSEN-2024-25-037	RIL02FL-029	36.7	1.60
NABSEN-2024-25-038	RIL02WI-013	52.0	2.27
NABSEN-2024-25-039	DH141947	72.6	3.17
NABSEN-2024-25-040	DH171854	63.1	2.76
NABSEN-2024-25-041	DH180676	46.5	2.03

NABSEN-2024-25-042	GN0-Vivar (DH170472)	53.0	2.32
NABSEN-2024-25-043	Lightning	79.5	3.47
NABSEN-2024-25-044	Thunder	64.9	2.83
NABSEN-2024-25-045	Top Shelf (DH162310)	64.3	2.81
NABSEN-2024-25-046	VA21BFHB-19DH0015	53.1	2.32
NABSEN-2024-25-047	VA21M-14	56.2	2.45
NABSEN-2024-25-048	VA21M-20	69.0	3.01
NABSEN-2024-25-049	VA22M-160	66.6	2.91
NABSEN-2024-25-050	VA22M-205	52.6	2.30
NABSEN-2024-25-051	VA22M-47	54.5	2.38
NABSEN-2024-25-052	Thoroughbred	71.3	3.11
NABSEN-2024-25-053	Hirondella	86.1	3.76
NABSEN-2024-25-054	Atlantic	43.8	1.91
NABSEN-2024-25-055	Secretariat	54.2	2.37
NABSEN-2024-25-056	Endeavor	62.0	2.71
NABSEN-2024-25-057	VA15H-73	22.9	1.00
NABSEN-2024-25-058	Calypso	74.3	3.24
NABSEN-2024-25-059	Wintmalt	77.2	3.37

Table 5. Heading date (HD), Fusarium damaged kernels (FDK), DON concentration (ppm), and relative DON (RelDON) of winter barley lines evaluated at Ithaca, NY, in the 2024-25 Winter NABSEN season

Entry	Line	†HD	†FDK (%)	†DON (ppm)	RelDON
NABSEN-2024-25-001	11ARS652-7	148	32.5	66.7	3.67
NABSEN-2024-25-002	12ARS777-2	148	25.0	56.7	3.12
NABSEN-2024-25-003	13ARS526-8	146	35.0	56.9	3.13
NABSEN-2024-25-004	16ARS622-248	139	32.5	91.0	5.01
NABSEN-2024-25-005	16ARS627-037	143	17.5	50.0	2.75
NABSEN-2024-25-006	18ARS509-4	143	45.0	113.9	6.28
NABSEN-2024-25-007	18ARS517-5	149	35.0	103.8	5.72
NABSEN-2024-25-008	2MW19_3013-004	138	32.5	58.0	3.19
NABSEN-2024-25-009	2MW19_3346-014	133	27.5	43.9	2.42
NABSEN-2024-25-010	6MW18_4374-049	143	25.0	106.8	5.88
NABSEN-2024-25-011	6MW19_3346-024	135	25.0	53.8	2.96
NABSEN-2024-25-012	TM17.167-008	144	22.5	40.7	2.24
NABSEN-2024-25-013	TM18.236-016	135	35.0	34.5	1.90
NABSEN-2024-25-014	TM18.236-020	136	25.0	28.7	1.58
NABSEN-2024-25-015	MTWF5(F2)_21	143	30.0	73.6	4.06
NABSEN-2024-25-016	MTWF6(F2)_50-1	144	37.5	34.2	1.88
NABSEN-2024-25-017	MTWF6(F2)_50-7	148	27.5	54.7	3.01
NABSEN-2024-25-018	MTWF6(F3)_24	143	17.5	59.6	3.28
NABSEN-2024-25-019	MTWF6(F3)_50-11	145	30.0	37.7	2.08
NABSEN-2024-25-020	MTWF6(F4)_13-01	145	15.0	52.4	2.88
NABSEN-2024-25-021	MTWF7_19-7	125	20.0	57.0	3.14
NABSEN-2024-25-022	NB17401	144	37.5	188.5	10.38
NABSEN-2024-25-023	NB17411	141	32.5	97.5	5.37
NABSEN-2024-25-024	NB18406	140	27.5	210.9	11.62
NABSEN-2024-25-025	NB22240	143	22.5	99.7	5.49
NABSEN-2024-25-026	NB22260	143	30.0	87.2	4.80
NABSEN-2024-25-027	NYBS811-31	150	17.5	45.8	2.52
NABSEN-2024-25-028	NYBS811-33	121	25.0	41.3	2.27
NABSEN-2024-25-029	NYBS811-34	144	22.5	58.4	3.22
NABSEN-2024-25-030	NYBS811-43	150	22.5	56.2	3.09
NABSEN-2024-25-031	2011-725-02	145	10.0	24.5	1.35
NABSEN-2024-25-032	DH0214-007	138	25.0	56.0	3.09
NABSEN-2024-25-033	GHRIL0201-103	123	17.5	41.3	2.28
NABSEN-2024-25-034	MOB2549-NT074-012	143	30.0	49.0	2.70
NABSEN-2024-25-035	RIL0201-088	147	20.0	77.8	4.29
NABSEN-2024-25-036	RIL0257-01-011	147	17.5	29.9	1.64
NABSEN-2024-25-037	RIL02FL-029	139	25.0	36.3	2.00
NABSEN-2024-25-038	RIL02WI-013	144	30.0	25.4	1.40
NABSEN-2024-25-039	DH141947	151	37.5	42.2	2.32

NABSEN-2024-25-040	DH171854	144	27.5	37.0	2.04
NABSEN-2024-25-041	DH180676	139	32.5	99.4	5.47
NABSEN-2024-25-042	GN0-Vivar (DH170472)	146	32.5	41.3	2.27
NABSEN-2024-25-043	Lightning	144	25.0	75.3	4.15
NABSEN-2024-25-044	Thunder	139	27.5	31.8	1.75
NABSEN-2024-25-045	Top Shelf (DH162310)	139	30.0	46.4	2.55
NABSEN-2024-25-046	VA21BFHB-19DH0015	138	35.0	44.1	2.43
NABSEN-2024-25-047	VA21M-14	143	30.0	82.9	4.57
NABSEN-2024-25-048	VA21M-20	143	27.5	66.2	3.64
NABSEN-2024-25-049	VA22M-160	142	22.5	73.6	4.05
NABSEN-2024-25-050	VA22M-205	145	20.0	46.0	2.53
NABSEN-2024-25-051	VA22M-47	144	32.5	60.1	3.31
NABSEN-2024-25-052	Thoroughbred	138	40.0	164.7	9.07
NABSEN-2024-25-053	Hirondella	144	30.0	136.2	7.50
NABSEN-2024-25-054	Atlantic	133	25.0	49.0	2.70
NABSEN-2024-25-055	Secretariat	134	27.5	53.1	2.93
NABSEN-2024-25-056	Endeavor	145	35.0	39.0	2.15
NABSEN-2024-25-057	VA15H-73	139	7.5	18.2	1.00
NABSEN-2024-25-058	Calypso	143	17.5	57.6	3.17
NABSEN-2024-25-059	Wintmalt	139	15.0	55.1	3.04

Table 6. FHB index (DI×DS/100), DON concentration (ppm), and relative DON (RelDON) of winter barley lines evaluated at Raleigh, NC, in the 2024-25 Winter NABSEN season

Entry	Line	Index (DI*DS/100)	DON (ppm)	RelDON
NABSEN-2024-25-001	11ARS652-7	4.08	2.74	8.13
NABSEN-2024-25-002	12ARS777-2	7.15	2.84	8.41
NABSEN-2024-25-003	13ARS526-8	17.23	3.07	9.11
NABSEN-2024-25-004	16ARS622-248	7.06	1.60	4.76
NABSEN-2024-25-005	16ARS627-037	32.11	1.50	4.46
NABSEN-2024-25-006	18ARS509-4	14.18	3.36	9.97
NABSEN-2024-25-007	18ARS517-5	17.74	2.35	6.97
NABSEN-2024-25-008	2MW19_3013-004	2.00	1.36	4.03
NABSEN-2024-25-009	2MW19_3346-014	1.50	2.31	6.86
NABSEN-2024-25-010	6MW18_4374-049	5.50	2.55	7.57
NABSEN-2024-25-011	6MW19_3346-024	3.23	0.65	1.92
NABSEN-2024-25-012	TM17.167-008	7.91	1.49	4.42
NABSEN-2024-25-013	TM18.236-016	2.95	1.93	5.73
NABSEN-2024-25-014	TM18.236-020	4.55	0.43	1.26
NABSEN-2024-25-015	MTWF5(F2)_21	4.69	0.91	2.71
NABSEN-2024-25-016	MTWF6(F2)_50-1	11.54	0.47	1.39
NABSEN-2024-25-017	MTWF6(F2)_50-7	2.11	2.46	7.30
NABSEN-2024-25-018	MTWF6(F3)_24	8.86	2.95	8.74
NABSEN-2024-25-019	MTWF6(F3)_50-11	0.66	1.37	4.07
NABSEN-2024-25-020	MTWF6(F4)_13-01	1.32	0.68	2.02
NABSEN-2024-25-021	MTWF7_19-7	0.14	3.75	11.13
NABSEN-2024-25-022	NB17401	0.95	0.81	2.41
NABSEN-2024-25-023	NB17411	6.32	1.01	2.98
NABSEN-2024-25-024	NB18406	17.73	1.30	3.87
NABSEN-2024-25-025	NB22240	1.97	2.15	6.39
NABSEN-2024-25-026	NB22260	5.08	2.19	6.48
NABSEN-2024-25-027	NYBS811-31	7.72	2.25	6.68
NABSEN-2024-25-028	NYBS811-33	18.70	3.52	10.43
NABSEN-2024-25-029	NYBS811-34	11.07	2.85	8.47
NABSEN-2024-25-030	NYBS811-43	1.20	1.86	5.53
NABSEN-2024-25-031	2011-725-02	3.63	1.23	3.66
NABSEN-2024-25-032	DH0214-007	1.38	0.98	2.91
NABSEN-2024-25-033	GHRIL0201-103	3.75	1.65	4.90
NABSEN-2024-25-034	MOB2549-NT074-012	1.72	1.68	4.98
NABSEN-2024-25-035	RIL0201-088	2.09	4.11	12.18
NABSEN-2024-25-036	RIL0257-01-011	4.89	10.24	30.38
NABSEN-2024-25-037	RIL02FL-029	8.85	1.68	4.98
NABSEN-2024-25-038	RIL02WI-013	1.49	0.88	2.61
NABSEN-2024-25-039	DH141947	9.50	1.85	5.50
NABSEN-2024-25-040	DH171854	1.89	2.34	6.93

NABSEN-2024-25-041	DH180676	3.97	1.77	5.25
NABSEN-2024-25-042	GN0-Vivar (DH170472)	1.04	1.33	3.94
NABSEN-2024-25-043	Lightning	0.23	2.10	6.23
NABSEN-2024-25-044	Thunder	7.74	2.54	7.52
NABSEN-2024-25-045	Top Shelf (DH162310)	3.80	1.68	4.98
NABSEN-2024-25-046	VA21BFHB-19DH0015	2.94	1.33	3.94
NABSEN-2024-25-047	VA21M-14	3.90	1.46	4.34
NABSEN-2024-25-048	VA21M-20	1.16	1.55	4.61
NABSEN-2024-25-049	VA22M-160	4.09	2.03	6.01
NABSEN-2024-25-050	VA22M-205	1.38	1.55	4.61
NABSEN-2024-25-051	VA22M-47	3.35	2.29	6.78
NABSEN-2024-25-052	Thoroughbred	5.28	2.17	6.42
NABSEN-2024-25-053	Hirondella	12.65	6.26	18.55
NABSEN-2024-25-054	Atlantic	14.00	2.49	7.39
NABSEN-2024-25-055	Secretariat	23.39	1.82	5.39
NABSEN-2024-25-056	Endeavor	1.91	2.33	6.91
NABSEN-2024-25-057	VA15H-73	0.38	0.34	1.00
NABSEN-2024-25-058	Calypso	3.08	1.82	5.40
NABSEN-2024-25-059	Wintmalt	7.01	3.44	10.21

Table 7. DON concentration (ppm), FHB score, and relative DON (RelDON) of winter barley lines evaluated at the College Park, MD, in the 2024-25 Winter NABSEN season

Entry	Line	DON (ppm)	FHB Score	RelDON
NABSEN-2024-25-001	11ARS652-7	7.9	2	0.88
NABSEN-2024-25-002	12ARS777-2	7.3	3	0.81
NABSEN-2024-25-003	13ARS526-8	20.8	5	2.31
NABSEN-2024-25-004	16ARS622-248	6.1	2	0.68
NABSEN-2024-25-005	16ARS627-037	13.9	7	1.54
NABSEN-2024-25-006	18ARS509-4	15.6	6	1.73
NABSEN-2024-25-007	18ARS517-5	10.3	2	1.14
NABSEN-2024-25-008	2MW19_3013-004	8.8	7	0.98
NABSEN-2024-25-009	2MW19_3346-014	5.4	3	0.60
NABSEN-2024-25-010	6MW18_4374-049	9.0	4	1.00
NABSEN-2024-25-011	6MW19_3346-024	4.4	3	0.49
NABSEN-2024-25-012	TM17.167-008	9.4	3	1.04
NABSEN-2024-25-013	TM18.236-016	9.4	7	1.04
NABSEN-2024-25-014	TM18.236-020	5.7	7	0.63
NABSEN-2024-25-015	MTWF5(F2)_21	12.7	2	1.41
NABSEN-2024-25-016	MTWF6(F2)_50-1	10.3	2	1.14
NABSEN-2024-25-017	MTWF6(F2)_50-7	7.1	4	0.79
NABSEN-2024-25-018	MTWF6(F3)_24	4.2	5	0.47
NABSEN-2024-25-019	MTWF6(F3)_50-11	8.3	6	0.92
NABSEN-2024-25-020	MTWF6(F4)_13-01	9.1	4	1.01
NABSEN-2024-25-021	MTWF7_19-7	9.0	2	1.00
NABSEN-2024-25-022	NB17401	1.2	2	0.13
NABSEN-2024-25-023	NB17411	12.2	5	1.36
NABSEN-2024-25-024	NB18406	6.8	1	0.76
NABSEN-2024-25-025	NB22240	11.6	2	1.29
NABSEN-2024-25-026	NB22260	7.6	5	0.84
NABSEN-2024-25-027	NYBS811-31	16.4	1	1.82
NABSEN-2024-25-028	NYBS811-33	5.6	2	0.62
NABSEN-2024-25-029	NYBS811-34	6.7	6	0.74
NABSEN-2024-25-030	NYBS811-43	6.0	3	0.67
NABSEN-2024-25-031	2011-725-02	8.8	3	0.98
NABSEN-2024-25-032	DH0214-007	4.0	3	0.44
NABSEN-2024-25-033	GHRIL0201-103	7.0	2	0.78
NABSEN-2024-25-034	MOB2549-NT074-012	8.9	4	0.99
NABSEN-2024-25-035	RIL0201-088	10.3	3	1.14
NABSEN-2024-25-036	RIL0257-01-011	8.0	6	0.89
NABSEN-2024-25-037	RIL02FL-029	15.6	2	1.73
NABSEN-2024-25-038	RIL02WI-013	2.2	3	0.24
NABSEN-2024-25-039	DH141947	11.2	3	1.24
NABSEN-2024-25-040	DH171854	5.0	3	0.56

NABSEN-2024-25-041	DH180676	9.4	1	1.04
NABSEN-2024-25-042	GN0-Vivar (DH170472)	15.7	3	1.74
NABSEN-2024-25-043	Lightning	5.7	5	0.63
NABSEN-2024-25-044	Thunder	6.4	2	0.71
NABSEN-2024-25-045	Top Shelf (DH162310)	12.6	3	1.40
NABSEN-2024-25-046	VA21BFHB-19DH0015	10.3	7	1.14
NABSEN-2024-25-047	VA21M-14	5.2	2	0.58
NABSEN-2024-25-048	VA21M-20	12.9	3	1.43
NABSEN-2024-25-049	VA22M-160	9.0	5	1.00
NABSEN-2024-25-050	VA22M-205	5.3	2	0.59
NABSEN-2024-25-051	VA22M-47	6.2	2	0.69
NABSEN-2024-25-052	Thoroughbred	5.2	5	0.58
NABSEN-2024-25-053	Hirondella	4.2	3	0.47
NABSEN-2024-25-054	Atlantic	8.7	6	0.97
NABSEN-2024-25-055	Secretariat	11.3	7	1.26
NABSEN-2024-25-056	Endeavor	22.0	5	2.44
NABSEN-2024-25-057	VA15H-73	9.0	1	1.00
NABSEN-2024-25-058	Calypso	15.6	3	1.73
NABSEN-2024-25-059	Wintmalt	11.0	4	1.22

Table 8. Disease severity (SEV), incidence (INC), index (INX), Fusarium damaged kernels (FDK), DON concentration (ppm), and relative DON (RelDON) of winter barley lines evaluated at Lincoln, NE, in the 2024-25 Winter NABSEN season

Entry	Line	SEV (%)	INC (%)	INX (%)	FDK (%)	DON (ppm)	RelDON
NABSEN-2024-25-001	11ARS652-7	0.018	2	0.036	0.01	2.6	1.04
NABSEN-2024-25-002	12ARS777-2	0.261	1	0.261	0.02	1.0	0.40
NABSEN-2024-25-003	13ARS526-8	0.017	0.25	0.004	0.01	3.7	1.48
NABSEN-2024-25-004	16ARS622-248	0.039	0.75	0.029	0.03	1.6	0.64
NABSEN-2024-25-005	16ARS627-037	0.488	4	1.953	0.02	1.7	0.68
NABSEN-2024-25-006	18ARS509-4	0.790	2.5	1.975	0.01	7.4	2.96
NABSEN-2024-25-007	18ARS517-5	0.000	0	0.000	0.00	2.2	0.88
NABSEN-2024-25-008	2MW19_3013-004	0.444	3.67	1.627	0.03	1.0	0.40
NABSEN-2024-25-009	2MW19_3346-014	0.000	0	0.000	0.07	2.1	0.84
NABSEN-2024-25-010	6MW18_4374-049	0.000	0	0.000	0.06	2.9	1.16
NABSEN-2024-25-011	6MW19_3346-024	0.025	0.33	0.008	0.03	1.4	0.56
NABSEN-2024-25-012	TM17.167-008	0.547	4	2.186	0.05	3.0	1.20
NABSEN-2024-25-013	TM18.236-016	0.163	1.33	0.217	0.01	1.6	0.64
NABSEN-2024-25-014	TM18.236-020	0.630	4	2.520	0.05	2.2	0.88
NABSEN-2024-25-015	MTWF5(F2)_21	0.413	1.33	0.550	0.01	3.0	1.20
NABSEN-2024-25-016	MTWF6(F2)_50-1	0.188	3.33	0.625	0.11	0.2	0.08
NABSEN-2024-25-017	MTWF6(F2)_50-7	0.200	0.33	0.067	0.03	0.9	0.36
NABSEN-2024-25-018	MTWF6(F3)_24	0.520	4.75	2.472	0.00	4.1	1.64
NABSEN-2024-25-019	MTWF6(F3)_50-11	0.272	1.5	0.408	0.04	1.6	0.64
NABSEN-2024-25-020	MTWF6(F4)_13-01	0.000	0	0.000	0.05	4.6	1.84
NABSEN-2024-25-021	MTWF7_19-7	0.177	2.25	0.398	0.03	2.2	0.88
NABSEN-2024-25-022	NB17401	0.334	5.25	1.755	0.03	0.7	0.28
NABSEN-2024-25-023	NB17411	0.456	4.75	2.165	0.02	3.7	1.48
NABSEN-2024-25-024	NB18406	0.083	1.25	0.104	0.02	1.5	0.60
NABSEN-2024-25-025	NB22240	0.167	0.75	0.125	0.05	5.3	2.12
NABSEN-2024-25-026	NB22260	0.279	4	1.116	0.00	3.2	1.28
NABSEN-2024-25-027	NYBS811-31	0.033	1	0.033	0.03	2.5	1.00
NABSEN-2024-25-028	NYBS811-33	0.000	0	0.000	0.03	3.4	1.36
NABSEN-2024-25-029	NYBS811-34	0.017	1	0.017	-	-	-
NABSEN-2024-25-030	NYBS811-43	0.033	0.25	0.008	0.01	3.2	1.28
NABSEN-2024-25-031	2011-725-02	0.269	3	0.807	0.08	2.7	1.08
NABSEN-2024-25-032	DH0214-007	0.063	2.5	0.158	0.02	5.4	2.16
NABSEN-2024-25-033	GHRIL0201-103	0.000	0	0.000	0.00	2.2	0.88
NABSEN-2024-25-034	MOB2549-NT074-012	0.540	5.75	3.104	0.01	1.4	0.56
NABSEN-2024-25-035	RIL0201-088	0.000	0	0.000	0.03	6.0	2.40
NABSEN-2024-25-036	RIL0257-01-011	0.263	3.5	0.919	0.08	2.1	0.84
NABSEN-2024-25-037	RIL02FL-029	0.303	1.75	0.531	0.03	4.4	1.76
NABSEN-2024-25-038	RIL02WI-013	0.048	3.5	0.167	0.04	2.0	0.80
NABSEN-2024-25-039	DH141947	0.017	0.5	0.008	0.07	5.2	2.08

NABSEN-2024-25-040	DH171854	0.283	3.25	0.921	0.06	4.1	1.64
NABSEN-2024-25-041	DH180676	0.245	4	0.982	0.06	3.0	1.20
NABSEN-2024-25-042	GN0-Vivar (DH170472)	0.429	3.25	1.393	0.08	3.8	1.52
NABSEN-2024-25-043	Lightning	0.120	2.25	0.270	0.02	3.0	1.20
NABSEN-2024-25-044	Thunder	0.699	4.25	2.973	0.12	5.3	2.12
NABSEN-2024-25-045	Top Shelf (DH162310)	0.524	3.5	1.836	0.09	5.0	2.00
NABSEN-2024-25-046	VA21BFHB-19DH0015	0.227	1.25	0.283	0.10	10.7	4.28
NABSEN-2024-25-047	VA21M-14	0.017	0.75	0.013	0.07	11.3	4.52
NABSEN-2024-25-048	VA21M-20	0.050	2	0.100	0.01	7.8	3.12
NABSEN-2024-25-049	VA22M-160	0.100	1	0.100	0.04	5.8	2.32
NABSEN-2024-25-050	VA22M-205	0.174	2.5	0.435	0.08	4.7	1.88
NABSEN-2024-25-051	VA22M-47	0.254	4.25	1.081	0.00	7.8	3.12
NABSEN-2024-25-052	Thoroughbred	0.381	4.5	1.713	0.07	2.2	0.88
NABSEN-2024-25-053	Hirondella	0.097	2.25	0.218	0.03	17.8	7.12
NABSEN-2024-25-054	Atlantic	0.248	3.75	0.931	0.06	15.6	6.24
NABSEN-2024-25-055	Secretariat	0.563	4	2.250	0.05	8.9	3.56
NABSEN-2024-25-056	Endeavor	0.564	4.25	2.397	0.06	2.8	1.12
NABSEN-2024-25-057	VA15H-73	0.273	4.25	1.160	0.09	2.5	1.00
NABSEN-2024-25-058	Calypso	0.233	2	0.467	0.01	10.6	4.24
NABSEN-2024-25-059	Wintmalt	0.435	2.75	1.196	0.05	5.4	2.16

Table 9. DON concentration (ppm) and relative DON (RelDON) of winter barley lines evaluated at Blacksburg, VA, in the 2024-25 Winter NABSEN season

Entry	Line	†DON (ppm)	RelDON
NABSEN-2024-25-001	11ARS652-7	6.52	4.94
NABSEN-2024-25-002	12ARS777-2	4.04	3.06
NABSEN-2024-25-003	13ARS526-8	3.32	2.52
NABSEN-2024-25-004	16ARS622-248	3.82	2.89
NABSEN-2024-25-005	16ARS627-037	3.82	2.89
NABSEN-2024-25-006	18ARS509-4	5.48	4.15
NABSEN-2024-25-007	18ARS517-5	6.56	4.97
NABSEN-2024-25-008	2MW19_3013-004	4.38	3.32
NABSEN-2024-25-009	2MW19_3346-014	4.34	3.29
NABSEN-2024-25-010	6MW18_4374-049	3.56	2.70
NABSEN-2024-25-011	6MW19_3346-024	2.08	1.58
NABSEN-2024-25-012	TM17.167-008	6.06	4.59
NABSEN-2024-25-013	TM18.236-016	4.78	3.62
NABSEN-2024-25-014	TM18.236-020	2.10	1.59
NABSEN-2024-25-015	MTWF5(F2)_21	1.72	1.30
NABSEN-2024-25-016	MTWF6(F2)_50-1	1.62	1.23
NABSEN-2024-25-017	MTWF6(F2)_50-7	3.12	2.36
NABSEN-2024-25-018	MTWF6(F3)_24	2.98	2.26
NABSEN-2024-25-019	MTWF6(F3)_50-11	4.54	3.44
NABSEN-2024-25-020	MTWF6(F4)_13-01	4.40	3.33
NABSEN-2024-25-021	MTWF7_19-7	11.60	8.79
NABSEN-2024-25-022	NB17401	6.10	4.62
NABSEN-2024-25-023	NB17411	4.78	3.62
NABSEN-2024-25-024	NB18406	4.56	3.45
NABSEN-2024-25-025	NB22240	4.62	3.50
NABSEN-2024-25-026	NB22260	5.24	3.97
NABSEN-2024-25-027	NYBS811-31	5.70	4.32
NABSEN-2024-25-028	NYBS811-33	4.42	3.35
NABSEN-2024-25-029	NYBS811-34	7.88	5.97
NABSEN-2024-25-030	NYBS811-43	3.88	2.94
NABSEN-2024-25-031	2011-725-02	2.42	1.83
NABSEN-2024-25-032	DH0214-007	3.32	2.52
NABSEN-2024-25-033	GHRIL0201-103	10.50	7.95
NABSEN-2024-25-034	MOB2549-NT074-012	5.92	4.48
NABSEN-2024-25-035	RIL0201-088	6.70	5.08
NABSEN-2024-25-036	RIL0257-01-011	4.80	3.64
NABSEN-2024-25-037	RIL02FL-029	4.08	3.09
NABSEN-2024-25-038	RIL02WI-013	5.14	3.89
NABSEN-2024-25-039	DH141947	5.26	3.98
NABSEN-2024-25-040	DH171854	1.74	1.32
NABSEN-2024-25-041	DH180676	2.24	1.70

NABSEN-2024-25-042	GN0-Vivar (DH170472)	3.66	2.77
NABSEN-2024-25-043	Lightning	4.02	3.05
NABSEN-2024-25-044	Thunder	4.72	3.58
NABSEN-2024-25-045	Top Shelf (DH162310)	1.90	1.44
NABSEN-2024-25-046	VA21BFHB-19DH0015	1.72	1.30
NABSEN-2024-25-047	VA21M-14	4.22	3.20
NABSEN-2024-25-048	VA21M-20	6.52	4.94
NABSEN-2024-25-049	VA22M-160	7.38	5.59
NABSEN-2024-25-050	VA22M-205	3.92	2.97
NABSEN-2024-25-051	VA22M-47	2.78	2.11
NABSEN-2024-25-052	Thoroughbred	3.00	2.27
NABSEN-2024-25-053	Hirondella	6.24	4.73
NABSEN-2024-25-054	Atlantic	6.60	5.00
NABSEN-2024-25-055	Secretariat	4.92	3.73
NABSEN-2024-25-056	Endeavor	4.72	3.58
NABSEN-2024-25-057	VA15H-73	1.32	1.00
NABSEN-2024-25-058	Calypso	3.22	2.44
NABSEN-2024-25-059	Wintmalt	4.24	3.21

Table 10. Rankings of 12 lines based on DON levels (lowest DON = rank 1) across seven environments from 2021-22 through 2024-25

Line	OH 2021- 22	VA 2021- 22	OH 2022- 23	VA 2022- 23	NY 2023- 24	NY 2024- 25	OH 2024- 25	Avg rank
VA15H-73	1	1	1.0	1.0	1	1	1	1.0
RIL02FL-029	10	2	2.0	4.0	2	4	2	3.7
2011-725-02	7	5	7.0	6.0	3	2	6	5.1
Endeavor	3	8	4.0	7.0	5	5	5	5.3
Calypso	4	3	8.0	8.0	4	9	9	6.4
Thunder	8	10	3.0	3.0	12	3	7	6.6
Secretariat	2	4	10.0	10.0	10	7	4	6.7
Atlantic	6	7	11.0	12.0	7	6	3	7.4
Thoroughbred	5	6	5.5	9.0	9	12	8	7.8
Wintmalt	11	11	5.5	2.0	8	8	10	7.9
Lightning	9	9	12.0	5.0	6	10	11	8.9
Hirondella	12	12	9.0	11.0	11	11	12	11.1

Table 11a. Correlation between NY 2024-25 DON and DON from each prior location-year

Location-year	r	p	R²	Significance
OH 2021-22	0.446	0.146	0.199	Not significant
VA 2021-22	0.474	0.120	0.225	Not significant
OH 2022-23	0.444	0.149	0.197	Not significant
VA 2022-23	0.563	0.057	0.317	Not significant
NY 2023-24	0.488	0.108	0.238	Not significant
OH 2024-25	0.570	0.053	0.325	Not significant

Table 11b. Correlation between OH 2024-25 DON and DON from each prior location-year

Location-year	r	p	R²	Significance
OH 2021-22	0.684	0.014	0.467	Significant
VA 2021-22	0.756	0.005	0.571	Significant
OH 2022-23	0.572	0.052	0.327	Not significant
VA 2022-23	0.284	0.371	0.081	Not significant
NY 2023-24	0.605	0.037	0.366	Significant