

2018

**NORTH AMERICAN BARLEY SCAB EVALUATION NURSERY
(NABSEN) REPORT**

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INTRODUCTION

The 2018 North American Barley Scab Evaluation Nursery (NABSEN) was grown at Fargo, Langdon, and Casselton, ND; St. Paul and Crookston MN, and Brandon, Manitoba. Nurseries either were misted or unmisted (dryland). Dryland nurseries provide conditions similar to those found in commercial fields. Disease in misted fields was more severe than growers would observe in most years and entries with only moderate FHB resistance may have higher disease levels. Dryland nurseries allow discrimination of entries with moderate to low levels of FHB resistance. Each nursery included a set of common checks. The checks were Chevron, Quest and ND20493 (resistant six-row checks), Robust and Stander (susceptible six-row checks), and Conlon (resistant two-row check). At all locations percent severity of FHB was determined around the middle dough stage by determining the ratio of infected kernels to total kernels on 10-20 spikes per entry, and then multiplying by 100.

RESULTS

There was no FHB disease severity taken at Casselton and Osnabrock dryland nurseries. FHB disease severity levels were moderate to high at all locations in 2018. DON levels were highest in Fargo and Brandon, moderate at Langdon, Crookston and St. Paul and moderately low at Osnabrock and Casselton the two-dryland locations (Table 4). HB635, HB562, 2ND32829, 2ND33710 and BM1004-156 had the lowest DON levels in the misted trials.

Temperatures were above the 30-year average (Table. 6), for May and June and near average for July and August at all locations except Casselton; was below the average in August.

Precipitation were below the 30-year average at all locations May and near average for Casselton and St. Paul in June and above average for Fargo, Langdon and Crookston, MN. Langdon and Casselton had below average rainfall in July while the other locations were near the average. August precipitation was below the average for Langdon, St. Paul and Crookston and slightly above average for Fargo and Casselton, ND (Table 7).

Site details are as follows:

Fargo, & Langdon ND – Robert Brueggeman and Patrick Gross

- Misted
- Inoculated by grain spawn method
- 3 Replicates
- Disease severity - percentage of infected kernels
- Disease incidence - percentage of infected heads
- DON content (ppm) measured by GC/ECD by P. Schwarz, NDSU on a composite sample of 3 replicates
- Day to heading counted from date planted to 50% of heads emerged 50%

Osnabrock, ND – Richard Horsley

- Dryland
- 3 Replicates
- Disease incidence or severity – none taken
- DON content (ppm) measured by GC/ECD by P. Schwarz, NDSU on a composite sample of 3 replicates

Casselton, ND – Marie Timmerman and Austin Case

- Dryland
- 3 replicates
- Disease incidence or severity – none taken
- DON content (ppm) measured by GC/ECD by P. Schwarz, NDSU on a composite sample of 3 replicates

ST. PAUL & CROOKSTON, MN– Kevin Smith and Ruth Dill-Macky

- Misted (Crookston and St. Paul))
- Inoculated by grain spawn method
- Disease severity - percentage of infected kernels
- DON content (ppm) measured by GC/ECD by P. Schwarz, NDSU on a composite sample of 3 replicates (no DON data for St. Paul)
- Day to heading counted from date planted to 50% of heads emerged 50%

BRANDON, MANITOBA – Ana Badea and James Tucker

- Misted
- 4 replicates RCB design
- Disease severity - percentage of infected kernels
- Disease incidence - percentage of infected heads
- Day to heading counted from date planted to 80% of heads emerged 50%
- DON content (ppm) measured by ELISA technique at ECORC, Ottawa on a composite sample of 4 replicates

TABLE OF CONTENTS

Table 1. Mean FHB severity of entries grown in the 2018 NABSEN Nursery at five locations.....	6-7
Table 2. Mean disease incidence of entries grown in the 2018 NABSEN Nursery at three locations.....	8-9
Table 3. Mean days to heading after planting of entries grown in 2018 NABSEN Nursery at five locations.....	10-11
Table 4. Mean for DON (ppm) entries grown in 2018 NABSEN Nursery at seven locations.....	12-13
Table 5. Average means of heading date, FHB incidence, FHB severity and DON content.....	14-15
Table 6. Temperature (°F) compared to the 30-year average.....	16
Table 7. Rainfall (in.) compared to the 30-year average.....	16
Table 8. Correlation among locations for DON content.	17
Table 9. Pedigree and source of breeding lines tested for FHB resistance in 2018.....	18-19

Table 1. Mean FHB severity of entries grown in the 2018 NABSEN Nursery at five locations.

LABEL	Fargo	Langdon	Brandon	St. Paul	Crookston	mean
ND32889	34.6	38.4	7.8	43.3	58.2	36.5
ND32898	33.2	37.1	10.7	37.0	20.2	27.7
ND32920	31.0	31.6	6.4	35.3	55.7	32.0
ND34118	37.3	34.3	11.2	44.2	41.7	33.7
ND34318	30.1	27.6	7.1	32.5	34.2	26.3
ND35204	33.8	36.1	13.3	43.5	41.7	33.7
ND35207	28.6	40.0	8.5	50.8	53.0	36.2
ND35210	48.2	39.4	18.4	50.5	42.7	39.8
2ND32529	14.4	13.4	4.5	36.2	32.5	20.2
2ND32657	14.4	18.7	4.4	42.0	38.8	23.7
2ND32829	15.1	21.2	0.8	30.3	47.2	22.9
2ND33710	11.9	12.6	7.6	36.8	25.7	18.9
2ND33821	12.2	16.6	5.5	21.3	19.3	15.0
2ND34634	10.5	8.2	5.1	22.8	11.3	11.6
2ND34697	19.5	20.7	5.8	51.0	37.0	26.8
2ND34954	20.3	13.5	5.2	33.8	25.0	19.6
S2M168 (MS12_4151-004)	25.6	30.0	20.5	21.5	24.8	24.5
S6M175 (Gen10-144)	31.7	30.8	9.8	48.7	33.4	30.9
S6M176 (KLBC4-130i-KK)	31.6	28.6	8.6	43.8	37.5	30.0
S2M177 (TM14.013-41)	38.1	34.6	4.3	36.3	41.8	31.0
S2M178 (TM14.030-7)	26.5	32.9	17.5	20.7	26.2	24.7
S2M179 (TM15.002-12)	19.6	14.7	6.1	33.2	45.5	23.8
TM15.204-33	17.3	20.3	5.9	39.0	63.5	29.2
2MS16_4196-017	13.4	13.7	5.1	21.3	14.3	13.6
2B11-4949	16.7	15.5	8.4	48.0	11.8	20.1
2B13-6991	17.2	11.4	7.5	30.5	17.3	16.8

Table 1. cont: Mean FHB severity of entries grown in the 2018 NABSEN Nursery at five locations.

LABEL	Fargo	Langdon	Brandon	St. Paul	Crookston	mean
2IM14-7765	7.9	14.0	10.6	31.0	9.8	14.7
2IM14-7813	14.5	18.3	7.3	24.8	10.0	15.0
2IM14-7830	17.3	23.7	12.8	46.0	23.0	24.6
2IM14-8212	22.5	17.4	5.5	46.0	33.0	24.9
2IK14-8371	13.5	14.8	15.5	35.7	15.2	18.9
2IK14-8413	17.1	15.2	8.8	37.3	16.5	19.0
BM1004-156	11.9	9.3	3.4	18.8	7.3	10.1
BM1132-049	10.7	16.6	3.4	30.0	24.7	17.1
TR18262	10.0	15.1	3.0	32.3	9.0	13.9
BM0939-078	18.0	18.5	5.7	26.5	10.2	15.8
HB635 (FB487)	10.9	10.5	2.2	33.5	31.8	17.8
HB562	15.1	25.9	13.3	17.5	6.5	15.7
TR18644	11.6	14.2	2.7	29.8	25.7	16.8
TR18647	11.2	15.7	4.1	22.7	18.0	14.3
TR18170	8.4	13.0	8.2	30.0	7.7	13.5
TR18171	5.6	11.6	5.7	30.3	10.0	12.6
TR18172	15.3	12.5	5.3	32.8	13.8	16.0
TR18173	7.8	8.5	3.3	19.7	5.3	8.9
QUEST	17.0	17.6	3.2	37.7	20.7	19.2
Conlon	15.0	24.7	2.3	44.5	35.3	24.4
ND20493	24.8	29.8	4.2	27.8	57.7	28.9
Robust	29.6	27.8	10.2	22.3	17.8	21.6
Chevron	2.3	3.9	0.8	12.2	2.7	4.4
Stander	26.2	32.2	16.5	38.9	23.5	27.5

Table 2. Mean disease incidence of entries grown in the 2018 NABSEN Nursery at three locations.

LABEL	Fargo	Langdon	Brandon	mean
ND32889	100.0	100.0	80.0	93.3
ND32898	100.0	100.0	82.5	94.2
ND32920	100.0	100.0	72.5	90.8
ND34118	100.0	100.0	85.0	95.0
ND34318	100.0	100.0	65.0	88.3
ND35204	100.0	100.0	100.0	100.0
ND35207	100.0	100.0	75.0	91.7
ND35210	100.0	100.0	97.5	99.2
2ND32529	90.0	96.7	67.5	84.7
2ND32657	96.7	90.0	70.0	85.6
2ND32829	96.7	100.0	25.0	73.9
2ND33710	90.0	76.7	70.0	78.9
2ND33821	96.7	93.3	57.5	82.5
2ND34634	73.3	80.0	65.0	72.8
2ND34697	96.7	96.7	75.0	89.4
2ND34954	93.3	93.3	62.5	83.1
S2M168 (MS12_4151-004)	90.0	100.0	100.0	96.7
S6M175 (Gen10-144)	100.0	100.0	95.0	98.3
S6M176 (KLBC4-130i-KK)	100.0	100.0	87.5	95.8
S2M177 (TM14.013-41)	100.0	100.0	60.0	86.7
S2M178 (TM14.030-7)	100.0	100.0	87.5	95.8
S2M179 (TM15.002-12)	100.0	100.0	80.0	93.3
TM15.204-33	100.0	93.3	62.5	85.3
2MS16_4196-017	93.3	90.0	72.5	85.3
2B11-4949	100.0	100.0	72.5	90.8
2B13-6991	93.3	93.3	80.0	88.9

Table 2. cont: Mean disease incidence of entries grown in the 2018 NABSEN Nursery at three locations.

LABEL	Fargo	Langdon	Brandon	mean
2IM14-7765	83.3	96.7	80.0	86.7
2IM14-7813	93.3	96.7	85.0	91.7
2IM14-7830	93.3	100.0	90.0	94.4
2IM14-8212	86.7	93.3	77.5	85.8
2IK14-8371	93.3	96.7	87.5	92.5
2IK14-8413	90.0	100.0	77.5	89.2
BM1004-156	70.0	83.3	57.5	70.3
BM1132-049	96.7	100.0	47.5	81.4
TR18262	93.3	100.0	65.0	86.1
BM0939-078	86.7	100.0	55.0	80.6
HB635 (FB487)	96.7	90.0	55.0	80.6
HB562	100.0	100.0	87.5	95.8
TR18644	93.3	96.7	55.0	81.7
TR18647	100.0	96.7	62.5	86.4
TR18170	70.0	96.7	77.5	81.4
TR18171	70.0	100.0	60.0	76.7
TR18172	93.3	93.3	70.0	85.6
TR18173	90.0	86.7	42.5	73.1
QUEST	93.3	100.0	70.0	87.8
Conlon	100.0	100.0	45.0	81.7
ND20493	100.0	100.0	60.0	86.7
Robust	100.0	100.0	87.5	95.8
Chevron	46.7	76.7	22.5	48.6
Stander	100.0	100.0	97.5	99.2

Table 3. Mean days to heading after planting of entries grown in 2018 NABSEN Nursery at five locations.

LABEL	Fargo	Langdon	Brandon ¹	St. Paul	Crookston	mean
ND32889	58.0	44.7	48.3	42.3	43.3	47.3
ND32898	59.3	46.8	49.5	44.3	43.3	48.7

ND32920	58.0	46.0	49.5	42.7	44.3	48.1
ND34118	58.3	45.5	49.5	42.7	44.3	48.1
ND34318	58.3	45.3	49.8	42.7	43.7	47.9
ND35204	57.3	45.3	51.0	42.7	46.0	48.5
ND35207	57.7	45.8	49.0	42.3	45.3	48.0
ND35210	57.3	45.5	50.3	42.7	43.7	47.9
2ND32529	59.7	47.0	51.5	44.0	43.7	49.2
2ND32657	57.7	46.5	50.8	43.0	43.7	48.3
2ND32829	56.7	44.8	47.0	42.7	43.3	46.9
2ND33710	57.7	44.5	51.3	45.3	44.7	48.7
2ND33821	59.3	46.3	50.3	45.0	43.3	48.8
2ND34634	60.3	47.3	51.0	49.0	44.7	50.5
2ND34697	59.0	46.5	50.5	42.3	42.3	48.1
2ND34954	58.0	44.3	50.0	45.7	43.7	48.3
S2M168 (MS12_4151-004)	61.3	49.0	53.8	51.0	46.7	52.4
S6M175 (Gen10-144)	58.3	48.0	51.3	43.7	44.7	49.2
S6M176 (KLBC4-130i-KK)	58.3	48.0	50.5	45.0	46.0	49.6
S2M177 (TM14.013-41)	58.0	48.8	50.0	45.0	44.7	49.3
S2M178 (TM14.030-7)	59.3	49.5	52.3	49.3	47.7	51.6
S2M179 (TM15.002-12)	59.3	48.8	53.0	45.0	45.0	50.2
TM15.204-33	56.3	45.5	47.3	43.7	44.7	47.5
2MS16_4196-017	60.7	46.5	51.8	49.3	47.0	51.1
2B11-4949	61.7	49.3	57.3	48.3	48.0	52.9
2B13-6991	60.0	48.8	50.8	46.7	47.3	50.7

¹Day to heading counted from date planted to 80% of heads emerged 50%; other locations 50% heads emerged 50%

Table 3 cont. Mean days to heading after planting of entries grown in 2018 NABSEN Nursery at five locations.

LABEL	Fargo	Langdon	Brandon ¹	St. Paul	Crookston	mean
2IM14-7765	63.7	51.3	56.8	50.7	49.0	54.3
2IM14-7813	61.0	49.3	51.0	47.7	49.0	51.6

2IM14-7830	60.7	48.8	51.8	46.7	48.0	51.2
2IM14-8212	61.0	48.5	52.0	46.3	46.3	50.8
2IK14-8371	62.0	49.0	52.8	48.0	47.7	51.9
2IK14-8413	61.0	48.3	51.3	46.3	46.7	50.7
BM1004-156	64.3	51.3	60.3	51.0	49.3	55.2
BM1132-049	62.0	50.0	54.8	47.3	48.0	52.4
TR18262	62.7	49.3	56.0	50.3	51.0	53.9
BM0939-078	62.3	50.0	59.8	49.0	47.7	53.8
HB635 (FB487)	60.3	47.5	54.0	44.7	48.0	50.9
HB562	61.7	49.0	57.0	50.7	50.0	53.7
TR18644	58.3	46.5	52.0	44.7	44.3	49.2
TR18647	62.0	49.8	55.8	47.7	49.7	53.0
TR18170	65.0	50.5	56.3	51.0	48.7	54.3
TR18171	64.0	50.8	55.8	49.3	49.0	53.8
TR18172	62.3	49.8	53.8	47.0	48.0	52.2
TR18173	64.3	51.5	62.8	51.3	51.0	56.2
QUEST	58.7	50.3	54.0	45.0	44.7	50.5
Conlon	57.0	45.3	47.0	42.3	44.0	47.1
ND20493	56.7	45.5	49.0	42.3	42.0	47.1
Robust	60.0	48.8	54.8	46.3	45.7	51.1
Chevron	63.3	50.8	57.0	51.0	49.3	54.3
Stander	61.0	49.0	55.3	45.0	45.0	51.1

¹Day to heading counted from date planted to 80% of heads emerged 50%; other locations 50% heads emerged 50%

Table 4. Mean for DON (ppm) entries grown in 2018 NABSEN Nursery at seven locations.

LABEL	Misted					mean	Non-misted		mean
	Fargo	Langdon	Brandon	Crookston	St. Paul		Osnabrock	Casselton	
ND32889	32.6	11.3	27.2	7.5	1.2	16.0	0.8	0.2	0.5
ND32898	45.2	16.1	47.2	19.7	10.8	27.8	0.9	0.2	0.6

ND32920	26.7	12.9	29.2	11.7	7.1	17.5	0.6	0.6	0.6
ND34118	28.3	24.6	42.4	10.5	7.3	22.6	0.4	0.6	0.5
ND34318	28.0	12.8	25.4	6.2	7.1	15.9	0.3	0.3	0.3
ND35204	37.3	9.7	32.2	23.2	7.0	21.9	0.2	0.3	0.3
ND35207	34.3	25.5	42.0	9.5	13.2	24.9	0.4	0.3	0.3
ND35210	34.2	13.7	37.3	13.1	14.2	22.5	0.5	0.1	0.3
2ND32529	20.7	3.1	13.2	3.4	2.7	8.6	0.1	0.3	0.2
2ND32657	19.9	5.7	24.0	6.7	10.8	13.4	0.1	0.6	0.4
2ND32829	9.9	3.1	8.7	3.3	3.6	5.7	0.3	0.1	0.2
2ND33710	11.3	2.4	11.6	3.1	2.3	6.1	0.3	0.3	0.3
2ND33821	19.0	5.4	12.2	5.5	2.0	8.8	0.1	0.3	0.2
2ND34634	21.9	3.0	20.8	12.7	4.4	12.6	0.5	0.2	0.4
2ND34697	27.8	4.8	20.0	13.1	10.2	15.2	0.1	0.4	0.3
2ND34954	24.1	4.0	13.2	2.1	3.7	9.4	0.3	0.4	0.3
S2M168 (MS12_4151-004)	27.0	7.0	32.3	9.2	2.5	15.6	1.0	0.6	0.8
S6M175 (Gen10-144)	29.6	9.7	34.5	16.4	4.6	19.0	0.5	0.6	0.6
S6M176 (KLBC4-130i-KK)	29.1	6.0	33.0	15.8	6.1	18.0	0.4	0.8	0.6
S2M177 (TM14.013-41)	15.4	6.0	17.2	8.0	6.3	10.6	0.1	0.2	0.2
S2M178 (TM14.030-7)	32.1	4.4	18.7	9.3	1.1	13.1	0.5	0.4	0.5
S2M179 (TM15.002-12)	18.5	3.2	15.5	5.7	1.0	8.8	0.3	0.3	0.3
TM15.204-33	26.3	3.6	22.6	4.9	3.5	12.2	0.7	0.2	0.4
2MS16_4196-017	30.9	5.9	12.4	5.8	2.0	11.4	0.1	0.2	0.2
2B11-4949	22.3	3.5	21.4	4.9	2.1	10.8	0.1	0.7	0.4
2B13-6991	29.1	4.6	23.0	3.2	4.0	12.8	0.1	0.2	0.1

Table 4. cont. Mean for DON (ppm) entries grown in 2018 NABSEN Nursery at seven locations.

LABEL	Misted					mean	Non-misted		mean
	Fargo	Langdon	Brandon	Crookston	St. Paul		Osnabrock	Casselton	
2IM14-7765	13.1	1.5	30.9	5.4	0.8	10.4	0.0	0.5	0.3
2IM14-7813	31.1	4.1	18.1	9.3	4.6	13.4	0.0	0.4	0.2
2IM14-7830	29.9	5.4	24.2	14.2	3.3	15.4	0.3	0.7	0.5

2IM14-8212	26.4	4.1	21.7	9.8	7.4	13.9	0.3	0.5	0.4
2IK14-8371	29.3	6.1	23.4	5.7	1.3	13.2	0.5	1.0	0.7
2IK14-8413	23.0	4.5	30.8	3.4	0.7	12.5	0.2	0.4	0.3
BM1004-156	15.4	2.4	8.8	2.8	0.9	6.0	0.0	0.5	0.3
BM1132-049	16.7	2.8	6.1	5.8	0.4	6.4	0.0	0.3	0.2
TR18262	19.1	2.0	6.8	3.7	1.5	6.6	0.0	0.3	0.2
BM0939-078	24.1	4.1	13.1	8.9	1.8	10.4	0.4	0.6	0.5
HB635 (FB487)	8.3	0.7	4.8	1.4	1.5	3.3	0.0	0.2	0.1
HB562	8.8	2.2	14.8	0.9	0.2	5.4	0.0	0.1	0.0
TR18644	16.0	2.3	10.9	3.5	3.1	7.2	0.1	0.4	0.2
TR18647	18.0	1.4	10.4	3.7	1.9	7.1	0.1	0.5	0.3
TR18170	18.2	2.0	17.7	3.0	0.4	8.3	0.5	0.7	0.6
TR18171	18.7	3.9	11.4	6.8	1.7	8.5	0.0	0.5	0.3
TR18172	27.0	3.6	10.3	3.3	1.2	9.1	0.3	0.8	0.5
TR18173	29.9	4.7	13.2	7.6	0.4	11.2	0.1	0.6	0.3
QUEST	17.0	4.8	13.7	12.5	1.6	9.9	0.4	0.1	0.2
Conlon	17.7	3.2	8.8	2.5	2.7	7.0	0.2	0.2	0.2
ND20493	16.7	8.1	16.3	9.2	1.4	10.4	0.3	0.3	0.3
Robust	43.1	7.7	23.8	11.7	5.2	18.3	0.3	1.1	0.7
Chevron	11.7	2.2	2.5	1.4	0.7	3.7	0.0	0.4	0.2
Stander	38.7	14.3	35.6	13.7	8.0	22.1	0.5	0.4	0.5

Table 5. Average means of Heading date, FHB Incidence, FHB severity and DON content.

	Day to ¹	FHB ²	FHB ³	Misted ⁴	Non-misted ⁴
Line	Heading	Incidence	Severity	DON Mean	DON Mean
ND32889	47.3	93.3	36.5	16.0	0.5
ND32898	48.7	94.2	27.7	27.8	0.6
ND32920	48.1	90.8	32.0	17.5	0.6
ND34118	48.1	95.0	33.7	22.6	0.5
ND34318	47.9	88.3	26.3	15.9	0.3

ND35204	48.5	100.0	33.7	21.9	0.3
ND35207	48.0	91.7	36.2	24.9	0.3
ND35210	47.9	99.2	39.8	22.5	0.3
2ND32529	49.2	84.7	20.2	8.6	0.2
2ND32657	48.3	85.6	23.7	13.4	0.4
2ND32829	46.9	73.9	22.9	5.7	0.2
2ND33710	48.7	78.9	18.9	6.1	0.3
2ND33821	48.8	82.5	15.0	8.8	0.2
2ND34634	50.5	72.8	11.6	12.6	0.4
2ND34697	48.1	89.4	26.8	15.2	0.3
2ND34954	48.3	83.1	19.6	9.4	0.3
S2M168 (MS12_4151-004)	52.4	96.7	24.5	15.6	0.8
S6M175 (Gen10-144)	49.2	98.3	30.9	19.0	0.6
S6M176 (KLBC4-130i-KK)	49.6	95.8	30.0	18.0	0.6
S2M177 (TM14.013-41)	49.3	86.7	31.0	10.6	0.2
S2M178 (TM14.030-7)	51.6	95.8	24.7	13.1	0.5
S2M179 (TM15.002-12)	50.2	93.3	23.8	8.8	0.3
TM15.204-33	47.5	85.3	29.2	12.2	0.4
2MS16_4196-017	51.1	85.3	13.6	11.4	0.2
2B11-4949	52.9	90.8	20.1	10.8	0.4
2B13-6991	50.7	88.9	16.8	12.8	0.1

¹Date from planting when 50% of heads 50% emerged at five locations.

²FHB incidence means at three locations.

³FHB severity means at five locations.

⁴DON content means at five locations for misted and two for dryland.

Table 5. cont. Average means of Heading date, FHB Incidence, FHB severity and DON content.

	Day to ¹	FHB ²	FHB ³	Misted ⁴	Non-misted ⁴
Line	Heading	Incidence	Severity	DON Mean	DON Mean
2IM14-7765	54.3	86.7	14.7	10.4	0.3
2IM14-7813	51.6	91.7	15.0	13.4	0.2
2IM14-7830	51.2	94.4	24.6	15.4	0.5
2IM14-8212	50.8	85.8	24.9	13.9	0.4
2IK14-8371	51.9	92.5	18.9	13.2	0.7
2IK14-8413	50.7	89.2	19.0	12.5	0.3

BM1004-156	55.2	70.3	10.1	6.0	0.3
BM1132-049	52.4	81.4	17.1	6.4	0.2
TR18262	53.9	86.1	13.9	6.6	0.2
BM0939-078	53.8	80.6	15.8	10.4	0.5
HB635 (FB487)	50.9	80.6	17.8	3.3	0.1
HB562	53.7	95.8	15.7	5.4	0.0
TR18644	49.2	81.7	16.8	7.2	0.2
TR18647	53.0	86.4	14.3	7.1	0.3
TR18170	54.3	81.4	13.5	8.3	0.6
TR18171	53.8	76.7	12.6	8.5	0.3
TR18172	52.2	85.6	16.0	9.1	0.5
TR18173	56.2	73.1	8.9	11.2	0.3
QUEST	50.5	87.8	19.2	9.9	0.2
Conlon	47.1	81.7	24.4	7.0	0.2
ND20493	47.1	86.7	28.9	10.4	0.3
Robust	51.1	95.8	21.6	18.3	0.7
Chevron	54.3	48.6	4.4	3.7	0.2
Stander	51.1	99.2	27.5	22.1	0.5

¹Date from planting when 50% of heads 50% emerged at five locations.

²FHB incidence means at three locations.

³FHB severity means at five locations.

⁴DON content means at five locations for misted and two for dryland.

Table 6. Temperature (°F) compared to the 30-year average 2018.

Location	May	June	July	August
Fargo, ND	+7	+2	0	-1
Langdon, ND	+6	+4	0	0
Casselton, ND	+6	+3	0	-2
St. Paul, MN	+2	+12	+1.7	+2.7
Crookston, MN	+7	+5.5	+2	+5

Table 7. Rainfall (in.) compared to the 30-year average2018.

Location	May	June	July	August
Fargo, ND	-1	+1	+3	+4
Langdon, ND	-.8	+.8	-.8	-1
Casselton, ND	-.8	0	-.9	+5
St. Paul, MN	-.4	-.5	+4	-1.5
Crookston, MN	-1	+2	0	-3.0

Table 8. Correlation among location for DON levels content in 2018.

Location	Misted				St. Paul	Dryland	
	Fargo	Langdon	Brandon	Crookston		Osnabrock	Casselton
Fargo	1.00	**0.61	**0.69	**0.68	**0.53	**0.51	*0.28
Langdon	**0.61	1.0	**0.78	**0.52	**0.68	*0.47	0.02
Brandon	**0.69	**0.78	1.0	**0.67	**0.66	**0.60	0.15
Crookston	**0.68	**0.52	**0.67	1.0	**0.57	**0.45	0.11

St. Paul	**0.53	**0.68	**0.66	**0.57	1.0	0.27	-0.08
Osnabrock	**0.52	**0.47	**0.60	*0.45	0.27	1.0	0.18
Casselton	*0.28	0.02	0.15	0.11	-0.08	0.08	1.0
*,** r-values significantly different from 0.0 at P<0.05 and P<0.01, respectively							

Table 9. Pedigree and source of breeding lines tested for FHB resistance in 2018

Entry	LABEL	PEDIGREE	Row type	Program
1	ND32889	ND28479/ND25652	6	North Dakota State University
2	ND32898	ND28479/ND25652	6	North Dakota State University
3	ND32920	ND28479/INNOVATION	6	North Dakota State University
4	ND34118	ND28539/ND26804	6	North Dakota State University
5	ND34318	ND26902/ND28993	6	North Dakota State University
6	ND35204	6B07-1819/ND28993	6	North Dakota State University
7	ND35207	6B07-1819/ND28993	6	North Dakota State University
8	ND35210	6B07-1819/ND28993	6	North Dakota State University
9	2ND32529	2ND27705/2ND27560	2	North Dakota State University
10	2ND32657	2ND28086/2ND27705	2	North Dakota State University

11	2ND32829	2ND27480/2ND28065	2	North Dakota State University
12	2ND33710	2ND28065/2ND27767	2	North Dakota State University
13	2ND33821	2ND28131/2ND28046	2	North Dakota State University
14	2ND34634	2ND28131/2ND27699	2	North Dakota State University
15	2ND34697	2ND26333/2ND27705	2	North Dakota State University
16	2ND34954	2ND29977/2ND29990	2	North Dakota State University
17	S2M168 (MS12_4151-004)	MS11S3058-014 / MS11S3080-019	2	University of Minnesota
18	S6M175 (Gen10-144)	Gen2-129 / Lacey	6	University of Minnesota
19	S6M176 (KLBC4-130i-KK)	KLBC2F2 -1 / Lacey // Lacey , HVM74=KK	6	University of Minnesota
20	S2M177 (TM14.013-41)	ND21865-6/ND-Genesis	2	University of Minnesota
21	S2M178 (TM14.030-7)	ND-Genesis/ND24510	2	University of Minnesota
22	S2M179 (TM15.002-12)	ND11853//CMB85-533/ND13300/3/7*Bowman/4/ND-Genesis/5/ND23164	2	University of Minnesota
23	TM15.204-33	ND11853//CMB85-533/ND13300/3/7*Bowman/4/2*ND-Genesis	2	University of Minnesota
24	2MS16_4196-017	2MS14_5306-005 / 2MS14_4306-013	2	University of Minnesota
25	2B11-4949	MERIT 57/MT050118	2	Anheuser-Busch InBev
26	2B13-6991	2B06-0929/2B07-1581//2B06-0933/2B07-1590	2	Anheuser-Busch InBev

Table 9. cont. Pedigree and source of breeding lines tested for FHB resistance in 2018

Entry	Line	Pedigree	Row type	Program
27	2IM14-7765	2B09-3804/2B09-3763	2	Anheuser-Busch InBev
28	2IM14-7813	2B09-3883/2B08-2869	2	Anheuser-Busch InBev
29	2IM14-7830	2B09-3883/2B09-3361	2	Anheuser-Busch InBev
30	2IM14-8212	2B09-3408/2B09-3944	2	Anheuser-Busch InBev
31	2IK14-8371	2I08-3592/2B09-3778	2	Anheuser-Busch InBev
32	2IK14-8413	2B09-3778/2B09-3943	2	Anheuser-Busch InBev
33	BM1004-156	AAC Synergy/TR10214	2	AAFC Brandon
34	BM1132-049	TR10214/CDC Reserve	2	AAFC Brandon
35	TR18262	Cerveza/Xena	2	AAFC Brandon

36	BM0939-078	AAC Synergy/TR09212	2	AAFC Brandon
37	HB635 (FB487)	Xena/CDC McGwire	2	AAF FCDC
38	HB562	H96109010/H97109006	6	AAF FCDC
39	TR18644	I07605/Busby	2	AAF FCDC
40	TR18647	Xena/H94061120	2	AAF FCDC
41	TR18170	TR11129/TR10403	2	CDC Univ. of SK
42	TR18171	2ND25272/AAC Synergy	2	CDC Univ. of SK
43	TR18172	SM101437/AAC Synergy	2	CDC Univ. of SK
44	TR18173	TR11131/AAC Synergy	2	CDC Univ. of SK
45	QUEST	FEG18-20 / M110	6	
46	Conlon	BOWMAN*2/DWS1008/ND10232	2	
47	ND20493	ND16918*2/CIho 6611	6	
48	Robust	MOREX/MANKER	6	
49	Chevron	UNKNOWN	6	
50	Stander	ROBUST*2/3/CREE/BONANZA//	6	
		MANKER/4/ROBUST/BUMBER		