

2013

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

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INTRODUCTION

The 2013 North American Barley Scab Evaluation Nursery (NABSEN) was grown at Fargo, Langdon, and Casselton, ND; St. Paul and Crookston MN, and Brandon, Manitoba. Nurseries were either 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 ND 20493(resistant six-row checks), Robust and Stander (susceptible six-row checks), and Conlon (moderately 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

Disease levels in 2013 were very low at Crookston and Casselton unmisted nurseries thus no FHB incidence or severity data were taken from these nurseries. FHB disease levels were highest at Fargo and St. Paul misted locations; while Langdon, Crookston and Brandon locations had moderate FHB severity. DON levels were highest at Brandon (table. 4) and the other locations had moderate levels. Temperatures were close to average (table. 6) for the 30 year average, except for St. Paul which had temperature 2.7 degrees below normal in May. Precipitation was above the 30 year average in May and June for all locations except Langdon and Crookston which were below average in June (table.7). Precipitation was below the 30 year average in July and August for all locations.

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%

Casselton, ND – Richard Horsley

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

Casselton, ND – Jolanta Menert

- Dryland
- 3 replicates
- Inoculated by grain spawn method
- 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
- 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
- Day to heading counted from date planted to 50% of heads emerged 50%
- No DON data for Crookston dryland

BRANDON, MANITOBA - Bill Legge 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

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Table 1. Mean FHB severity of entries grown in the 2013 NABSEN Nursery at five locations.

Line	<u>Crookston</u>					Mean
	Fargo	Langdon	Brandon	misted	St. Paul	
ND26891	25.5	13.3	12.3	26.4	21.5	19.8
ND27177	23.9	8.6	6.0	12.5	18.4	13.9
ND28554	23.3	13.1	11.6	17.5	12.1	15.5
ND28555	28.6	12.1	7.8	19.7	12.8	16.2
ND28993	33.1	14.9	21.1	40.2	14.4	24.7
ND29144	35.4	12.4	13.4	24.9	8.6	18.9
ND29196	22.9	9.5	5.7	11.1	23.8	14.6
ND29380	26.9	10.7	16.1	12.8	15.9	16.5
2ND27705	6.4	6.8	6.3	8.3	6.5	6.9
2ND28065	10.1	6.3	3.7	8.7	13.3	8.4
2ND28071	14.2	4.5	6.4	9.5	9.0	8.7
2ND28131	15.5	13.9	12.1	14.5	10.7	13.3
2ND29817	15.5	5.8	7.9	7.7	12.3	9.8
2ND29827	11.7	9.3	7.2	13.2	6.2	9.5
2ND29990	21.0	8.6	9.4	18.5	9.3	13.4
2ND30002	15.3	10.9	7.6	5.5	12.2	10.3
M151	18.8	8.3	4.0	9.2	10.9	10.2
M152	24.0	9.5	6.9	20.5	5.5	13.3
M155	22.2	5.3	3.0	16.1	4.0	10.1
M156	29.7	10.0	11.1	19.1	11.2	16.2
M157	25.4	7.1	6.4	14.9	14.9	13.7
M158	20.7	8.1	3.9	11.5	8.6	10.6
M159	16.1	4.0	6.0	12.1	4.6	8.6
FEG250-16	21.6	7.2	7.8	23.9	22.5	16.6
2B10-4162	19.9	10.3	9.2	9.7	23.8	14.6
2B10-4185	11.3	4.4	5.3	5.3	10.2	7.3
2B10-4257	19.2	9.2	4.4	6.3	21.8	12.2
2B10-4301	14.9	4.3	7.0	3.5	30.7	12.1

Table 1. cont: Mean FHB severity of entries grown in the 2013 NABSEN Nursery at five locations.

Line	<u>Crookston</u>					Mean
	Fargo	Langdon	Brandon	misted	St. Paul	
2B10-4378	21.3	11.0	9.6	4.7	15.7	12.4
2B10-4465	14.9	9.1	4.8	5.0	23.3	11.4
2B10-4480	27.7	7.8	12.6	10.5	39.5	19.6
2B10-4501	17.3	9.6	7.3	6.7	27.0	13.6
2B10-4543	17.6	5.1	4.4	3.8	23.5	10.9
2B10-4556	15.6	5.5	10.5	10.2	29.8	14.3
2B10-4672	30.4	7.1	8.8	10.3	18.5	15.0
2B10-4785	19.3	4.0	11.1	5.0	26.2	13.1
TR13232	6.3	5.1	5.2	8.2	14.0	7.7
TR13233	13.2	8.9	9.3	7.8	16.5	11.2
TR13236	21.5	6.5	12.6	6.8	17.8	13.0
H280-35	22.6	15.5	9.8	14.0	17.7	15.9
SB090163	17.0	3.3	4.7	8.2	23.5	11.3
SM090108	15.5	3.2	5.4	4.3	18.2	9.3
SM090503	11.7	1.8	5.5	1.8	16.2	7.4
SM095253	11.6	7.1	9.5	8.0	14.2	10.1
TR13608	14.4	5.4	6.1	3.0	16.0	9.0
TR13609	10.2	3.9	4.8	1.3	8.0	5.7
TR13612	7.8	4.0	6.6	6.2	9.4	6.8
BT597	24.0	16.7	22.9	15.4	64.3	28.7
QUEST	15.9	6.1	2.8	15.2	3.0	8.6
Conlon	14.2	6.4	9.9	17.5	10.2	11.6
ND 20493	27.7	8.0	4.1	22.8	7.3	14.0
Robust	26.0	11.4	11.5	24.8	22.8	19.3
Chevron	3.3	0.2	0.8	0.8	4.9	2.0
Stander	20.8	12.1	16.1	15.3	24.7	17.8

Table 2. Mean disease incidence of entries grown in the 2013 NABSEN Nursery at three locations.

Line	Fargo	Langdon	Brandon	Mean
ND26891	100.0	93.3	80.0	91.1
ND27177	100.0	80.0	77.5	85.8
ND28554	100.0	96.7	87.5	94.7
ND28555	100.0	93.3	77.5	90.3
ND28993	100.0	93.3	100.0	97.8
ND29144	100.0	96.7	100.0	98.9
ND29196	93.3	90.0	70.0	84.4
ND29380	100.0	90.0	95.0	95.0
2ND27705	60.0	70.0	67.5	65.8
2ND28065	73.3	73.3	55.0	67.2
2ND28071	90.0	46.7	67.5	68.1
2ND28131	93.3	86.7	87.5	89.2
2ND29817	90.0	63.3	77.5	76.9
2ND29827	86.7	76.7	72.5	78.6
2ND29990	93.3	86.7	77.5	85.8
2ND30002	83.3	90.0	77.5	83.6
M151	100.0	93.3	67.5	86.9
M152	100.0	80.0	77.5	85.8
M155	100.0	80.0	67.5	82.5
M156	100.0	86.7	80.0	88.9
M157	100.0	86.7	87.5	91.4
M158	93.3	70.0	77.5	80.3
M159	93.3	63.3	67.5	74.7
FEG250-16	100.0	93.3	65.0	86.1
2B10-4162	90.0	86.7	65.0	80.6
2B10-4185	83.3	63.3	62.5	69.7
2B10-4257	93.3	86.7	62.5	80.8
2B10-4301	96.7	63.3	60.0	73.3

Table 2. cont: Mean disease incidence of entries grown in the 2013 NABSEN Nursery at three locations.

Line	Fargo	Langdon	Brandon	Mean
2B10-4378	96.7	86.7	82.5	88.6
2B10-4465	90.0	60.0	62.5	70.8
2B10-4480	100.0	76.7	82.5	86.4
2B10-4501	83.3	93.3	67.5	81.4
2B10-4543	100.0	56.7	57.5	71.4
2B10-4556	93.3	56.7	77.5	75.8
2B10-4672	96.7	56.7	77.5	76.9
2B10-4785	96.7	50.0	77.5	74.7
TR13232	56.7	63.3	55.0	58.3
TR13233	93.3	76.7	52.5	74.2
TR13236	93.3	76.7	75.0	81.7
H280-35	100.0	90.0	77.5	89.2
SB090163	90.0	43.3	62.5	65.3
SM090108	93.3	36.7	50.0	60.0
SM090503	80.0	30.0	55.0	55.0
SM095253	70.0	60.0	82.5	70.8
TR13608	93.3	60.0	67.5	73.6
TR13609	73.3	43.3	55.0	57.2
TR13612	80.0	50.0	75.0	68.3
BT597	96.7	96.7	95.0	96.1
QUEST	96.7	86.7	52.5	78.6
Conlon	86.7	63.3	80.0	76.7
ND 20493	100.0	83.3	67.5	83.6
Robust	100.0	90.0	90.0	93.3
Chevron	76.7	10.0	37.5	41.4
Stander	100.0	86.7	87.5	91.4

Table 3. Mean days to heading after planting of entries grown in 2013 NABSEN Nursery at five locations.

Line	Fargo	Langdon	Brandon	Crookston		Mean
				misted	St. Paul	
ND26891	54.3	49.7	46.3	52.3	52	50.9
ND27177	54.7	49.3	46.0	51.3	51	50.5
ND28554	54.7	49.3	45.0	51.7	51	50.4
ND28555	53.7	49.0	47.5	50.3	51	50.3
ND28993	54.3	48.3	43.8	50.7	50	49.4
ND29144	53.7	48.7	45.0	50.7	51	49.8
ND29196	56.3	49.3	48.5	52.0	54	52.0
ND29380	55.3	49.0	46.5	52.0	52	51.0
2ND27705	57.3	48.3	49.0	56.0	54	52.9
2ND28065	55.3	47.7	47.5	53.0	52	51.1
2ND28071	54.7	47.3	47.5	52.0	52	50.7
2ND28131	53.7	47.3	44.8	51.7	50	49.5
2ND29817	55.3	47.3	45.0	51.0	51	50.0
2ND29827	52.7	48.0	44.5	50.3	49	49.0
2ND29990	54.3	47.0	45.8	53.7	51	50.4
2ND30002	54.3	47.0	44.5	54.0	51	50.2
M151	54.7	49.3	46.5	51.7	50	50.5
M152	53.3	49.3	44.5	50.7	50	49.6
M155	53.7	49.0	45.3	50.0	50	49.7
M156	54.0	49.3	46.3	51.0	52	50.5
M157	54.3	49.3	45.0	51.7	50	50.1
M158	54.7	48.7	45.5	52.7	51	50.4
M159	54.0	49.0	45.8	51.7	51	50.4
FEG250-16	54.7	50.0	45.8	51.7	51	50.6
2B10-4162	57.3	49.0	48.5	56.7	56	53.5
2B10-4185	56.7	50.0	48.8	57.7	56	53.8
2B10-4257	57.3	51.0	49.5	57.0	56	54.2
2B10-4301	57.3	52.0	50.8	58.0	59	55.4

Table 3. cont: Mean days to heading after planting of entries grown in 2013 NABSEN Nursery at five locations.

Line	Fargo	Langdon	Brandon	Crookston		Mean
				misted	St. Paul	
2B10-4465	56.0	51.0	48.5	57.3	55	53.6
2B10-4480	56.3	50.0	50.0	56.3	56	53.8
2B10-4501	56.0	47.0	49.0	57.3	56	53.1
2B10-4543	57.0	51.7	49.5	57.0	56	54.2
2B10-4556	57.3	50.3	49.0	55.7	57	53.9
2B10-4672	56.3	49.0	45.8	54.0	54	51.8
2B10-4785	56.7	51.7	48.8	58.0	58	54.6
TR13232	57.3	51.3	49.5	56.0	54	53.7
TR13233	55.7	50.7	47.3	55.0	54	52.5
TR13236	57.0	49.7	47.5	55.7	55	53.0
H280-35	56.7	49.3	46.8	56.3	55	52.8
SB090163	55.3	49.3	46.8	53.0	53	51.5
SM090108	58.3	51.3	50.0	58.0	58	55.1
SM090503	58.0	53.7	52.0	58.3	59	56.3
SM095253	56.7	51.3	47.0	54.3	55	52.8
TR13608	57.0	51.7	51.5	58.0	59	55.4
TR13609	59.3	53.7	52.3	59.0	60	56.8
TR13612	56.7	51.7	50.5	57.7	57	54.6
BT597	58.3	50.7	49.0	55.7	57	54.1
QUEST	55.3	49.3	46.5	51.0	51	50.6
Conlon	53.0	47.0	43.3	53.0	53	49.8
ND 20493	54.0	49.0	44.3	51.3	50	49.8
Robust	54.3	50.0	46.0	51.0	51	50.5
Chevron	60.0	54.7	51.3	58.0	57	56.3
Stander	55.7	53.7	47.0	53.7	52	52.4

Table 4. Mean for DON (ppm) entries grown in 2013 NABSEN Nursery at seven locations.

Line	Fargo	Langdon	Brandon	St. Paul	Crookston	Misted	BAR -	NDSU	Dryland
						mean	LLC Casselton	Casselton	mean
ND26891	20.1	22.2	45.6	33.57	11.46	26.57	0.53	0.20	0.37
ND27177	23.7	18.4	21.0	12.49	11.00	17.33	0.21	0.07	0.14
ND28554	20.2	20.6	48.2	7.66	19.40	23.22	0.15	0.42	0.29
ND28555	15.4	19.9	50.8	21.74	12.19	24.00	0.56	0.04	0.30
ND28993	41.8	29.6	62.9	42.35	45.21	44.36	0.29	0.17	0.23
ND29144	25.3	17.4	81.9	12.21	11.51	29.67	0.88	0.01	0.45
ND29196	23.3	26.1	67.1	15.66	23.15	31.05	0.43	0.07	0.25
ND29380	19.6	21.0	55.9	25.45	22.51	28.89	0.52	0.11	0.32
2ND27705	3.0	13.1	32.6	5.80	0.94	11.10	0.05	2.87	1.46
2ND28065	5.1	6.6	35.8	3.28	2.29	10.62	0.03	0.02	0.03
2ND28071	7.2	8.6	42.6	4.38	6.60	13.90	0.11	0.09	0.10
2ND28131	8.6	17.5	53.7	12.27	13.16	21.03	0.37	1.17	0.77
2ND29817	5.2	7.3	33.1	4.24	2.65	10.51	0.00	2.26	1.13
2ND29827	3.6	7.4	30.0	4.11	3.18	9.67	0.11	0.48	0.29
2ND29990	10.3	15.6	54.8	10.63	6.27	19.51	0.33	0.38	0.36
2ND30002	5.0	9.4	43.0	3.90	6.60	13.57	0.37	0.11	0.24
M151	11.8	8.6	35.4	5.80	13.63	15.04	0.11	0.18	0.14
M152	14.5	16.0	32.9	5.09	8.83	15.47	0.08	0.02	0.05
M155	13.1	5.4	26.4	10.58	10.52	13.19	0.03	0.04	0.04
M156	25.1	21.0	58.7	21.34	12.18	27.65	0.19	0.03	0.11
M157	16.6	17.5	42.2	6.72	14.47	19.49	0.37	0.08	0.22
M158	12.0	11.0	38.2	6.26	12.96	16.09	0.26	0.03	0.14
M159	15.6	7.5	32.8	2.20	6.23	12.86	0.18	0.00	0.09
FEG250-16	11.5	14.4	43.3	8.90	11.19	17.87	0.19	0.02	0.11
2B10-4162	15.4	22.5	50.8	7.70	2.94	19.86	0.13	0.04	0.08
2B10-4185	5.4	8.3	42.4	13.06	0.19	13.88	0.29	0.91	0.60
2B10-4257	6.2	13.3	40.9	15.31	1.07	15.36	0.22	0.58	0.40
2B10-4301	6.3	14.9	62.9	4.24	13.50	20.36	0.11	2.00	1.06

Table 4. cont: Mean for DON (ppm) entries grown in 2013 NABSEN Nursery at seven locations.

Line	Fargo	Langdon	Brandon	St. Paul	Crookston	<u>Misted</u>	BAR - <u>LLC</u>	<u>NDSU</u>	<u>Dryland</u>
						mean	Casselton	Casselton	mean
2B10-4378	10.9	16.2	53.7	19.17	3.65	20.73	0.08	1.43	0.76
2B10-4465	8.0	15.0	45.0	14.14	4.75	17.36	0.08	0.32	0.20
2B10-4480	10.6	20.9	58.3	17.64	4.59	22.39	0.14	0.25	0.20
2B10-4501	8.9	19.2	41.9	5.28	4.48	15.96	0.37	0.03	0.20
2B10-4543	6.4	16.8	48.7	11.16	3.72	17.36	0.25	0.92	0.58
2B10-4556	6.1	13.8	44.6	12.40	1.71	15.73	0.24	0.33	0.29
2B10-4672	15.1	14.7	44.7	21.52	7.30	20.66	0.21	0.78	0.50
2B10-4785	7.4	12.9	39.3	6.70	3.52	13.96	0.98	0.89	0.94
TR13232	6.1	6.9	41.4	2.80	1.88	11.81	0.03	0.71	0.37
TR13233	10.8	9.5	43.8	7.39	4.36	15.17	0.08	0.03	0.06
TR13236	7.5	10.6	40.5	16.01	1.81	15.29	0.15	0.03	0.09
H280-35	6.0	11.9	44.4	22.51	6.87	18.34	0.50	0.20	0.35
SB090163	7.1	20.4	27.5	9.57	3.03	13.51	0.08	0.01	0.04
SM090108	10.3	6.0	45.7	17.06	1.96	16.20	0.52	3.42	1.97
SM090503	4.9	8.4	39.3	2.31	0.90	11.17	0.19	0.05	0.12
SM095253	10.9	9.1	41.0	18.40	3.43	16.58	0.23	0.08	0.16
TR13608	7.1	15.5	40.9	13.47	2.06	15.79	0.26	0.85	0.56
TR13609	2.2	10.2	21.0	1.96	2.49	7.57	0.37	1.00	0.69
TR13612	4.9	11.2	35.3	6.90	2.40	12.12	0.27	0.09	0.18
BT597	30.1	50.9	63.1	11.40	7.80	32.68	1.98	1.36	1.67
QUEST	16.3	11.3	37.4	16.76	16.65	19.68	0.52	0.07	0.30
Conlon	5.3	8.2	27.7	13.61	16.98	14.35	0.08	0.06	0.07
ND 20493	20.1	11.2	23.3	11.53	20.26	17.27	0.13	0.15	0.14
Robust	20.2	27.2	49.1	20.98	26.97	28.90	0.22	0.20	0.21
Chevron	2.6	2.4	29.2	3.08	0.55	7.57	0.01	0.28	0.14
Stander	21.7	25.5	62.3	18.16	23.46	30.21	0.69	0.90	0.80

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

Label	<u>Days to</u> ¹ heading	<u>FHB</u> ² incidence	<u>FHB</u> ³ severity	<u>DON ppm</u> ⁴ misted	<u>DON ppm</u> ⁴ dryland
ND26891	50.9	91.1	19.8	26.57	0.37
ND27177	50.5	85.8	13.9	17.33	0.14
ND28554	50.4	94.7	15.5	23.22	0.29
ND28555	50.3	90.3	16.2	24.00	0.30
ND28993	49.4	97.8	24.7	44.36	0.23
ND29144	49.8	98.9	18.9	29.67	0.45
ND29196	52.0	84.4	14.6	31.05	0.25
ND29380	51.0	95.0	16.5	28.89	0.32
2ND27705	52.9	65.8	6.9	11.10	1.46
2ND28065	51.1	67.2	8.4	10.62	0.03
2ND28071	50.7	68.1	8.7	13.90	0.10
2ND28131	49.5	89.2	13.3	21.03	0.77
2ND29817	50.0	76.9	9.8	10.51	1.13
2ND29827	49.0	78.6	9.5	9.67	0.29
2ND29990	50.4	85.8	13.4	19.51	0.36
2ND30002	50.2	83.6	10.3	13.57	0.24
M151	50.5	86.9	10.2	15.04	0.14
M152	49.6	85.8	13.3	15.47	0.05
M155	49.7	82.5	10.1	13.19	0.04
M156	50.5	88.9	16.2	27.65	0.11
M157	50.1	91.4	13.7	19.49	0.22
M158	50.4	80.3	10.6	16.09	0.14
M159	50.4	74.7	8.6	12.86	0.09
FEG250-16	50.6	86.1	16.6	17.87	0.11
2B10-4162	53.5	80.6	14.6	19.86	0.08
2B10-4185	53.8	69.7	7.3	13.88	0.60
2B10-4257	54.2	80.8	12.2	15.36	0.40

¹Date from planting to 50% of heads 50% emerged at five locations, except for Brandon, MN had 80% heads 50% emerged.

²FHB incidence means at three locations.

³FHB severity means at five locations.

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

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

Label	<u>Days to</u> ¹	<u>FHB</u> ²	<u>FHB</u> ³	<u>DON ppm</u> ⁴	<u>DON ppm</u> ⁴
	head	indence	severity	misted	dryland
2B10-4301	55.4	73.3	12.1	20.36	1.06
2B10-4378	54.3	88.6	12.4	20.73	0.76
2B10-4465	53.6	70.8	11.4	17.36	0.20
2B10-4480	53.8	86.4	19.6	22.39	0.20
2B10-4501	53.1	81.4	13.6	15.96	0.20
2B10-4543	54.2	71.4	10.9	17.36	0.58
2B10-4556	53.9	75.8	14.3	15.73	0.29
2B10-4672	51.8	76.9	15.0	20.66	0.50
2B10-4785	54.6	74.7	13.1	13.96	0.94
TR13232	53.7	58.3	7.7	11.81	0.37
TR13233	52.5	74.2	11.2	15.17	0.06
TR13236	53.0	81.7	13.0	15.29	0.09
H280-35	52.8	89.2	15.9	18.34	0.35
SB090163	51.5	65.3	11.3	13.51	0.04
SM090108	55.1	60.0	9.3	16.20	1.97
SM090503	56.3	55.0	7.4	11.17	0.12
SM095253	52.8	70.8	10.1	16.58	0.16
TR13608	55.4	73.6	9.0	15.79	0.56
TR13609	56.8	57.2	5.7	7.57	0.69
TR13612	54.6	68.3	6.8	12.12	0.18
BT597	54.1	96.1	28.7	32.68	1.67
QUEST	50.6	78.6	8.6	19.68	0.30
Conlon	49.8	76.7	11.6	14.35	0.07
ND 20493	49.8	83.6	14.0	17.27	0.14
Robust	50.5	93.3	19.3	28.90	0.21
Chevron	56.3	41.4	2.0	7.57	0.14
Stander	52.4	91.4	17.8	30.21	0.80

¹ Date from planting to 50% of heads 50% emerged at five locations except for Brandon, MN had 80% heads 50% emerged.

² FHB incidence means at three locations.

³ FHB severity means at five locations.

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

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

Location	May	June	July	August
Fargo, ND	0	1	1	1
Langdon, ND	-1	2	-1	1
Prosper, ND*	1	-1	1	1
St. Paul, MN	-2.7	-1	0	1.4
Crookston, MN	-0.2	1	0	0
Brandon, MA	n/a	-1.3	0	1.2

*Prosper is closest recording NDAWN weather station to Casselton, ND

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

Location	May	June	July	August
Fargo, ND	2.7	4	-1.8	-2.0
Langdon, ND	2.7	-2.4	-1.3	-1.2
Prosper, ND*	1.1	3.6	-2.7	-0.6
St. Paul, MN	3.5	2.8	-1.2	-2.4
Crookston, MN	1	-1.0	-2.0	-3.0
Brandon, MA	1.05	1.1	-0.22	-1.4**

*Prosper is closest recording NDAWN weather station to Casselton, ND

** Some days missing

Table 8. Correlation among locations for DON content.

Location	Fargo	Langdon	Brandon	St. Paul	<u>Misted</u> Crookston	<u>BAR-LLC</u> Casselton	<u>NDSU</u> Casselton
Fargo	1	0.7**	0.5**	0.6**	0.8**	0.4**	-0.2
Langdon	0.7**	1	0.6**	0.5**	0.5**	0.6**	-0.03
Brandon	0.5**	0.6**	1	0.4**	0.4**	0.5**	0.07
St. Paul	0.6**	0.5**	0.4**	1	0.6**	0.2	-0.08
Crookston-misted	0.8**	0.5**	0.4**	0.6**	1	0.1	-0.2
BAR-LLR Casselton	0.4**	0.6**	0.5**	0.2	0.1	1	0.1
(NDSU)Casselton	-0.2	-0.03	0.07	-0.08	-0.2	0.1	1

*,** 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 2013

Entry	Label	Pedigree	Origin	Line name	Row-type
1	ND26891	ND21376/ND20299	North Dakoota State University		6-row
2	ND27177	Stellar-ND/ND23530	North Dakoota State University		6-row
3	ND28554	ND23497/ND22421	North Dakoota State University		6-row
4	ND28555	ND23497/ND22421	North Dakoota State University		6-row
5	ND28993	ND22466/ND22783	North Dakoota State University		6-row
6	ND29144	ND24867/6B01-2218	North Dakoota State University		6-row
7	ND29196	ND20299/ND21786	North Dakoota State University		6-row
8	ND29380	ND25025/ND21843	North Dakoota State University		6-row
9	2ND27705	2ND24393/TR05285	North Dakoota State University		2-row
10	2ND28065	2ND21867/2ND24238	North Dakoota State University		2-row
11	2ND28071	2ND21867/2ND24383	North Dakoota State University		2-row
12	2ND28131	2ND24238/2ND24341	North Dakoota State University		2-row
13	2ND29817	2ND22927/2ND24263	North Dakoota State University		2-row
14	2ND29827	2ND22927/2ND24263	North Dakoota State University		2-row
15	2ND29990	2ND24238/2ND25265	North Dakoota State University		2-row
16	2ND30002	2ND24388/2ND24527	North Dakoota State University		2-row
17	M151 (FEG201-38)	Quest / M129	Uveristy of Minnesota		6-row
18	M152 (FEG212-01)	FEG175-48 / M135	Uveristy of Minnesota		6-row
19	M155 (FEG227-17)	FEG167-25 / M141 (FEG175-57)	Uveristy of Minnesota		6-row
20	M156 (FEG234-18)	NEG2-48 / M137	Uveristy of Minnesota		6-row
21	M157 (FEG260-09)	NEG2-59 / M141	Uveristy of Minnesota		6-row
22	M158 (MS10S4001-013)	Quest / M140 (FEG154-47)	Uveristy of Minnesota		6-row
23	M159 (MS10S4013-019)	Quest / FEG183-52	Uveristy of Minnesota		6-row
24	FEG250-16	M139 / FEG160-03	Uveristy of Minnesota		6-row
25	2B10-4162	MERIT 57 / 2B05-0712	BAR - LLC		2-row
26	2B10-4185	2B99-2763-10 / 2B05-0712	BAR - LLC		2-row
27	2B10-4257	2B05-0615 / 2B05-0676	BAR - LLC		2-row
28	2B10-4301	ABI VOYAGER // ABI VOYAGER / 2B03-3711	BAR - LLC		2-row

Table 9. cont: Pedigree and source of breeding lines tested for FHB resistance in 2013

Entry	Label	Pedigree	Origin	Line name	Row-type
29	2B10-4378	2B99-2763-10 / 2B03-3669 // 2B05-0822 / 2B99-2763-10	BAR - LLC		2-row
30	2B10-4465	2B04-0291 / 2B05-0615	BAR - LLC		2-row
31	2B10-4480	2B04-0294 / 2B05-0676	BAR - LLC		2-row
32	2B10-4501	2B05-0615 / 2B05-0733	BAR - LLC		2-row
33	2B10-4543	2B05-0676 / 2B00-0089M	BAR - LLC		2-row
34	2B10-4556	2B05-0821 / 2B05-0837	BAR - LLC		2-row
35	2B10-4672	2B99-2763-10 / Z055O012O	BAR - LLC		2-row
36	2B10-4785	ABI VOYAGER / 2B05-0829 // 2B05-0829 / 2B06-0929	BAR - LLC		2-row
37	TR13232	TR04282/TR03273	Agriculture and Agri-Food Canada (Legge)	BM0423-376	2-row
38	TR13233	TR04282/TR03273	Agriculture and Agri-Food Canada (Legge)	BM0423-260	2-row
39	TR13236	TR05287/Newdale	Agriculture and Agri-Food Canada (Legge)	BM0537-286	2-row
40	H280-35	HB808/2/Alamo/Chuanluo-2/3/Millhouse	Agriculture and Agri-Food Canada (Badea)	H280-35	2-row
41	SB090163	Vodohray/TR05387	CDC-University of Saskatchewan	SB090163	2-row
42	SM090108	SM04394/TR05288	CDC-University of Saskatchewan	SM090108	2-row
43	SM090503	TR05286/SM04450	CDC-University of Saskatchewan	SM090503	2-row
44	SM095253	SM04767s/TR06293	CDC-University of Saskatchewan	SM095253	2-row
45	TR13608	J01039F1/J01038F1	FCDC-Alberta Agriculture	J01073006	2-row
46	TR13609	H92017203Z/Ponoka	FCDC-Alberta Agriculture	J02033006	2-row
47	TR13612	Manley/Leo//TR238///Seebe	FCDC-Alberta Agriculture	J04075010	2-row
48	BT597	Mahigan/H00058	FCDC-Alberta Agriculture	H01024003	6-row
49	QUEST	FEG18-20 / M110	Check		6-row
50	Conlon	BOWMAN*2/DWS1008/ND10232	Check		2-row
51	ND 20493	ND16918*2/CIho 6611	Check		6-row
52	Robust	MOREX/MANKER	Check		6-row
53	Chevron	UNKNOWN	Check		6-row
54	Stander	ROBUST*2/3/CREE/BONANZA//MANKER/4/ROBUST/BUMBER	Check		6-row