

Report of the 2025 Uniform Regional Scab Nursery for Spring Wheat Parents

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The Uniform Regional Scab Nursery for Spring Wheat Parents (URSN) was grown for the 31st year in 2025. Five locations (St. Paul, MN, Crookston, MN, Brookings, SD, Prosper, ND, and Fargo, ND) reported results.

A total of 32 entries were included in the 2025 URSN, in addition to the resistant checks ND2710, Glenn, and Rollag, the susceptible checks Roblin, Wheaton, and Norm. The entries were contributed by four university wheat breeding programs.

The core set of traits evaluated at the nursery locations varied, but most included Fusarium head blight (FHB) incidence, FHB severity, and disease index. In addition, visual scabby kernel ratings (VSK/tombstone/FDK) were provided for locations. Additional agronomic trait data are presented in individual location summary tables for locations where they were measured. Adult plant and seedling stem rust reactions are also presented. Molecular marker genotypes for a set of FHB resistance QTL and other traits are provided for entries.

The data of genotype means for locations (Tables 3-7) will be available online on the Triticeae Toolbox under T3/Wheat.

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Cooperators for the 2025 Uniform Regional Scab Nursery for Spring Wheat Parents

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Pablo Olivera, Shaobin Zhong, Jim Kolmer, Yue Jin, and Sam Gale

Please note change in personnel: Shaobin Zhong has filled Jim Kolmer's position. Yue Jin retired in 2025.

Previous URSN Entries Released as New Cultivars

Unlike the Hard Red Spring Wheat Uniform Regional Nursery (HRSWURN) Annual Report, the URSN Annual Report has not included records of experimental lines becoming released varieties. Including this information is valuable to the wheat community for tracking experimental lines that were tested in this nursery under FHB-inoculated conditions and their status of becoming a released variety. Some of these varieties were also tested in the HRSWURN, and information on their phenotype data can be found in that Annual Report posted to the GrainGenes website: <https://wheat.pw.usda.gov/GG3/>

When the spring wheat breeders release a new variety tested in the HRSWURN, the released variety name, experimental name, PI number, brief description, and years entered in the HRSWURN or URSN will be included below. No newly released varieties were named for the 2025 season.

Figure 1. Map of Uniform Regional Scab Nursery Locations, 2025

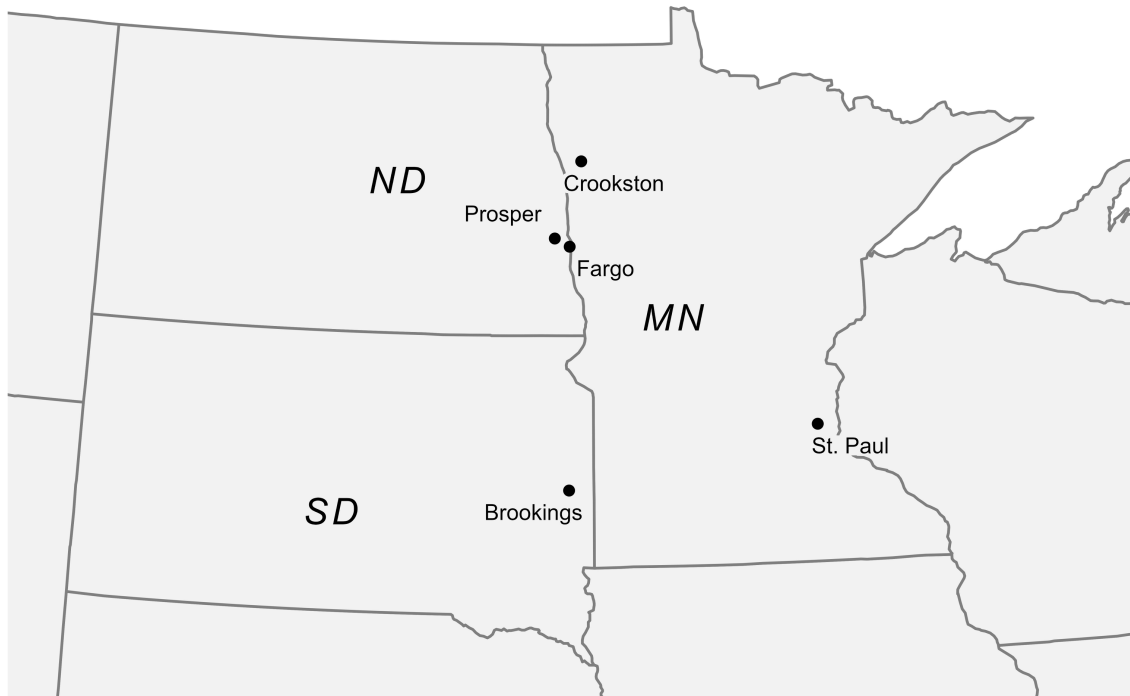


Table 1. Entries for the 2025 Uniform Regional Scab Nursery Parents.

Entry	Line	Pedigree	1st Year		
			in URSN	Submitter	Organization
1	Glenn	CHECK			
2	ND2710	CHECK			
3	Rollag	CHECK			
4	Roblin	CHECK			
5	Wheaton	CHECK			
6	Norm	CHECK			
7	MN21007-3	BW980/MN-Rothsay	2025	J. Anderson	UMN
8	MN21061-1	Linkert-gpcB1/Lang-MN//MN13288-1-32	2025	J. Anderson	UMN
9	MN21107-1	MN16274/MN14223-5	2025	J. Anderson	UMN
10	MN21155-3	MN15450/Bolles	2025	J. Anderson	UMN
11	MN21320-1	MN16311/MN13288-1-32	2025	J. Anderson	UMN
12	MN21416-1	MN15319/MN13479-8	2025	J. Anderson	UMN
13	MN21466-2	MN16360/MN14223-5	2025	J. Anderson	UMN
14	MN21482-1	MN15524/MN13288-1-32	2025	J. Anderson	UMN
15	NDHRS18-0069-B069	NDHRS16-12-52/SYVALDA	2025	A. Green	NDSU
16	NDHRS18-0069-C025	NDHRS16-12-52/SYVALDA	2025	A. Green	NDSU
17	NDHRS18-0180-F066	MSCHEVELLE/FALLER//NDVITPRO	2025	A. Green	NDSU
18	NDHRS18-0261-C088	NDFROHBERG/ALSEN	2025	A. Green	NDSU
19	NDHRS19-0082-C16	SD4724/NDHRS16-12-19//SYINGMAR	2025	A. Green	NDSU
20	NDHRS19-6036-C40	17Sr4 (16-15-1385)/GLENN/NDHRS16-13-89	2025	A. Green	NDSU
21	NDHRS20-0003-C40	HILLIARD/GLENN	2025	A. Green	NDSU
22	NDHRS20-0358-C108	NDHRS16-14-91/LANNING//NDHRS16-14-36	2025	A. Green	NDSU
23	SD5095	SD4366/MN09028-1	2025	K. Glover	SDSU
24	SD5105	SD4771/DRIVER	2025	K. Glover	SDSU
25	SD5131	SD4724/SD4719	2025	K. Glover	SDSU
26	SD5168	ASCEND-SD/MN15195-5	2025	K. Glover	SDSU
27	SD5251	SURPASS/ASCEND-SD	2025	K. Glover	SDSU
28	SD5256	BRAWN-SD/FN19-14242	2025	K. Glover	SDSU
29	SD5261	BRAWN-SD/FN19-13402	2025	K. Glover	SDSU
30	SD5265	ASCEND-SD/NH057	2025	K. Glover	SDSU
31	MT22345	DAGMAR/MN14105-7	2024	J. Cook	MSU
32	MT23067	DAGMAR/NDHRS16-14-41	2025	J. Cook	MSU
33	MT23184	MT 1857/MT 1673	2025	J. Cook	MSU
34	MT23190	MT 1815/MT 1934	2025	J. Cook	MSU
35	MT23204	MT 1857/MT 1817	2025	J. Cook	MSU
36	MT23206	MT 1815/MT 1904	2025	J. Cook	MSU
37	MT23297	DAGMAR/NDHRS16-14-41	2024	J. Cook	MSU
38	MT23385	MT 1866//VIDA/SxD3(1052)	2025	J. Cook	MSU

Table 2. Locations and Comparative Plot Management for the 2025 URSN.

	Date	
	Seeded	Harvested
Minnesota		
St. Paul	April 30	August 11
Crookston	May 26	August 27
North Dakota		
Prosper	-	-
Fargo	-	-
South Dakota		
Brookings	May 14	-

Table 3. 2025 Uniform Regional Scab Nursery for Spring Wheat Parents, St. Paul, MN.

Entry	Line	Incidence %	Severity %	Disease Index	VSK %	DON ppm	Heading Julian day	micro TWT ¹ g
1	Glenn	100.0	40.3	40.3	32.5	4.5	178.0	11.1
2	ND2710	100.0	20.4	20.4	17.5	2.6	179.5	11.8
3	Rollag	100.0	29.7	29.7	16.0	2.9	179.5	11.1
4	Roblin	100.0	97.3	97.3	77.5	4.6	178.0	–
5	Wheaton	100.0	87.2	87.2	82.5	6.8	182.5	8.9
6	Norm	100.0	75.3	75.3	42.5	4.7	184.0	10.5
7	MN21007-3	100.0	19.2	19.2	9.0	2.1	182.5	11.2
8	MN21061-1	100.0	23.1	23.1	21.0	2.7	179.5	11.1
9	MN21107-1	100.0	28.0	28.0	11.0	3.9	179.5	10.8
10	MN21155-3	100.0	37.4	37.4	20.0	3.2	181.0	11.2
11	MN21320-1	100.0	35.0	35.0	10.0	2.6	182.5	11.2
12	MN21416-1	100.0	32.6	32.6	13.5	4.8	184.0	11.0
13	MN21466-2	96.5	17.9	17.4	6.0	1.5	181.0	12.0
14	MN21482-1	100.0	26.9	26.9	16.0	2.0	181.0	10.8
15	NDHRS18-0069-B069	100.0	32.7	32.7	15.0	3.5	184.0	11.2
16	NDHRS18-0069-C025	100.0	34.5	34.5	15.0	4.2	179.5	11.4
17	NDHRS18-0180-F066	100.0	29.7	29.7	17.0	4.3	182.5	11.0
18	NDHRS18-0261-C088	100.0	24.3	24.3	16.0	4.1	181.0	11.4
19	NDHRS19-0082-C16	100.0	29.8	29.8	20.0	4.0	179.5	11.0
20	NDHRS19-6036-C40	100.0	33.1	33.1	16.0	5.3	181.0	11.3
21	NDHRS20-0003-C40	100.0	77.6	77.6	25.0	5.1	179.5	10.4
22	NDHRS20-0358-C108	100.0	39.6	39.6	32.5	4.4	181.0	10.0
23	SD5095	100.0	38.7	38.7	13.5	2.4	184.0	11.7
24	SD5105	100.0	46.7	46.7	21.0	3.8	184.0	10.6
25	SD5131	100.0	40.0	40.0	17.0	3.6	181.0	11.3
26	SD5168	100.0	36.6	36.6	25.0	5.6	181.0	10.7
27	SD5251	100.0	20.0	20.0	12.5	3.2	179.5	10.6
28	SD5256	100.0	34.0	34.0	30.0	2.2	179.5	11.0
29	SD5261	100.0	29.4	29.4	20.0	2.7	178.0	11.3
30	SD5265	100.0	27.3	27.3	22.5	4.2	179.5	11.0
31	MT22345	100.0	32.4	32.4	30.0	6.7	181.0	10.1
32	MT23067	100.0	43.2	43.2	25.0	3.3	181.0	10.5
33	MT23184	100.0	70.9	70.9	30.0	6.1	179.5	10.0
34	MT23190	100.0	55.1	55.1	57.5	5.1	181.0	10.0
35	MT23204	100.0	80.4	80.4	37.5	3.3	184.0	9.9
36	MT23206	100.0	36.6	36.6	30.0	4.2	181.0	10.4
37	MT23297	100.0	56.0	56.0	30.0	8.7	181.0	10.2
38	MT23385	100.0	35.3	35.3	20.0	7.9	182.5	10.8
Mean		99.9	21.6	40.9	25.0	4.1	181.0	10.8
LSD		1.6	23.4	23.4	10.9	–	2.8	0.6
CV		0.8	53.2	28.2	26.2	–	0.8	2.7

¹ Weight of the VSK sample that fits in a 15.7 mL copper vessel measuring 20 mm in diameter and 50 mm in height

Environmental notes: high disease pressure and very high VSK values - higher than usual for resistant checks.

Table 4. 2025 Uniform Regional Scab Nursery for Spring Wheat Parents, Crookston, MN.

Entry	Line	Incidence %	Severity %	Disease Index	VSK %	DON ppm	Heading Julian day	micro TWT ¹ g
1	Glenn	95.0	37.3	36.0	13.5	24.4	188.5	11.9
2	ND2710	100.0	14.0	14.0	12.5	20.3	189.5	12.0
3	Rollag	100.0	33.8	33.8	11.0	12.0	189.5	11.8
4	Roblin	100.0	77.5	77.5	22.5	15.0	188.5	10.3
5	Wheaton	100.0	85.0	85.0	35.0	36.1	192.0	–
6	Norm	100.0	73.5	73.5	22.5	26.9	191.0	–
7	MN21007-3	100.0	34.9	34.9	8.0	14.5	194.5	11.8
8	MN21061-1	95.0	18.0	17.0	10.0	30.2	192.0	12.0
9	MN21107-1	100.0	35.3	35.3	9.0	15.2	191.0	11.9
10	MN21155-3	100.0	40.3	40.3	7.0	18.5	191.0	12.1
11	MN21320-1	90.0	30.8	27.7	6.0	11.1	193.0	11.6
12	MN21416-1	100.0	26.4	26.4	10.0	22.0	194.0	11.7
13	MN21466-2	100.0	26.4	26.4	10.0	15.1	189.0	11.9
14	MN21482-1	100.0	35.3	35.3	9.0	8.8	188.5	11.3
15	NDHRS18-0069-B069	100.0	27.0	27.0	12.0	15.0	191.0	11.5
16	NDHRS18-0069-C025	95.0	19.4	18.5	10.0	17.3	190.5	11.4
17	NDHRS18-0180-F066	100.0	39.3	39.3	15.0	28.1	191.0	11.8
18	NDHRS18-0261-C088	100.0	30.0	30.0	12.5	16.6	189.0	11.9
19	NDHRS19-0082-C16	100.0	32.5	32.5	10.0	22.4	189.5	11.9
20	NDHRS19-6036-C40	100.0	28.9	28.9	12.0	19.1	190.0	11.2
21	NDHRS20-0003-C40	100.0	45.2	45.2	21.0	16.8	189.0	10.4
22	NDHRS20-0358-C108	100.0	69.5	69.5	11.0	12.3	188.5	–
23	SD5095	100.0	28.0	28.0	13.5	21.5	192.5	11.7
24	SD5105	100.0	59.1	59.1	10.0	26.2	192.5	11.3
25	SD5131	95.0	21.9	20.9	13.5	14.3	191.0	11.6
26	SD5168	100.0	21.7	21.7	9.0	16.8	191.5	11.1
27	SD5251	100.0	22.2	22.2	9.0	12.0	189.0	11.6
28	SD5256	100.0	19.3	19.3	7.0	7.9	188.5	12.0
29	SD5261	100.0	21.7	21.7	8.0	9.5	187.5	12.1
30	SD5265	90.0	26.1	24.4	11.0	17.5	191.5	11.6
31	MT22345	100.0	59.4	59.4	20.0	34.9	191.0	10.6
32	MT23067	100.0	63.0	63.0	12.5	18.2	188.5	10.5
33	MT23184	100.0	73.5	73.5	17.0	13.8	188.0	–
34	MT23190	100.0	71.5	71.5	22.5	18.7	189.5	–
35	MT23204	100.0	47.1	47.1	13.5	18.6	191.5	11.3
36	MT23206	100.0	78.8	78.8	17.5	25.5	189.5	–
37	MT23297	100.0	41.2	41.2	13.5	14.8	193.0	11.4
38	MT23385	100.0	59.3	59.3	13.5	26.7	192.5	–
Mean		99.0	21.2	41.1	13.3	18.8	190.4	11.5
LSD		7.0	19.1	19.5	4.9	–	1.4	0.6
CV		3.5	44.2	23.4	22.1	–	0.4	2.4

¹ Weight of the VSK sample that fits in a 15.7 mL copper vessel measuring 20 mm in diameter and 50 mm in height

Environmental notes: high in-field disease. VSK values were lower than expected, likely due to too much air applied during sample cleaning. Susceptible checks had almost no seed, ~1-2g (8-20g expected) and the majority of that was sound seed so I suspect that most of the lighter, shriveled VSK kernels were blown out of all samples during cleaning. Any sample without enough seed for micro twt had less than 10g of seed.

Table 5. 2025 Uniform Regional Scab Nursery for Spring Wheat Parents, Brookings, SD.

Entry	Line	Incidence %	Severity %	Disease Index	VSK %	Heading d from 6-1
1	Glenn	100.0	26.0	26.0	21.7	31.7
2	ND2710	100.0	21.0	21.0	30.0	32.7
3	Rollag	100.0	29.8	29.8	26.7	31.3
4	Roblin	100.0	46.3	46.3	70.0	30.3
5	Wheaton	100.0	55.7	55.7	81.7	34.3
6	Norm	100.0	34.7	34.7	50.0	33.3
7	MN21007-3	100.0	29.5	29.5	10.7	38.0
8	MN21061-1	96.7	22.7	22.1	23.3	35.7
9	MN21107-1	100.0	26.7	26.7	16.7	33.7
10	MN21155-3	100.0	24.8	24.8	21.7	33.3
11	MN21320-1	100.0	36.2	36.2	18.3	37.3
12	MN21416-1	100.0	33.2	33.2	14.0	37.3
13	MN21466-2	95.0	18.5	17.6	11.3	30.7
14	MN21482-1	98.3	20.3	20.0	36.7	31.7
15	NDHRS18-0069-B069	100.0	26.0	26.0	21.7	34.7
16	NDHRS18-0069-C025	96.7	21.0	20.5	16.7	32.7
17	NDHRS18-0180-F066	100.0	34.0	34.0	30.0	34.3
18	NDHRS18-0261-C088	100.0	29.2	29.2	26.7	33.7
19	NDHRS19-0082-C16	100.0	25.3	25.3	21.7	32.3
20	NDHRS19-6036-C40	100.0	23.7	23.7	23.3	31.7
21	NDHRS20-0003-C40	98.3	27.2	26.8	31.7	32.0
22	NDHRS20-0358-C108	100.0	32.2	32.2	28.3	30.7
23	SD5095	100.0	27.2	27.2	20.0	34
24	SD5105	100.0	33.2	33.2	25.0	33.7
25	SD5131	100.0	27.3	27.3	21.7	35.3
26	SD5168	100.0	22.0	22.0	18.3	34.7
27	SD5251	96.7	23.3	22.8	18.3	31
28	SD5256	100.0	20.7	20.7	21.7	32.3
29	SD5261	95.0	21.7	21.0	12.3	30.7
30	SD5265	100.0	31.5	31.5	17.3	34.3
31	MT22345	100.0	53.20	53.2	31.7	32.7
32	MT23067	98.3	33.5	33.1	28.3	31.7
33	MT23184	100.0	42.0	42.0	30.0	32.0
34	MT23190	100.0	46.0	46.0	61.7	32.7
35	MT23204	100.0	42.2	42.2	33.3	34.7
36	MT23206	100.0	52.0	52.0	43.3	34.3
37	MT23297	100.0	37.3	37.3	26.7	36.3
38	MT23385	100.0	45.2	45.2	25.0	34.3
Mean		99.3	31.6	31.5	28.0	33.3
LSD		NS	10.2	10.4	10.9	2.1
CV			37.2	37.7	24.1	7.4

Inoculation dates: July 1, 4, 7, 9, and 11. Method: Early application of corn spawn and conidial suspension near flowering.

Environmental notes: Pretty good trial. In addition to the mist-irrigation, there was no shortage of rainy or humid conditions.

Table 6. 2025 Uniform Regional Scab Nursery for Spring Wheat Parents, Prosper,

Entry	Line	FHB 1-9	FDK %	DON ppm
1	Glenn	3.8	9.5	5.4
2	ND2710	2.4	13.3	9.9
3	Rollag	4.3	10.4	7.0
4	Roblin	6.8	25.8	9.2
5	Wheaton	6.5	17.9	10.1
6	Norm	7.5	22.1	13.8
7	MN21007-3	4.4	5.0	11.7
8	MN21061-1	3.0	9.0	7.1
9	MN21107-1	3.2	5.6	7.1
10	MN21155-3	4.9	9.7	7.7
11	MN21320-1	6.7	8.0	6.1
12	MN21416-1	7.0	13.2	13.7
13	MN21466-2	2.9	3.3	5.4
14	MN21482-1	4.0	7.6	4.7
15	NDHRS18-0069-B069	3.7	11.8	11.0
16	NDHRS18-0069-C025	3.9	4.8	5.3
17	NDHRS18-0180-F066	5.8	9.5	8.7
18	NDHRS18-0261-C088	4.8	11.3	8.8
19	NDHRS19-0082-C16	4.7	12.9	12.5
20	NDHRS19-6036-C40	4.2	9.1	6.8
21	NDHRS20-0003-C40	5.3	36.9	6.0
22	NDHRS20-0358-C108	6.3	13.5	4.7
23	SD5095	4.4	16.0	10.3
24	SD5105	7.7	12.7	7.7
25	SD5131	3.5	12.3	8.0
26	SD5168	3.8	9.1	9.9
27	SD5251	4.3	5.8	5.1
28	SD5256	4.5	5.2	3.8
29	SD5261	3.5	5.2	4.9
30	SD5265	3.7	5.1	5.9
31	MT22345	5.5	32.2	9.6
32	MT23067	7.5	6.2	3.3
33	MT23184	5.9	15.4	8.9
34	MT23190	6.5	19.9	8.6
35	MT23204	5.7	15.5	10.6
36	MT23206	7.3	19.2	6.0
37	MT23297	7.1	9.7	9.0
38	MT23385	5.8	11.6	6.8
Mean		5.1	12.4	7.9

This site supported strong FHB disease development, with some additional presence of bacterial leaf streak (BLS). An overhead mist irrigation system delivered consistent, uniform moisture throughout the season, complemented by natural rainfall. Inoculation was carried out uniformly by hand using actively sporulating corn, with three applications spaced one week apart. The combination of steady moisture and thorough inoculation effectively promoted and established disease expression.

Table 7. 2025 Uniform Regional Scab Nursery for Spring Wheat Parents, Fargo, ND.

Entry	Line	FHB 1-9	FDK %	DON ppm
1	Glenn	4.4	7.5	7.9
2	ND2710	2.6	10.2	6.4
3	Rollag	6.4	10.0	6.1
4	Roblin	8.7	24.2	12.5
5	Wheaton	7.7	14.3	14.0
6	Norm	7.3	15.8	19.1
7	MN21007-3	2.4	1.8	5.2
8	MN21061-1	3.3	5.5	4.1
9	MN21107-1	6.4	5.4	6.3
10	MN21155-3	4.4	5.8	7.0
11	MN21320-1	4.5	7.1	8.6
12	MN21416-1	2.8	4.2	4.9
13	MN21466-2	4.5	4.5	6.8
14	MN21482-1	6.6	6.3	5.1
15	NDHRS18-0069-B069	3.5	7.8	8.0
16	NDHRS18-0069-C025	4.0	3.1	4.1
17	NDHRS18-0180-F066	4.1	5.5	9.1
18	NDHRS18-0261-C088	6.2	10.2	8.4
19	NDHRS19-0082-C16	4.1	3.6	7.8
20	NDHRS19-6036-C40	4.0	6.6	6.2
21	NDHRS20-0003-C40	6.8	23.1	6.8
22	NDHRS20-0358-C108	7.3	9.5	6.8
23	SD5095	4.6	10.1	7.3
24	SD5105	7.4	14.4	7.3
25	SD5131	6.3	7.2	6.6
26	SD5168	6.6	7.2	6.8
27	SD5251	5.1	4.6	7.0
28	SD5256	4.6	4.1	3.7
29	SD5261	5.3	3.2	4.7
30	SD5265	2.6	3.8	4.7
31	MT22345	7.1	13.0	16.1
32	MT23067	7.8	9.9	8.7
33	MT23184	8.2	14.2	8.5
34	MT23190	8.3	13.8	7.0
35	MT23204	8.6	16.0	11.2
36	MT23206	7.7	10.8	9.4
37	MT23297	7.8	10.1	10.3
38	MT23385	8.5	10.9	7.5
Mean		5.7	9.1	7.8

This site was managed with a drip-tape irrigation system, and early-season rainfall provided consistent moisture for the developing crop. Inoculum was applied uniformly by hand using actively sporulating corn, with three applications spaced one week apart. As a result, disease pressure was established and progressed effectively.

Table 8. 2025 Uniform Regional Scab Nursery for Spring Wheat Parents - Summary of Means.

Line	Incidence ¹		Severity ¹		Disease		VSK ²		FHB ³		DON ⁴	
	%	Rank	%	Rank	Index ¹	Rank	%	Rank	1-9	Rank	ppm	Rank
No. of Locations >	3		3		3		5		2		4	
Glenn	98.3	6	34.5	24	34.1	22	16.9	27	4.1	9	10.5	26
ND2710	100.0	13	18.4	1	18.4	1	16.7	26	2.5	1	9.8	22
Rollag	100.0	13	31.1	19	31.1	19	14.8	19	5.4	22	7.0	5
Roblin	100.0	13	73.7	37	73.7	37	44.0	37	7.7	38	10.3	24
Wheaton	100.0	13	76.0	38	76.0	38	46.3	38	7.1	30	16.8	37
Norm	100.0	13	61.2	35	61.2	35	30.6	35	7.4	33	16.1	36
MN21007-3	100.0	13	27.9	11	27.9	12	6.9	1	3.4	4	8.4	14
MN21061-1	97.2	4	21.2	3	20.7	3	13.7	16	3.2	3	11.0	29
MN21107-1	100.0	13	30.0	17	30.0	17	9.5	3	4.8	16	8.1	11
MN21155-3	100.0	13	34.2	22	34.2	23	12.8	10	4.7	14	9.1	16
MN21320-1	96.7	1	34.0	21	33.0	21	9.9	5	5.6	24	7.1	7
MN21416-1	100.0	13	30.7	18	30.7	18	11.0	8	4.9	18	11.3	32
MN21466-2	97.2	3	20.9	2	20.5	2	7.0	2	3.7	6	7.2	8
MN21482-1	99.4	10	27.5	9	27.4	9	15.1	20	5.3	21	5.2	2
NDHRS18-0069-B069	100.0	13	28.5	13	28.5	13	13.7	14	3.6	5	9.4	19
NDHRS18-0069-C025	97.2	4	25.0	7	24.5	6	9.9	6	4.0	7	7.7	9
NDHRS18-0180-F066	100.0	13	34.3	23	34.3	24	15.4	22	4.9	19	12.6	35
NDHRS18-0261-C088	100.0	13	27.8	10	27.8	11	15.3	21	5.5	23	9.5	20
NDHRS19-0082-C16	100.0	13	29.2	15	29.2	15	13.6	13	4.4	10	11.7	33
NDHRS19-6036-C40	100.0	13	28.6	14	28.6	14	13.4	11	4.1	8	9.4	18
NDHRS20-0003-C40	99.4	10	50.0	31	49.9	31	27.5	34	6.0	25	8.7	15
NDHRS20-0358-C108	100.0	13	47.1	29	47.1	29	19.0	29	6.8	27	7.0	6
SD5095	100.0	13	31.3	20	31.3	20	14.6	18	4.5	12	10.4	25
SD5105	100.0	13	46.3	26	46.3	26	16.6	25	7.5	36	11.3	30
SD5131	98.3	6	29.7	16	29.4	16	14.3	17	4.9	17	8.1	12
SD5168	100.0	13	26.8	8	26.8	8	13.7	15	5.2	20	9.8	21
SD5251	98.9	9	21.8	4	21.6	4	10.0	7	4.7	15	6.8	4
SD5256	100.0	13	24.6	6	24.6	7	13.6	12	4.6	13	4.4	1
SD5261	98.3	6	24.2	5	24.0	5	9.7	4	4.4	11	5.5	3
SD5265	96.7	1	28.3	12	27.7	10	11.9	9	3.1	2	8.1	10
MT22345	100.0	13	48.3	30	48.3	30	25.4	33	6.3	26	16.8	38
MT23067	99.4	10	46.6	27	46.4	27	16.4	24	7.6	37	8.4	13
MT23184	100.0	13	62.1	36	62.1	36	21.3	30	7.1	28	9.3	17
MT23190	100.0	13	57.5	34	57.5	34	35.1	36	7.4	32	9.9	23
MT23204	100.0	13	56.6	33	56.6	33	23.2	31	7.1	29	10.9	28
MT23206	100.0	13	55.8	32	55.8	32	24.2	32	7.5	35	11.3	31
MT23297	100.0	13	44.8	25	44.8	25	18.0	28	7.4	34	10.7	27
MT23385	100.0	13	46.6	28	46.6	28	16.2	23	7.2	31	12.2	34

¹ Includes the locations of St. Paul, Crookston, and Brookings

² Includes all locations

³ Includes the locations of Prosper and Fargo

⁴ Includes the locations of St. Paul, Crookston, Prosper and Fargo

Table 9. Correlation Coefficients Between Traits, by Location.

Correlation Between	St. Paul	Crookston	Brookings	Prosper	Fargo
Incidence & Severity	0.192	0.304	0.442		
Incidence & Disease Index	0.196	0.331	0.460		
Incidence & Tombstone/VSK/FDK	0.192	0.218	0.282		
Incidence & DON	0.272	0.053			
Severity & Disease Index	1.000	1.000	1.000		
Severity & Tombstone/VSK/FDK	0.802	0.720	0.676		
Severity & DON	0.440	0.383			
Disease Index & Tombstone/VSK/FDK	0.803	0.721	0.676		
Disease Index & DON	0.441	0.382			
Tombstone/VSK/FDK & DON	0.429	0.555		0.341	0.595

Table 10. Correlation coefficients among traits, using means across locations.

	Incidence	Severity	Disease Index
Severity	0.257		
Disease Index	0.277	0.9998	
Tombstone/VSK/FDK	0.205	0.484	0.485
Calculated using 3 locations: St. Paul, Crookston, and Brookings			

Table 11. 2025 Uniform Regional Scab Nursery for Spring Wheat Parents, St. Paul, MN.
Seedling stem rust reactions (P. Olivera-Firpo, USDA-ARS).

Entry	Line	Domestic races						Foreign races				Field evaluation St. Paul	
		QFCSC 95MN1080	QTHJC 69MN399	RKRQC 99KS76A-1	TPMKC 74MN1409	TTTTF 01MN84A-1- 2	TTKSK 04KEN156/0 4	TKKT 14KEN58-1	TTRTF 18GEO189-1	TKKTF 19ETH252-1- 1		7/17/25	7/25/25
1	Glenn	0;	12-	1-	2-	0;1	3	3	3	3+		20 MRR	20 MRR
2	ND2710	0;	2-	;1-	2-	;1-						5 R	10 R
3	Rollag	0;	12-	12-	2-	;1	2	2+	2+	2+3		5 R	10 R
4	Roblin	0	2-LIF	;1-	12	0;1						20 MR	20 MR
5	Wheaton	0	1-1	;1-	1-	0;1						5 R	5 R
6	Norm	0;	;1-	0;	1-	0;1						0	10 R
7	MN21007-3	0;	1-	1- LIF	2-	0;1						0	10 R
8	MN21061-1	0;	;1-	1 LIF	2-	0;						10 R	10 R
9	MN21107-1	0	1-	;1-	0;	1;						0	5 R
10	MN21155-3	1	12-	1	2	1;						20 MR	20 MR
11	MN21320-1	0;	11-	1	2-	1;						0	10 RMR
12	MN21416-1	0;	1-	1-	2-	0;						0	10 R
13	MN21466-2	0;	;1-	1-1	;1-	;1						0	0
14	MN21482-1	0	1	1-1	2-	1;						0	0
15	NDHRS18-0069-B069	0;	2-	1-1	0;	;1						10 R	10 R
16	NDHRS18-0069-C025	;2-	1	12-	2-	1;						5 R	10 R
17	NDHRS18-0180-F066	0;	1-	2-	2-	11+;						0	5 R
18	NDHRS18-0261-C088	0;	1-	0;/;	2-	0;						0	0
19	NDHRS19-0082-C16	0;	11-	1-1	2-	0;	3	33+	1+1	4		10 R	10 R
20	NDHRS19-6036-C40	0;	1-	1-1	0;	1;	3+	3+	3	2-		5 R	5 R
21	NDHRS20-0003-C40	2-	12	3	2	3+						20 MR	20 MR
22	NDHRS20-0358-C108	--	1-	12-	;	3+						0	0
23	SD5095	0;/;	2-	12-	0;	;1						0	5 R
24	SD5105	;2-	2-	12-	2	1;						0	0
25	SD5131	0;	;2-	1	2-	11+;						10 R	10 R
26	SD5168	0;	22-	1	2-	;1						10 RMR	10 RMR
27	SD5251	0;	2	3-	2	;1	3	3+	2	3		0	10 R
28	SD5256	0;	2-	2-	2-	0;1	3	3+	2	3		20 R	20 R
29	SD5261	0;	2-C	2	2-	;1	3	3+	3+	3+		0	0
30	SD5265	;	2-	2-	2-	1;	3+	3+	31	3+		10 R	10 R
31	MT22345	0;	0;	2-	0	0;1	2+	22+	11+	32+		0	10 R
32	MT23067	;	2-	2-	2-	0;1	2+	33+	3	3		10 R	15 R
33	MT23184	2-	2	2	2-	;1						20 MR	30 MR
34	MT23190	;	2C	12-	2-	;1						10 R	10 R
35	MT23204	12-	2	1-;	12-	1;						10 R	10 R
36	MT23206	12-	2	12-	2	0;1						20 MR	30 MR
37	MT23297	;	12-	12-	2-	0;1	3	33+	31+	2+		10 R	10 R
38	MT23385	0;	2-	12	2-	;1	3	3+	33+	3+		0	10 R
*	Line E	3+	3+	3+	3+	3+	4	3+	4	3+		90 S	90 S
*	LMPG-6	22+	22+	3	3	3						70 S	70 S
*	NA101/MqSr7a	1;	3-	1;	3+	11+;	3+	3+	3+	3+		40 MS	40 MS

* Checks

Explanatory notes on next page

Table 11 continued, Explanatory notes.

A. Races used in seedling evaluations:

Race	Origin	Virulence on differential genes
QFCSC	MN, USA	5 8a 9a 9d 9g 10 17 21 McN
QTHJC	MN, USA	5 6 8a 9b 9d 9g 10 11 17 21 McN
RKRQC	MN, USA	5 6 7b 8a, 9a 9b 9d 9g 17 21 36 McN
TPMKC	MN, USA	5 7b 8a 9d 9e 9g 10 11 17 21 36 Tmp McN
TTTTF	MN, USA	5 6 7b 8a 9a 9b 9d 9e 9g 10 11 17 21 30 36 38 Tmp McN

B. Seedling rating scale:

0 to 4 infection type scale of Stakmen et al., 3 or 4 are considered susceptible

"/" denotes heterogeneous, the predominant type given first.

LIF = low infection frequency (fewer number of pustules)

C = extensive chlorosis

N = extensive necrosis

C. Field stem rust nursery evaluations:

The stem rust nursery (X-13) was planted in 1-m row plots.

Nurseries were inoculated by spray inoculations with a single race QFCSC.

F. Field ratings:

Stem rust terminal severity (%) and infection responses (R, MR, MS, S or combination thereof) were rated when entries were at the soft dough stage

BIN-Black internode, a likely indication of the presence of Sr2. This trait is considered to be more consistent than pseudo black chaff (PBC) in the St. Paul nursery.

Sr2 also could be seen at the seedling stage in some cases, labeled as Sr2M (=Sr2 induced mosaic)

Table 12. 2025 Uniform Regional Scab Nursery for Spring Wheat Parents, St. Paul, MN.
Adult rust reactions in the field. Data from inoculated trials using a mixture of races. (CDL)

Entry	Line	Leaf Rust
1	Glenn	60S
2	ND2710	70S
3	Rollag	80S
4	Roblin	80S
5	Wheaton	60S
6	Norm	60MS
7	MN21007-3	50S
8	MN21061-1	20MS
9	MN21107-1	70S
10	MN21155-3	50S
11	MN21320-1	1R
12	MN21416-1	0R
13	MN21466-2	0R
14	MN21482-1	5MR
15	NDHRS18-0069-B069	0R
16	NDHRS18-0069-C025	80S
17	NDHRS18-0180-F066	80S
18	NDHRS18-0261-C088	10M
19	NDHRS19-0082-C16	60S
20	NDHRS19-6036-C40	80S
21	NDHRS20-0003-C40	30MR
22	NDHRS20-0358-C108	20MR
23	SD5095	1R
24	SD5105	0R
25	SD5131	20MS
26	SD5168	5MS
27	SD5251	60S
28	SD5256	10M
29	SD5261	60S
30	SD5265	60S
31	MT22345	50MS
32	MT23067	30MS
33	MT23184	80S
34	MT23190	80S
35	MT23204	50S
36	MT23206	80S
37	MT23297	20MS
38	MT23385	20M

Table 13. Markers Associated With Selected Traits/Genes (J. Fiedler, USDA-ARS).

		Trait																											
		StemRust 3B	StemRust 6A	StemRust 3B	Stem Rust 7D	Leaf Rust 2D	LeafRust 2B	LeafRust 2B	LeafRust 1D	LeafRust 2B	LeafRust 7D	YellowRust 2B	TanSpot 5B	Fhb 3B	Fhb 3B	Fhb 5A	Fhb 5A	Fhb 6B	GrainProt. 6B	Glutenins 1D	Glutenin 1A	Dwarfing 4B	Dwarfing 4B	Dwarfing 6A	Photoper. 2B	Photoper. 2D	Kernel Color	Kernel Color	Kernel Color
Marker		Sr2	Sr8	Sr12	Sr25	Lr2	Lr13	Lr16	Lr21	Lr23	Lr34	Yr7D	Tsn1	Fhb1	Fhb1-TahRC	barc180	barc186	gwm644	GPC	Glud1	umr19	RhtB1	RhtD1	Rht24	PpdB1	PpdD1	Tamyb10-A1	Tamyb10-B1	Tamyb10-D1
1	Glenn	--	S	R	S	R	R	R	R	R	S	S	S	S	S	S	S	S	N	G	2	Wt	Wt	Wt	S	S	R	R	R
2	ND2710	S	S	R	S	R	R	S	S	R	R	S	S	R	R	R	R	S	N	G	1	Wt	Wt	Wt	S	S	R	R	R
3	Rollag	S	S	R	R	S	R	R	S	R	R	S	R	R	R	R	S	R	N	G	2	Wt	D	D	S	S	R	R	R
4	Roblin	S	S	R	S	S	R	S	R	R	R	R	R	S	S	S	S	S	N	G	2	unk	Wt	Wt	I	I	R	R	R
5	Wheaton	S	S	R	S	S	R	S	S	R	R	R	R	S	S	S	S	S	N	G	2	Wt	D	Wt	S	I	W	R	R
6	Norm	S	S	R	S	S	R	R	S	R	R	R	R	S	S	S	S	S	N	G	2	Wt	D	Wt	S	S	W	R	R
7	MN21007-3	--	S	R	S	R	S	S	S	S	R	R	R	R	R	R	S	S	N	G	2	D	Wt	D	S	S	R	R	R
8	MN21061-1	--	S	R	R	S	R	R	S	R	R	R	R	R	R	R	S	S	N	G	1	Wt	Wt	D	S	S	R	R	R
9	MN21107-1	--	S	R	S	S	R	R	S	R	R	S	R	R	R	R	S	S	N	G	2	D	Wt	D	I	I	R	R	R
10	MN21155-3	S	S	S	S	S	R	S	S	R	R	S	R	S	S	S	S	S	N	G	2	D	Wt	Wt	S	S	R	R	R
11	MN21320-1	S	S	R	S	S	R	S	S	S	R	R	R	R	R	R	S	S	N	G	1	D	Wt	D	I	S	R	R	R
12	MN21416-1	--	S	R	S	R	R	R	S	S	S	R	R	R	R	R	R	S	N	G	2	D	Wt	D	I	S	R	R	R
13	MN21466-2	--	S	R	R	S	S	S	R	S	R	R	R	R	R	R	R	S	N	G	2	D	Wt	Wt	S	I	W	R	R
14	MN21482-1	--	S	R	R	S	R	S	S	R	S	R	S	R	R	S	S	S	N	G	2	Wt	Wt	D	S	H	R	R	R
15	NDHRS18-0069-B069	--	S	S	S	S	S	R	R	R	R	R	R	S	S	S	S	S	N	G	2	Wt	D	Wt	S	S	R	R	R
16	NDHRS18-0069-C025	--	S	S	S	R	S	R	U	R	S	R	R	S	S	S	S	S	N	G	2	D	Wt	Wt	S	S	R	R	R
17	NDHRS18-0180-F066	--	S	R	S	R	S	R	R	R	R	R	R	S	R	R	S	S	N	G	2	D	Wt	Wt	S	S	R	R	R
18	NDHRS18-0261-C088	--	S	R	S	R	R	R	S	R	R	S	S	R	R	R	R	S	N	G	2	D	Wt	Wt	S	S	R	R	R
19	NDHRS19-0082-C16	--	S	R	S	R	S	R	R	R	R	R	S	S	S	S	S	S	N	G	2	Wt	Wt	Wt	S	S	R	R	R
20	NDHRS19-6036-C40	--	S	R	S	S	R	R	R	S	S	S	S	R	R	S	S	S	N	G	2	D	Wt	D	S	S	R	R	R
21	NDHRS20-0003-C40	--	S	S	S	S	R	S	R	R	R	R	R	S	S	S	S	S	N	P	2	Wt	Wt	Wt	S	I	R	R	R
22	NDHRS20-0358-C108	S	S	R	S	S	R	R	R	R	R	S	S	S	S	R	R	S	N	G	2	D	Wt	Wt	S	S	R	R	R
23	SD5095	--	S	R	S	S	R	R	S	R	R	R	S	R	R	S	S	S	N	G	2	Wt	Wt	D	S	I	R	R	R
24	SD5105	--	R	R	S	R	S	R	S	R	S	R	R	S	R	S	S	S	N	G	1	D	Wt	Wt	S	S	R	R	R
25	SD5131	--	S	R	S	R	R	R	U	R	S	S	S	S	S	S	S	S	N	G	2	Wt	Wt	D	S	S	R	R	R
26	SD5168	S	S	R	S	R	R	S	S	R	R	R	S	S	S	S	S	S	N	G	2	Wt	Wt	D	S	S	R	W	R
27	SD5251	S	S	R	S	R	S-O	S	S	S	R	R	S	R	R	S	S	S	N	G	2	Wt	Wt	D	S	S	R	R	R
28	SD5256	--	S	R	S	R	S	S	R	R	R	S	R	R	R	S	S	S	N	G	2	Wt	Wt	D	S	S	R	R	R
29	SD5261	--	S	R	R	R	S-O	R	S	S	S	R	S	S	S	S	S	S	N	G	2	Wt	Wt	D	S	S	R	R	R
30	SD5265	--	S	R	S	R	R	R	S	R	R	S	S	R	R	S	S	S	N	G	2	D	Wt	Wt	S	S	R	W	R
31	MT22345	--	S	R	R	S	R	R	S	S	R	R	R	S	S	S	S	S	N	G	1	D	Wt	Wt	I	I	R	R	R
32	MT23067	--	S	R	S	R	R	R	S	S	S	S	R	S	S	S	R	S	N	G	2	D	Wt	Wt	S	S	R	R	R
33	MT23184	S	S	S	S	R	S	S	R	S	S	R	R	S	S	S	S	S	N	G	1	D	Wt	Wt	S	S	R	R	R
34	MT23190	--	S	R	S	S	U	S	S	S	S	S	R	S	S	S	S	S	N	G	1	D	Wt	D	S	S	R	R	R
35	MT23204	S	R	S	S	S	S	S	R	S	S	R	R	S	S	S	S	S	N	G	2	D	Wt	Wt	S	S	R	R	R
36	MT23206	S	S	R	S	S	S-O	S	S	S	S	S	R	S	S	S	S	S	N	G	1	D	Wt	D	S	S	R	R	R
37	MT23297	--	S	S	S	R	S	R	S	R	S	R	R	S	S	S	S	S	N	G	2	D	Wt	Wt	S	S	R	R	R
38	MT23385	S	S	R	S	R	S-O	S	S	S	S	R	R	S	S	S	S	S	N	G	2	D	Wt	Wt	S	S	R	W	R

Information about markers on next page

Allele Code	R = Resistant (Hope allele)	S = Susceptible
R = Resistant (Harvest allele)	S = Susceptible	
R = Resistant	S = Susceptible	
R = Resistant (200 bp present)	S = Susceptible (no 200 bp)	
R = Resistant	S = Susceptible	
R = Ne2/Lr13_ha, Lr13 resistant and hybrid necrosis (Ne2 allele)	S = Ne2/Lr13_hb, Lr13 susceptible, hybrid necrosis	
R = Resistant	S = Susceptible	
R = Resistant	S = Susceptible	
R = Resistant	S = Susceptible	
R = Resistant (Thatcher allele)	S = Susceptible	
R = Resistant	S = Susceptible	
R = Resistant	S = Susceptible	
R = Resistant	S = Susceptible	
R = Resistant	S = Susceptible	
R = Resistant	S = Susceptible	
R = Resistant (161 bp present)	S = Susceptible (no 161 bp)	
I = Increased	N = Normal	
G = Good (5+10)	P = Poor (2+12)	
1=358bp = Ax1 or Ax-null	2 = 341bp = Ax2	
D = Dwarfing = Rht-B1b	Wt = Wild Type = Rht-B1a	
D = Dwarfing = Rht-D1b	Wt = Wild Type = Rht-D1a	
D = Dwarfing	Wt = Wild Type	
I = Insensitive	S = Sensitive	
I = Insensitive	S = Sensitive	
R = Red	W = White	
R = Red	W = White	
R = Red	W = White	

U = No Call or Unknown = Indeterminant designation

Het = Heterozygous call

Table 13 continued, Marker information

Name	Chromosome	Alternate Name	Comment	Manuscript
barc180	5A	GENE-3371_56	equivalent to SR	https://doi.org/10.1007/s00122-011-1573-0
barc186	5A	IWA6412	equivalent to SR	Chao, unpublished
Fhb1	3B	FM227		https://doi.org/10.1007/s00122-016-2727-x
GluD1	1D			https://doi.org/10.1270/jsbbs.57.243
GPC	6B	GPC-B1_DUP		https://doi.org/10.1111/j.1469-8137.2005.01627.x
gwm644	6B		SR	https://doi.org/10.1093/genetics/149.4.2007
Lr13	2B			Anderson lab
Lr16	2B	kwm849		https://doi.org/10.1186/s12870-017-0993-7
Lr21	1D			https://doi.org/10.1007/s11032-012-9773-0
Lr23	2B	sunKASP_16		https://doi.org/10.1007/s11032-017-0628-6
Lr2	2D	flanking markers		https://doi.org/10.1007/s00122-023-04440-9
Lr34	7D	FJ436983-T67957A		https://doi.org/10.1126/science.1166453
PpdB1	2B			https://doi.org/10.1371/journal.pone.0079459
PpdD1	2D			https://doi.org/10.1007/s11032-012-9765-0
Rht24	6A	Rht24-TaAP2.1		Anderson lab
RhtB1	4B			https://doi.org/10.1007/s00122-002-1048-4
RhtD1	4D			https://doi.org/10.1007/s00122-002-1048-4
Sr12	3B	NBLR3		https://doi.org/10.1371/journal.pone.0157029
Sr2	3B		Null allele	https://doi.org/10.1007/s00122-010-1482-7
Sr25	7D		SR	Chao, unpublished
Sr8	6A	kwh53		https://doi.org/10.1094/PHYTO-05-16-0186-R
TaHRC	3B			https://doi.org/10.1007/s00122-018-3159-6
Tamyb10-A1	3A			https://doi.org/10.1007/s00122-011-1555-2
Tamyb10-B1	3B			https://doi.org/10.1007/s00122-011-1555-2
Tamyb10-D1	3D			https://doi.org/10.1007/s00122-011-1555-2
Tsn	5B	Tsn1-1Ka	SNP flanking deletion	Faris Lab unpublished
umn19	1A		SR	https://doi.org/10.1007/s00122-008-0886-0
Yr7	2B	Yr7D		https://doi.org/10.1038/s41477-018-0236-4

Table 14. 2025 Field Stem and Stripe Rust Reactions in Kenya.

Coordinated by the Cereal Disease Lab, St. Paul, MN.

Pablo Olivera and Yue Jin

Nursery	Entry	Line	Njoro International Stem Rust Nursery				
			Stem Rust			Stripe Rust	
			09/24/2025	10/03/2025	10/15/2025	9/16/25	9/23/25
NDSU	1	Glenn	TMS	20MSS	60MSS	20MS	40MSS
UMN	3	Rollag	0	20MSS	40S	5MR	20MRMS
NDSU	19	NDHRS19-0082-C16	TMR	5MSMR	40MSS	5MRMS	40MSMR
NDSU	20	NDHRS19-6036-C40	TMR	5MS	20MSMR	60S	70S
SDSU	27	SD5251	TMS	15MSMR	60S	15MS	40MSMR
SDSU	28	SD5256	TMR	30MSMR	50S	15MRMS	20MRMS
SDSU	29	SD5261	5MSMR	20MSS	60S	20MSMR	40MRMS
SDSU	30	SD5265	0	10MRMS	40MSS	5MR	20MRMS
MSU	31	MT22345	0	5RMR	10RMR	5MR	20MRMS
MSU	32	MT23067	5MS	15MSS	40MSS	5MR	30MSS
MSU	37	MT23297	0	10MSMR	20MSS	0	10MR
MSU	38	MT23385	0	5MS	15MSMR	30MS	40MSS
USDA-ARS CDL	check	Line E	20S	40S	90S	5MRMS	10MRMS
USDA-ARS CDL	check	Linkert	0	5R	5MS	5MR	5MR
USDA-ARS CDL	check	Chris	0	0	5MSMR	0	5MR
USDA-ARS CDL	check	Marquis	TMR	TMS	15MSS	5MR	5MRMS
USDA-ARS CDL	check	Thatcher	0	TMS	5MSMR	5MR	10MRMS
USDA-ARS CDL	check	MN15111-4 (Sr22 shor	0	5R	5RMR	5MR	5MR
USDA-ARS CDL	check	MN15130-1 (Sr26 shor	0	0	TMR	0	0