

## 1999 Uniform Regional Scab Nursery for Spring Wheat Parents

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The Uniform Regional Scab Nursery for Spring Wheat Parents was grown for the 5<sup>th</sup> year in 1999 at 7 locations. These locations included St. Paul, Morris, and Crookston, MN; Langdon and Prosper, ND; Brookings, SD; and Glenlea, Manitoba. All nurseries were misted and inoculated with *Fusarium* to obtain infection in the entries. Langdon did not report data.

A total of 40 entries were tested including four check, (2375, Wheaton, BacUp, and Oslo) and 36 parental lines including 6 durums. Many entries have a Chinese source of resistant in their pedigree, usually derived from Sumai. Replications varied from two to four depending upon location. Methods of inoculation varied somewhat among locations, from macro-conidial spore suspension during anthesis ( $2 \times 10^4$  to  $10 \times 10^4$ ) and/or by scattering infected kernels prior to anthesis (grain spawn) or both. Entries were planted in single rows or hill-planted.

Visual head symptoms of scab infection and post-harvested visual scabby kernel rating, based on a standard set, or counts (Tombstone) are reported in %. Minnesota does not read scabbed kernels beyond 50% so Minnesota locations will have lower % tombstone readings of the kernels. Each location's data are presented separately and entry means were used for the combined location analysis.

Level of disease varied by locations. Location means for Severity ranged from a low of 23% at Manitoba to a high of 65% at Brookings. Disease Index is computed by multiplying Severity x Incidence. Disease Index ranged from a low of 12% at Manitoba to a high of 65% at Brookings. Percent Tombstone (% scabby kernels) ranged from a low of 24% at Crookston to a high of 45% at Brookings. Yield of the plots were taken at four locations to attempt to determine entries ability to maintain yield under very severe scab conditions. Incidence levels approached 100% at several locations, therefore Disease correlated best over locations with % Severity ( $r=0.83$ ) and moderately with incidence ( $r=0.55$ ) over locations. High correlations would be expected because Disease is calculated by Severity and Incidence. Percent Tombstone of kernels was well related to Disease over locations ( $r=0.62$ ) but related rather poorly to both Incidence and Severity ( $r= \sim 0.35$ ). Yield did not relate well to any of the visual head data, but was related ( $r=0.55$ ) to % Tombstone kernels.

Entry means over locations are presented in Table 8. Genotype x environment interaction was present for all traits evaluated, but better consistency among entries was observed in 1999 than in previous years. Possible the resistance expression is becoming more stable across environments as new germplasm is developed.

Collaborators for the 1999 Uniform Regional Scab Nursery for Spring Wheat Parents were:

**Minnesota** - R. Busch, J. Anderson, R. Dill-Macky, (St. Paul); J. Wiersma (Crookston); G. Nelson (Morris).

**South Dakota** - Yue Jin, Jackie Rudd (Brookings)

**North Dakota** - R. Stack, R. Frohberg (Fargo); J. Lukach (Langdon).

**Manitoba** - J. Gilbert, F. Townley-Smith (Winnipeg).

Entries were contributed by:

University of Minnesota; South Dakota State University; North Dakota State University; Agriculture and Agri-Food Canada; Trigen Seed Co.-Minneapolis, MN; AgriPro- Berthoud, Colorado; Western Plant Breeders, Bozeman Montana.

**Table 1. Pedigree and Source of 1999 Uniform Regional Scab Nursery for Spring Wheat**

Entry no.	Entry name	Pedigree	Source
1	2375	CHECK	ND
2	WHEATON	CHECK	MN
3	BACUP	CHECK	MN
4	OSLO	CHECK	AGRIP
5	SD3310	SD8072/SD3067	SD
6	SD3407	COMPOSITE	SD
7	SD3414	COMPOSITE	SD
8	SD3521	SUMAI3/2375//SD0014	SD
9	SD3523	SD3116/2375//FAN1/SD3116	SD
10	ND2710	SUMAI3/WHEATON//GRANDIN	ND
11	ND2831	ND2709/ND688	ND
12	ND2891	F0.2756//ND2710/ND674	ND
13	ND2928	NING7840/ND706	ND
14	ND2941	ND674//ND2710/ND688	ND
15	97NPY3209	HAMER//SUMAI3/DALEN	AGRIP
16	97NPY3263	N92-0098//SUMAI3/DALEN	AGRIP
17	97NPY3294	N92-0176//SUMAI3/DALEN	AGRIP
18	97NPY3445	N92-0338//SUMAI3/DALEN	AGRIP
19	97NPY3449	N92-0338//SUMAI3/DALEN	AGRIP
20	FA997-703		WPB
21	99T412	PROBRAND822/NORM-2M	TRIGEN
22	99T413	PROBRAND822/NORM-12M	TRIGEN
23	99TSP115	PROBRAND822/NORM-15M	TRIGEN
24	99TSP119	SWM169KA/KLCBR'S//H1225B	TRIGEN
25	MN97518	SBE0303-18/MN92320	MN
26	MN97596	2375/SBG0590-83	MN
27	MN97603	GRANDIN/SBG0339-75	MN
28	MN98068	SBG0339-75/2370	MN
29	MN98513	BACUP/MCVEY	MN
30	AC BARRIE	NEEPAWA/COLUMBUS//BW90	MANT
31	HY 644	A16//A*4/BGBSR/3/SCEPTRE/NING8331	MANT
32	98EPWBFHB43	PR2375/ACFOREMOST	MANT
33	93B42-V2A	ACDOMAIN*2/SUMAI3	MANT
34	93B42-AW3C	ACDOMAIN*2/SUMAI3	MANT
35	FA897-733	DURUM	WPB
36	FA897-735	DURUM	WPB
37	DH98031	DURUM	ND
38	DH98052	DURUM	ND
39	DH98053	DURUM	ND
40	DH98069	DURUM	ND
	AGRIP=AgriPro	WPB=Western Plant Breeders	
	MANT=Agriculture and Agrifood Canada, Manitoba		

**Table 2. Uniform Regional Scab Nursery for Spring Wheat Parents, Manitoba, 1999**

Entry	Name	Severity	Incidence	Disease	Disease
			(%)		rank
1	2375	20	43	10	19
2	Wheaton	51	79	43.4	38
3	BacUp	19	42	8.53	17
4	Oslo	51	82	44.1	39
5	SD3310	25	51	12.8	29
6	SD3407	20	26	5.91	12
7	SD3414	19	39	7.66	15
8	SD3521	19	24	4.89	10
9	SD3523	12	21	2.86	5
10	ND2710	21	14	3.66	7
11	ND2831	22	56	12.5	28
12	ND2891	23	50	10.8	25
13	ND2928	15	11	1.77	3
14	ND2941	20	57	11.7	24
15	97NPY3209	17	49	8.77	18
16	97NPY3263	35	37	7.24	32
17	97NPY3294	54	90	49.7	40
18	97NPY3445	11	35	4.35	9
19	97NPY3449	30	66	19.8	36
20	FA997-703	9	18	1.67	2
21	99T412	19	72	14	33
22	99T413	25	65	17.5	34
23	99TSP115	42	66	27.6	37
24	99TSP119	18	70	14.6	31
25	MN97518	13	39	5.39	11
26	MN97596	21	29	5.79	13
27	MN97603	21	59	12.5	27
28	MN98068	20	38	7.93	14
29	MN98513	12	19	2.37	4
30	AC Barrie	19	43	9.25	16
31	HY 644	13	24	3.08	6
32	98EPWAFHB43	19	8	1.56	1
33	93B42-V2A	14	26	4.39	8
34	93B42-AW3C	52	24	9.15	30
35	FA897-733	16	61	10.6	22
36	FA897-735	19	54	10.1	21
37	DH98031	24	74	18.4	35
38	DH98052	23	55	12.6	26
39	DH98053	19	59	11.2	23
40	DH98069	17	55	9.7	20
	Mean	23	46	12	
	LSD 0.05	22	18	11	

One row plot, 2.4 m long. 3 reps. Mist-irrigated. Grain spawn inoculation.

Severity, Incidence, and Disease assessment from 20 spikes.

Weight (grain yield) and Scab (tombstone kernels) from entire row. 50% is maximum scab reading

**Table 3. Uniform Regional Scab Nursery for Spring Wheat Parents, Brookings, SD, 1999**

Entry	Name	Yield	Tombstone	Severity	Incidence	Disease
		g		%		
1	2375	11.3	50	71	100	71
2	Wheaton	4.11	90	84	100	84
3	BacUp	17.3	38	56	100	56
4	Oslo	5.1	88	78	100	78
5	SD3310	36.3	22	39	98	39
6	SD3407	14.3	42	56	100	56
7	SD3414	29	32	45	100	45
8	SD3521	31.7	22	33	92	32
9	SD3523	36.2	38	48	100	48
10	ND2710	25.2	25	35	98	34
11	ND2831	24.5	38	42	100	42
12	ND2891	22.4	32	48	98	48
13	ND2928	10.8	32	54	100	54
14	ND2941	10.8	32	59	100	59
15	97NPY3209	19.2	43	51	100	51
16	97NPY3263	13.6	42	45	100	45
17	97NPY3294	7.9	62	80	100	80
18	97NPY3445	6.6	43	76	100	76
19	97NPY3449	8.4	38	72	100	72
20	FA997-703	7.6	37	72	100	72
21	99T412	8.1	53	76	100	76
22	99T413	5.6	58	73	100	73
23	99TSP115	6.8	7	73	100	73
24	99TSP119	6.3	62	79	100	79
25	MN97518	17.2	40	53	100	53
26	MN97596	13.2	55	68	100	68
27	MN97603	10.2	48	64	98	63
28	MN98068	6.1	47	66	100	66
29	MN98513	21.5	42	54	100	54
30	AC Barrie	2.8	50	87	100	87
31	HY 644	7.1	72	73	100	73
32	98EPWAFHB43	6.2	42	75	100	75
33	93B42-V2A	4.5	30	74	100	74
34	93B42-AW3C	4.1	72	66	100	66
35	FA897-733	5.7	42	68	100	68
36	FA897-735	6.2	38	77	100	77
37	DH98031	5.3	77	84	100	84
38	DH98052	4.6	33	81	100	81
39	DH98053	4	47	81	100	81
40	DH98069	10.9	43	73	100	73
	Mean	12.5	45	65	99.6	65
	LSD 0.05	7	19			19
	Entries 21,2,35,36,39 were late maturing-data less reliable					
	l-meter rows, 3 reps. Mist-irrigated with spray and grain spawn inoculum.					
	Incidence, Severity and Disease assessment from 20 spikes/rep.					
	Grain yield and Scab (tombstone kernels) estimated from entire row					

**Table 4. Uniform Regional Scab Nursery for Spring Wheat Parents, Fargo, ND, 1999**

Entry	Name	Tombstone	Severity	Incidence	Disease
			%		
1	2375	34	63	96	61
2	WHEATON	74	91	100	91
3	BACUP	24	44	96	42
4	OSLO	56	94	100	94
5	SD3310	43	68	98	67
6	SD3407	30	61	100	61
7	SD3414	28	29	90	26
8	SD3521	18	37	98	37
9	SD3523	17	61	100	61
10	ND2710	21	38	100	68
11	ND2831	37	55	100	55
12	ND2891	26	39	98	69
13	ND2928	22	28	98	25
14	ND2941	25	59	100	59
15	97NPY3209	26	67	100	67
16	97NPY3263	27	55	100	55
17	97NPY3294	33	81	100	81
18	97NPY3445	25	55	100	55
19	97NPY3449	24	47	98	46
20	FA997-733	22	90	100	90
21	99T412	33	69	100	69
22	99T413	28	45	100	45
23	99TSP115	31	66	98	65
24	99TSP119	36	58	100	58
25	MN97518	32	49	98	48
26	MN97596	30	55	100	55
27	MN97603	29	33	98	62
28	MN98068	26	51	100	51
29	MN98513	33	61	100	61
30	AC BARRIE	28	60	98	59
31	HY644	29	38	100	38
32	98EPWBFHB4	43	79	100	79
33	93B42-V2A	11	74	98	73
34	93B42-AW3C	30	57	95	54
35	FA897-735	36	92	100	92
36	FA997-703	9	49	100	49
37	DH98031	39	88	100	88
38	DH98052	27	62	100	62
39	DH98053	43	55	100	55
40	DH98069	31	63	100	63
	Mean	30	59	99	59
	FLSD(.05)	14	26	ns	
	Mist-irrigation. Two replicates. Spray and grain spawn inoculation.				
	Incidence, Severity, and Disease estimated from two replicates				
	Scab is count of tombstone kernels				

**Table 5. Uniform Regional Scab Nursery for Spring Wheat Parents, St. Paul, MN, 1999**

Entry	Name	Weight (g)	Tombstone	Severity (%)	Incidence	Disease	Head date days 6-1
1	2375	54	46	40	75	32	22
2	Wheaton	14	50	68	100	68	27
3	BacUp	42	15	39	90	35	19
4	Oslo	27	50	44	85	37	22
5	SD3310	48	36	36	85	31	21
6	SD3407	54	36	45	85	42	21
7	SD3414	79	20	30	78	25	20
8	SD3521	73	21	44	90	40	20
9	SD3523	69	23	21	75	17	25
10	ND2710	54	23	22	80	18	25
11	ND2831	93	26	31	95	29	24
12	ND2891	68	21	38	88	34	22
13	ND2928	70	23	18	70	13	29
14	ND2941	60	26	22	81	19	23
15	97NPY3209	79	26	42	91	39	23
16	97NPY3263	74	13	24	80	21	23
17	97NPY3294	38	48	37	96	35	24
18	97NPY3445	61	18	25	88	22	24
19	97NPY3449	50	21	28	86	24	24
20	FA997-703	60	15	26	90	23	32
21	99T412	43	43	53	100	53	34
22	99T413	63	38	45	98	44	32
23	99TSP115	57	40	54	98	53	30
24	99TSP119	29	36	65	100	65	30
25	MN97518	37	28	51	88	46	22
26	MN97596	57	28	32	81	28	22
27	MN97603	39	26	49	91	45	20
28	MN98068	40	38	58	100	58	26
29	MN98513	84	25	25	71	20	20
30	AC Barrie	32	31	35	93	33	28
31	HY 644	33	25	39	100	39	31
32	98EPWAFHB43	31	36	45	96	43	33
33	93B42-V2A	36	30	40	93	38	31
34	93B42-AW3C	26	45	50	98	50	29
35	FA897-733	45	46	30	88	27	29
36	FA897-735	31	48	38	95	36	27
37	DH98031	30	50	66	100	66	30
38	DH98052	16	48	77	100	77	30
39	DH98053	38	50	61	98	60	34
40	DH98069	25	50	44	98	44	28
	Mean	49	33	41	90	39	26
	LSD 0.05	20	12	18	19	20	

One row plot, 2.4 m long. 3 reps. Mist-irrigated. Spray inoculation.

Severity, Incidence, and Disease assessment from 20 spikes.

Weight (grain yield) and Scab (tombstone kernels) from entire row. 50% is maximum Scab reading.

**Table 6. Uniform Regional Scab Nursery for Spring Wheat Parents, Morris, MN, 1999**

Entry	Name	Weight (g)	Tombstone	Severity (%)	Incidence	Disease	Head date days 6-1
1	2375	88	35	31	90	28	21
2	Wheaton	11	50	62	98	61	25
3	BacUp	79	11	17	68	12	21
4	Oslo	30	50	49	98	48	23
5	SD3310	96	18	32	86	28	21
6	SD3407	66	20	35	93	32	21
7	SD3414	89	11	27	88	23	21
8	SD3521	74	10	29	75	25	22
9	SD3523	84	21	22	68	15	23
10	ND2710	69	16	12	43	5	23
11	ND2831	62	18	19	68	12	23
12	ND2891	77	10	19	71	14	21
13	ND2928	48	21	9	38	3	25
14	ND2941	62	13	29	88	26	23
15	97NPY3209	68	21	43	10	43	22
16	97NPY3263	71	11	25	83	22	23
17	97NPY3294	55	23	47	98	46	23
18	97NPY3445	51	13	20	65	13	24
19	97NPY3449	54	15	35	91	32	22
20	FA997-703	96	11	6	30	2	25
21	99T412	39	30	39	93	36	26
22	99T413	43	28	37	95	35	25
23	99TSP115	28	35	57	10	57	25
24	99TSP119	34	28	42	96	41	25
25	MN97518	45	16	29	86	25	23
26	MN97596	73	25	24	71	18	23
27	MN97603	66	18	19	66	15	21
28	MN98068	31	16	53	10	53	25
29	MN98513	78	35	29	93	27	22
30	AC Barrie	31	28	37	93	35	25
31	HY 644	40	33	15	61	9	25
32	98EPWAFHB43	33	45	9	31	3	26
33	93B42-V2A	34	11	26	66	19	26
34	93B42-AW3C	29	28	38	86	35	26
35	FA897-733	25	45	44	10	44	24
36	FA897-735	30	45	50	10	50	23
37	DH98031	17	46	49	98	48	25
38	DH98052	20	45	34	85	30	25
39	DH98053	19	45	35	81	29	25
40	DH98069	30	50	44	98	43	24
	Mean	52	27	32	81	29	24
	LSD 0.05	20	6	6	21	14	

One row plot, 2.4 m long. 3 reps. Mist-irrigated. Spray and grain spawn inoculation.

Severity, Incidence, and Disease assessment from 20 spikes

Weight (grain yield) and Scab (tombstone kernels) from entire row. 50% is maximum Scab reading.

**Table 7. Uniform Regional Scab Nursery for Spring Wheat Parents, Crookston, MN, 1999**

Entry	Name	Weight (g)	Tombstone	Severity (%)	Incidence	Disease	Head date days 6-1
1	2375	152	23	38	88	39	30
2	Wheaton	28	50	61	96	62	34
3	BacUp	115	11	44	93	43	27
4	Oslo	58	48	63	99	62	29
5	SD3310	235	13	24	76	18	27
6	SD3407	165	18	30	90	27	27
7	SD3414	155	12	23	78	18	26
8	SD3521	204	9	19	75	14	27
9	SD3523	209	13	28	83	26	31
10	ND2710	134	11	16	53	13	30
11	ND2831	143	19	35	95	34	28
12	ND2891	153	23	31	90	28	26
13	ND2928	155	16	29	75	23	34
14	ND2941	126	18	31	85	26	28
15	97NPY3209	101	28	34	90	31	28
16	97NPY3263	164	11	21	78	17	28
17	97NPY3294	106	33	52	98	51	28
18	97NPY3445	131	9	23	66	16	29
19	97NPY3449	85	18	19	66	12	29
20	FA997-703	117	12	22	73	17	38
21	99T412	73	25	53	98	52	36
22	99T413	86	25	48	98	47	35
23	99TSP115	75	30	68	100	68	34
24	99TSP119	93	26	60	100	60	35
25	MN97518	184	15	18	66	12	28
26	MN97596	143	25	28	80	23	29
27	MN97603	91	15	25	85	21	24
28	MN98068	101	21	47	91	45	34
29	MN98513	145	31	28	93	26	27
30	AC Barrie	99	26	47	95	45	32
31	HY 644	122	30	47	100	47	34
32	98EPWAFHB43	101	33	29	80	24	35
33	93B42-V2A	85	11	41	96	40	35
34	93B42-AW3C	91	36	54	100	54	35
35	FA897-733	110	36	67	98	66	30
36	FA897-735	69	36	67	98	66	30
37	DH98031	109	40	49	86	45	31
38	DH98052	75	41	87	100	87	32
39	DH98053	81	31	76	100	76	35
40	DH98069	123	33	77	100	77	31
	Mean	120	24	42	88	39	31
	LSD 0.05	42	10	19	18	10	

One row plot, 2.4 m long. 3 reps. Mist-irrigated. Grain spawn inoculation.

Severity, Incidence, and Disease assessment from 20 spikes.

Weight (grain yield) and Scab (tombstone kernels) from entire row. 50% is maximum scab reading

**Table 8. Summary for 1999 Uniform Regional Scab Nursery for Spring Wheat Parents**

Entry	Name	Yield	Tombstone	Severity	Incidence	Disease	Days head
		g			%		01-Jun
		[4]	[5]	[6]	[6]	[6]	[3]
1	2375	76	37.6	43	76	33	24
2	Wheaton	14	62.6	69	90	62	29
3	BacUp	63	19.6	36	73	26	22
4	Oslo	30	58.4	63	87	42	25
5	SD3310	104	26.4	37	74	27	23
6	SD3407	75	29.2	41	75	31	23
7	SD3414	88	20.6	28	70	20	22
8	SD3521	96	16	30	68	38	23
9	SD3523	99	22.4	32	65	21	26
10	ND2710	71	19.2	24	55	13	26
11	ND2831	81	27.6	34	75	26	25
12	ND2891	80	22.2	33	74	24	23
13	ND2928	71	22.6	25	56	14	29
14	ND2941	65	22.6	36	75	27	25
15	97NPY3209	67	28.8	42	65	27	24
16	97NPY3263	81	20.6	34	70	24	25
17	97NPY3294	52	39.8	58	87	30	25
18	97NPY3445	62	21.6	35	65	23	26
19	97NPY3449	49	23	38	74	28	25
20	FA997-703	70	19.2	37	57	21	32
21	99T412	41	36.6	51	86	44	32
22	99T413	49	35.4	45	83	37	31
23	99TSP115	42	28.6	60	71	43	30
24	99TSP119	41	37.6	53	88	47	30
25	MN97518	71	26.2	35	73	26	24
26	MN97596	72	32.4	38	68	26	25
27	MN97603	52	27.2	35	75	26	22
28	MN98068	45	29.6	49	66	32	28
29	MN98513	82	33	34	71	24	23
30	AC Barrie	41	32.4	47	77	36	28
31	HY 644	51	37.8	37	70	26	30
32	98EPWAFHB43	43	39.8	42	60	25	31
33	93B42-V2A	40	18.6	44	71	31	31
34	93B42-AW3C	48	42.2	52	75	39	30
35	FA897-733	46	41	52	66	34	28
36	FA897-735	34	35.2	50	66	33	27
37	DH98031	40	50.4	60	87	52	29
38	DH98052	29	38.6	60	86	52	29
39	DH98053	36	43.2	54	83	45	31
40	DH98069	47	41.2	53	82	43	28
	Mean	58	31.7	44	74	33	27
	LSD 0.05	27	10.4	13	17	11	3
	[n]=no. of locations. Mist-irrigated, spray and/or grain spawn inoculation.						
	Incidence, Severity, and Disease estimated Disease=Severity*Incidence.						
	Scab is count of tombstone kernels as %.						