1999 MINNDAK UNIFORM FUSARIUM HEAD BLIGHT NURSERY REPORT

JUNE 2000

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INTRODUCTION

This report contains information from the 1999 MinnDak Uniform Barley Fusarium head blight (FHB) nurseries grown at St. Paul and Crookston, MN and Fargo and Langdon, ND. All entries in the nurseries were replicated a minimum of three times per environment and were grown in irrigated nurseries inoculated with *Fusarium graminearum*. The nurseries at Crookston, Fargo, and Langdon were inoculated using the grain spawn method. The nursery at St. Paul was inoculated with macroconidia. Severity of FHB was determined at the soft dough stage by determining the ratio of infected kernels to total kernels on 10-20 spikes per entry. Drs. Kevin Smith and Don Rasmusson, and staff on their project oversaw nurseries in Minnesota. Dr. Brian Steffenson and staff on his project oversaw nurseries in North Dakota.

In the 1999 nursery, all entries were not grown at every location. This was especially true for checks. For the 2000 nurseries, a list of checks chosen by barley researchers present at the Barley Breakout Group Session at the 1999 Scab Forum will be used. The checks will be CIho 4196 (resistant two-row check), Chevron (resistant six-row check), Robust and Stander (susceptible six-row checks), MNBrite (moderately resistant six-row check), and Conlon (moderately resistant two-row check).

In discussions concerning the MinnDak nursery at the Barley Breakout Group Session, the group decided that three-non-irrigated, non-inoculated sites should be added. Disease levels in the irrigated nurseries often are high and only the most resistant lines appear resistant. Lines with moderate levels of resistance can be overwhelmed with FHB in these nurseries and appear susceptible. Growers in the upper-Midwest U.S. do not experience as severe of conditions in their fields as are present in the irrigated-inoculated nurseries. Inclusion of dryland nurseries will allow us to screen lines under conditions similar to those found in growers' fields. One dryland nursery in Minnesota and two in North Dakota will be grown this summer. Irrigated-inoculated nurseries continue to be grown at Crookston, St. Paul, Fargo, and Langdon.

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Table 1. Mean FHB severity, DON concentration and days to heading of entries grown in the 1999 MinnDak Nursery at four Midwest locations.

	Nursery Location								
	St. Paul, MN		Crookston, MN			Fargo, ND		Langdon, ND	
Entry	Days to heading (after 31 May)	FHB severity (%)	Days to heading (after 31 May)	FHB severity (%)	DON (ppm)	FHB severity (%)	DON (ppm)	FHB severity (%)	DON (ppm)
Robust	22.7	33.6	27.0	20.8	35.9				
Stander	23.3	36.2	28.7	38.3	36.8				
MNBrite	24.3	14.6	28.7	20.2	29.3	6.2	9.4	33.0	60.4
Foster	22.3	30.4	27.7	35.4	24.1				
M98	22.0	35.9	27.0	34.7	31.3	10.8	17.1	18.8	61.6
FB4-54	23.3	17.4	29.0	27.5	29.7	10.0		38.5	
FB4-93									
6B93-2978	22.7	28.4	28.7	32.5	28.8	10.5	13.6	40.0	75.6
Steptoe	23.7	48.3	29.0	59.2	41.0	25.0	23.1	47.8	72.4
PI383933	8.0	90.8	18.3	100.0	24.5				
Sudan	24.7	42.9	28.7	40.7	29.1	9.6	8.0	15.1	57.6
Zhedar 2	34.7	1.1	37.0		15.3	3.4	5.6	8.4	25.7
CIho 4196	33.7	0.7	37.7		11.9	0.6	7.8	5.5	26.5
Chevron	30.0	9.2	34.0	7.5	12.9	1.3	2.8	17.8	41.6
FEG4-66	27.7	31.2	30.7	20.9	29.1	8.3	9.7	25.2	91.5
FEG4-67	23.0	19.4	27.0	13.5	21.4	5.1	7.7	8.8	61.0
FEG9-15	36.0	21.4	36.3		34.4	8.4	25.4	46.9	80.0
FEG10-09	24.0	24.1	28.3	28.4	29.0	7.5	10.7	16.9	48.3
FEG11-91	33.0	10.4	31.0	21.8	34.8	8.9	12.8	31.9	60.1
C97-21-38	28.7	25.1	33.7	17.5	28.1	4.2	16.2	13.3	58.3
C97-21-63	29.0	15.5	37.3		26.3	7.4	19.9	35.0	74.3
C97-24-44	30.7	15.9	33.7	28.3	37.7	8.3	22.0	40.8	67.6
2ND16554	24.0	12.9	27.7	21.2	22.2	4.1	11.7	13.3	44.4
2ND16092	20.0	11.1	25.0	10.6	11.7	5.8	7.6	22.9	27.6
2ND17470	25.3	14.9	27.7	15.1	14.4	1.3	3.4	10.9	27.8
2ND17490	25.7	16.0	30.7	14.4	13.7	2.6	5.0	11.2	28.0
2ND16461	24.0	14.9	27.7	13.3	15.5	1.9	7.5	14.3	27.6
2ND17518	23.7	17.2	29.3	19.0	22.5	1.9	7.5	25.6	60.6
6B94-7378	22.7	31.1	27.7	32.8	40.1	10.5	17.7	30.7	102.2
6B94-8253	23.7	26.2	28.3	38.3	41.0	6.9	9.9	14.9	72.2
6B95-2482	22.0	28.3	27.3	19.7	37.7	6.2	10.6	6.7	52.9
Average	25.3	24.2	29.7	28.1	27.0	6.8	11.7	22.8	56.2
Std Dev.	5.3	16.9	4.1	18.6	9.3	4.9	6.2	12.9	21.3
Minimum	8.0	0.7	18.3	7.5	11.7	0.6	2.8	5.5	25.7
Maximum	36.0	90.8	37.7	100.0	41.0	25.0	25.4	47.8	102.2

Table 2. Mean FHB severity of entries grown in the 1999 MinnDak Nursery at four Midwest locations.

	FHB Severity (%)					
Entry	St. Paul, MN	Crookston, MN	Fargo, ND	Langdon, ND	Average[1]	Std. Dev.[1]
Robust	33.6	20.8				
Stander	36.2	38.3				
MNBrite	14.6	20.2	6.2	33.0	18.5	11.3
Foster	30.4	35.4				
M98	35.9	34.7	10.8	18.8	25.0	12.3
FB4-54	17.4	27.5	10.0	38.5	23.3	12.4
FB4-93						
6B93-2978	28.4	32.5	10.5	40.0	27.9	12.5
Steptoe	48.3	59.2	25.0	47.8	45.1	14.4
PI383933	90.8	100.0				
Sudan	42.9	40.7	9.6	15.1	27.1	17.2
Zhedar 2	1.1					
Ciho 4196	0.7		0.6	5.5		
Chevron	9.2	7.5	1.3	17.8	8.9	6.8
FEG4-66	31.2	20.9	8.3	25.2	21.4	9.7
FEG4-67	19.4	13.5	5.1	8.8	11.7	6.2
FEG9-15	21.4		8.4	46.9		
FEG10-09	24.1	28.4	7.5	16.9	19.2	9.1
FEG11-91	10.4	21.8	8.9	31.9	18.3	10.7
C97-21-38	25.1	17.5	4.2	13.3	15.0	8.7
C97-21-63	15.5		7.4	35.0		
C97-24-44	15.9	28.3	8.3	40.8	23.3	14.2
2ND16554	12.9	21.2	4.1	13.3	12.9	7.0
2ND16092	11.1	10.6	5.8	22.9	12.6	7.3
2ND17470	14.9	15.1	1.3	10.9	10.5	6.5
2ND17490	16.0	14.4	2.6	11.2	11.1	6.0
2ND16461	14.9	13.3	1.9	14.3	11.1	6.2
2ND17518	17.2	19.0	1.9	25.6	15.9	10.0
6B94-7378	31.1	32.8	10.5	30.7	26.3	10.6
6B94-8253	26.2	38.3	6.9	14.9	21.6	13.6
6B95-2482	28.3	19.7	6.2	6.7	15.2	10.7
Average	24.2	28.1	6.8	22.8		
Std Dev.	16.9	18.6	4.9	12.9		
Minimum	0.7	7.5	0.6	5.5	8.9	6.0
Maximum	90.8	100.0	25.0	47.8	45.1	17.2

[1]Averages and standard deviations calculated for those entries in which data were available in all environments.

Table 3. Mean DON concentration of entries grown in the 1999 MinnDak Nursery at three Midwest locations.

	DON concentration (ppm)				
Entry	Crookston, MN	Fargo, ND	Langdon, ND	Average[1]	Std. Dev.[1]
Robust	35.9				
Stander	36.8				
MNBrite	29.3	9.4	60.4	33.0	25.7
Foster	24.1				
M98	31.3	17.1	61.6	36.7	22.8
FB4-54	29.7				
FB4-93					
6B93-2978	28.8	13.6	75.6	39.3	32.3
Steptoe	41.0	23.1	72.4	45.5	25.0
PI383933	24.5				
Sudan	29.1	8.0	57.6	31.6	24.9
Zhedar 2	15.3	5.6	25.7	15.5	10.1
Ciho 4196	11.9	7.8	26.5	15.4	9.8
Chevron	12.9	2.8	41.6	19.1	20.1
FEG4-66	29.1	9.7	91.5	43.4	42.7
FEG4-67	21.4	7.7	61.0	30.0	27.7
FEG9-15	34.4	25.4	80.0	46.6	29.3
FEG10-09	29.0	10.7	48.3	29.3	18.8
FEG11-91	34.8	12.8	60.1	35.9	23.7
C97-21-38	28.1	16.2	58.3	34.2	21.7
C97-21-63	26.3	19.9	74.3	40.1	29.7
C97-24-44	37.7	22.0	67.6	42.4	23.1
2ND16554	22.2	11.7	44.4	26.1	16.7
2ND16092	11.7	7.6	27.6	15.6	10.6
2ND17470	14.4	3.4	27.8	15.2	12.2
2ND17490	13.7	5.0	28.0	15.6	11.6
2ND16461	15.5	7.5	27.6	16.9	10.1
2ND17518	22.5	7.5	60.6	30.2	27.3
6B94-7378	40.1	17.7	102.2	53.3	43.8
6B94-8253	41.0	9.9	72.2	41.0	31.2
6B95-2482	37.7	10.6	52.9	33.7	21.4
Average	27.0	11.5	56.8		
Std Dev.	9.3	5.9	21.0		
Minimum	11.7	2.8	26.5	15.2	9.8
Maximum	41.0	25.4	102.2	53.3	43.8

[1]Averages and standard deviations calculated for those entries in which data were available in all environments.

Table 4. Mean days to heading of entries grown in the 1999 MinnDak Nursery at two Midwest locations.

	Days to heading (after 31 May)			
Entry	St. Paul, MN	Crookston, MN	Average[1]	Std. Dev.[1]
Robust	22.7	27.0	24.8	3.1
Stander	23.3	28.7	26.0	3.8
MNBrite	24.3	28.7	26.5	3.1
Foster	22.3	27.7	25.0	3.8
M98	22.0	27.0	24.5	3.5
FB4-54	23.3	29.0	26.2	4.0
FB4-93				
6B93-2978	22.7	28.7	25.7	4.2
Steptoe	23.7	29.0	26.3	3.8
PI383933	8.0	18.3	13.2	7.3
Sudan	24.7	28.7	26.7	2.8
Zhedar 2	34.7	37.0	35.8	1.6
Ciho 4196	33.7	37.7	35.7	2.8
Chevron	30.0	34.0	32.0	2.8
FEG4-66	27.7	30.7	29.2	2.1
FEG4-67	23.0	27.0	25.0	2.8
FEG9-15	36.0	36.3	36.2	0.2
FEG10-09	24.0	28.3	26.2	3.1
FEG11-91	33.0	31.0	32.0	1.4
C97-21-38	28.7	33.7	31.2	3.5
C97-21-63	29.0	37.3	33.2	5.9
C97-24-44	30.7	33.7	32.2	2.1
2ND16554	24.0	27.7	25.8	2.6
2ND16092	20.0	25.0	22.5	3.5
2ND17470	25.3	27.7	26.5	1.6
2ND17490	25.7	30.7	28.2	3.5
2ND16461	24.0	27.7	25.8	2.6
2ND17518	23.7	29.3	26.5	4.0
6B94-7378	22.7	27.7	25.2	3.5
6B94-8253	23.7	28.3	26.0	3.3
6B95-2482	22.0	27.3	24.7	3.8
Average	25.3	29.7		
Std Dev.	5.3	4.1		
Minimum	8.0	18.3	13.2	0.2
Maximum	36.0	37.7	36.2	7.3

[1]Averages and standard deviations calculated for those entries in which data were available in all environments.

Table 5. Pedigree, row type, and developer of entries grown in the 1999 MinnDak Nursery.

Entry	Row type	Pedigree	Developer	Comments
Robust	6	Morex/Manker	Univ. of Minnesota	
Stander	6	Robust*2/3/Cree/Bonanza//Manker/4/Robust/Bumper	Univ. of Minnesota	
MNBrite	6	M90-89/M69	Univ. of Minnesota	
Foster	6	Robust/3/ND5570//Glenn/Karl	North Dakota State Univ.	
M98	6	M78/M79	Univ. of Minnesota	
FB4-54	6	MNBrite/M81	Univ of Minnesota	
FB4-93	6	MNBrite/M81	Univ of Minnesota	
6B93-2978	6	Bumper/Karl//Bumper/Manker/3/Bumper/Karl/4/Excel	Busch Ag. Resources Inc.	
Steptoe	6	Wash. Sel. 3564/Unitan	Washington State Univ.	Susceptible check
PI383933	6	Ko. 1-18/Kyoto Nakate	Japan	Susceptible check
Sudan	6	Unknown	Uncertain	Susceptible check
Zhedar 2	2	Unknown	China	Resistant check
Ciho 4196	2	Unknown	China	Resistant check
Chevron	6	Unknown	Switzerland	Resistant check
FEG4-66	6	Atahualpa/2*M81	Univ. of Minnesota	
FEG4-67	6	Atahualpa/2*M81	Univ. of Minnesota	
FEG9-15	6	M95-1/Stander//M81	Univ. of Minnesota	
FEG10-09	6	M93-215/M81//Stander	Univ. of Minnesota	
FEG11-91	6	M92-514/2*Stander	Univ. of Minnesota	
C97-21-38	6	ND15483/C93-3230 (#30)	North Dakota State Univ.	
C97-21-63	6	ND15483/C93-3230 (#30)	North Dakota State Univ.	
C97-24-44	6	ND15483/C93-3286 (#76)	North Dakota State Univ.	
2ND16554	2	Conlon/ND14636	North Dakota State Univ.	
2ND16092	2	ND13297/ND14701	North Dakota State Univ.	
2ND17470	2	ND15471/ND15509	North Dakota State Univ.	
2ND17490	2	ND15486/ND15509	North Dakota State Univ.	
2ND16461	2	ND13296/ND14760	North Dakota State Univ.	
2ND17518	2	DH6/ND15062	North Dakota State Univ.	
6B94-7378	6	Azure/6B82-2618//Excel	Busch Ag. Resources Inc.	
6B94-8253	6	B1614/Stander	Busch Ag. Resources Inc.	
6B95-2482	6	6B89-2126/ND10981	Busch Ag. Resources Inc.	

Miscellaneous pedigrees of lines with FHB resistance:
F95-1 = Chevron/M69//Stander
F93-215 = Harrington/Excel//M77
M92-514 = Chevron/M69
C93-3230 (#30) = B2912/Heitpas 5//B2912 (Busch Ag. Resources breeding line)
C93-3286 (#76) = 6B89-2126/PC84//B2912/Heitpas 5 (Busch Ag. Resources breeding line)
ND15062 = ND13254//Bowman/PC84