2001 MINNDAK UNIFORM FUSARIUM HEAD BLIGHT NURSERY – FINAL REPORT

FEBRUARY 2002

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INTRODUCTION

This report contains information from the 2001 MinnDak Uniform Barley Fusarium head blight (FHB) nurseries grown at Crookston, MN, and Fargo, Langdon, Osnabrock, and Park River, ND. Two nurseries were grown at Crookston. One of the nurseries at Crookston, and the nurseries at Fargo, and Langdon were irrigated. One nursery at Crookston, and the nurseries at Osnabrock and Park River were not irrigated and are referred to as "dryland" nurseries. Dryland nurseries were added in 2000 to provide conditions that growers would observe in their fields. Conditions in the irrigated field generally are more severe than growers would observe in most years and result in entries with moderate FHB resistance being overwhelmed and appearing susceptible. Only entries with levels of resistance similar to Chevron or CIho 4196 are scored as resistant in the irrigated nurseries. Dryland nurseries are needed to identify entries with moderate levels of FHB resistance. The nurseries at Crookston, Fargo, Langdon, and Park River were inoculated with *Fusarium graminearum* using the grain spawn method. All entries in the nurseries were replicated a minimum of three times.

Dr. Kevin Smith and staff on his project oversaw the nurseries in Minnesota. Mr. Yongliang Sun and staff on his project oversaw nurseries in Fargo; Dr. Linnea Skoglund and her staff oversaw the nursery at Park River; and Dr. Rich Horsley and his staff oversaw the nurseries at Langdon and Osnabrock, ND.

Each nursery included a set of common checks. The checks were 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). Percent 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, and then multiplying by 100. Severity data were collected at Crookston (irrigated), MN, and all North Dakota locations. Percent FHB incidence was determined at the soft dough stage by determining the ratio of infected spikes to total spikes on 10-30 spikes per entry, and then multiplying by 100. Incidence data were collected in the dryland nurseries at Park River and Osnabrock, and the irrigated nurseries at Fargo and Langdon.

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Table 1. Mean Fusarium head blight severity of entries grown in the 2001 MinnDak Nursery at three irrigated and two dryland sites in the upper Midwest.

LABEL	Fargo, ND Irrigated	Langdon, ND Irrigated	Crookston, MN Irrigated	Osnabrock, ND Dryland	Park River, ND Dryland	Average Irrigated	Average Dryland	Average Overall
	% Severity							
Chevron	2.0	11.0	0.3	1.0	0.0	4.4	0.5	2.9
CIho4196	11.7	4.0	1.0	2.0	0.0	5.6	1.0	3.7
Conlon	6.7	11.0	23.8	2.0	5.5	13.8	3.8	9.8
MNBrite	2.7	9.0	13.8	1.0	2.5	8.5	1.8	5.8
Robust	4.3	13.3	16.0	1.3	9.5	11.2	5.4	8.9
Stander	5.0	13.3	28.7	2.0	6.0	15.7	4.0	11.0
6B95-2482	4.0	14.3	19.6	1.3	4.4	12.6	2.8	8.7
6B96-3733	7.0	14.7	25.7	1.3	3.0	15.8	2.2	10.3
6B97-2037	4.7	20.7	29.2	1.7	6.4	18.2	4.0	12.5
6B98-9022	6.0	21.7	30.0	1.0	3.9	19.2	2.4	12.5
6B98-9170	5.7	17.7	40.7	1.3	6.5	21.4	3.9	14.4
FEG2-94	5.0	15.0	15.6	2.3	5.3	11.9	3.8	8.6
FEG14-76	3.3	17.0	17.2	1.3	4.5	12.5	2.9	8.7
FEG18-40	3.3	11.3	15.3	2.0	0.9	10.0	1.4	6.5
FEG31-91	1.3	15.3	4.9	0.3	1.0	7.2	0.7	4.6
FEG39-03	3.7	10.3	17.8	3.0	1.6	10.6	2.3	7.3
2ND18172	8.7	11.7	13.5	2.3	3.0	11.3	2.7	7.8
2ND18220	8.0	17.0	8.7	2.7	2.4	11.2	2.5	7.7
2ND18365	8.0	15.0	7.7	3.3	8.1	10.2	5.7	8.4
2ND19052	7.0	8.7	11.3	2.3	1.5	9.0	1.9	6.2
2ND19099	8.0	24.7	27.7	3.0	6.5	20.1	4.8	14.0
2ND19130	8.7	6.3	8.2	1.0	1.3	7.7	1.1	5.1
ND19191	4.7	14.7	4.8	2.0	2.1	8.1	2.1	5.7
ND19192	7.0	10.0	1.4	0.7	0.0	6.1	0.4	3.8
ND19193	7.7	13.0	3.3	2.0	0.0	8.0	1.0	5.2
ND19194	9.7	16.7	8.2	2.0	4.4	11.5	3.2	8.2
ND19195	3.7	11.0	2.8	1.0	2.0	5.8	1.5	4.1
ND19196	3.7	11.7	0.7	1.0	3.3	5.4	2.1	4.1
Average	5.8	13.6	14.2	1.7	3.4	11.2	2.6	7.7
Stnd Dev.	2.5	4.5	10.8	0.8	2.6	4.6	1.4	3.2
Minimum	1.3	4.0	0.3	0.3	0.0	4.4	0.4	2.9
Maximum	11.7	24.7	40.7	3.3	9.5	21.4	5.7	14.4

Table 2. Mean Fusarium head blight severity of entries grown in the 2001 MinnDak Nursery at three irrigated and Two dryland locations in the Midwest U.S. expressed as a percentage of Robust.

LABEL	Fargo, ND Irrigated	Langdon, ND Irrigated	Crookston, MN Irrigated	Osnabrock, ND Dryland	Park River, ND Dryland	Average Irrigated	Average Dryland	Average Overall
	----------% Severity of Robust----------							
Chevron	46.5	82.7	1.9	76.9	0.0	43.7	38.5	41.6
CIho4196	272.1	30.1	6.3	153.8	0.0	102.8	76.9	92.5
Conlon	155.8	82.7	149.0	153.8	57.9	129.2	105.9	119.8
MNBrite	62.8	67.7	86.5	76.9	26.3	72.3	51.6	64.0
Robust	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Stander	116.3	100.0	179.2	153.8	63.2	131.8	108.5	122.5
6B95-2482	93.0	107.5	122.5	100.0	46.1	107.7	73.0	93.8
6B96-3733	162.8	110.5	160.4	100.0	31.6	144.6	65.8	113.1
6B97-2037	109.3	155.6	182.3	130.8	67.1	149.1	98.9	129.0
6B98-9022	139.5	163.2	187.5	76.9	40.8	163.4	58.9	121.6
6B98-9170	132.6	133.1	254.2	100.0	68.4	173.3	84.2	137.6
FEG2-94	116.3	112.8	97.3	176.9	55.3	108.8	116.1	111.7
FEG14-76	76.7	127.8	107.5	100.0	47.4	104.0	73.7	91.9
FEG18-40	76.7	85.0	95.4	153.8	9.2	85.7	81.5	84.0
FEG31-91	30.2	115.0	30.4	23.1	10.5	58.6	16.8	41.9
FEG39-03	86.0	77.4	111.5	230.8	17.1	91.6	123.9	104.6
2ND18172	202.3	88.0	84.4	176.9	31.6	124.9	104.3	116.6
2ND18220	186.0	127.8	54.2	207.7	25.0	122.7	116.3	120.1
2ND18365	186.0	112.8	47.9	253.8	85.5	115.6	169.7	137.2
2ND19052	162.8	65.4	70.8	176.9	15.8	99.7	96.4	98.4
2ND19099	186.0	185.7	172.9	230.8	68.4	181.6	149.6	168.8
2ND19130	202.3	47.4	51.0	76.9	13.2	100.2	45.0	78.2
ND19191	109.3	110.5	30.2	153.8	22.4	83.3	88.1	85.3
ND19192	162.8	75.2	9.0	53.8	0.0	82.3	26.9	60.2
ND19193	179.1	97.7	20.4	153.8	0.0	99.1	76.9	90.2
ND19194	225.6	125.6	51.0	153.8	46.1	134.1	99.9	120.4
ND19195	86.0	82.7	17.3	76.9	21.1	62.0	49.0	56.8
ND19196	86.0	88.0	4.2	76.9	34.2	59.4	55.6	57.9
Average	134.0	102.1	88.7	132.1	35.9	108.3	84.0	98.6
Stnd Dev.	58.2	33.8	67.4	58.0	27.3	34.8	35.2	30.8
Minimum	30.2	30.1	1.9	23.1	0.0	43.7	16.8	41.6
Maximum	272.1	185.7	254.2	253.8	100.0	181.6	169.7	168.8

Table 3. Mean Fusarium head blight incidence of entries grown in the 2001 MinnDak Nursery at three irrigated and two dryland sites in the upper Midwest U.S.

LABEL	Fargo, ND Irrigated	Langdon, ND Irrigated	Osnabrock, ND Dryland	Park River, ND Dryland	Average Irrigated	Average Dryland	Overall
	% Incidence						
Chevron	66.7	80.0	23.3	0.0	73.4	11.7	42.5
CIho4196	96.7	50.0	33.3	0.0	73.4	16.7	45.0
Conlon	76.7	96.7	36.7	35.0	86.7	35.9	61.3
MNBrite	70.0	96.7	33.3	22.5	83.4	27.9	55.6
Robust	86.7	100.0	53.3	65.0	93.4	59.2	76.3
Stander	93.3	96.7	40.0	55.0	95.0	47.5	71.3
6B95-2482	83.3	96.7	36.7	45.0	90.0	40.9	65.4
6B96-3733	90.0	96.7	33.3	25.0	93.4	29.2	61.3
6B97-2037	90.0	100.0	36.7	50.0	95.0	43.4	69.2
6B98-9022	96.7	100.0	30.0	30.0	98.4	30.0	64.2
6B98-9170	93.3	100.0	43.3	47.5	96.7	45.4	71.0
FEG2-94	96.7	100.0	46.7	37.5	98.4	42.1	70.2
FEG14-76	66.7	96.7	23.3	35.0	81.7	29.2	55.4
FEG18-40	76.7	100.0	36.7	10.0	88.4	23.4	55.9
FEG31-91	50.0	93.3	16.7	12.5	71.7	14.6	43.1
FEG39-03	73.3	100.0	40.0	17.5	86.7	28.8	57.7
2ND18172	93.3	90.0	33.3	30.0	91.7	31.7	61.7
2ND18220	83.3	80.0	33.3	22.5	81.7	27.9	54.8
2ND18365	76.7	93.3	36.7	50.0	85.0	43.4	64.2
2ND19052	83.3	73.3	33.3	12.5	78.3	22.9	50.6
2ND19099	93.3	100.0	33.3	42.5	96.7	37.9	67.3
2ND19130	86.7	66.7	20.0	15.0	76.7	17.5	47.1
ND19191	86.7	100.0	43.3	20.0	93.4	31.7	62.5
ND19192	90.0	93.3	23.3	0.0	91.7	11.7	51.7
ND19193	100.0	100.0	40.0	0.0	100.0	20.0	60.0
ND19194	100.0	96.7	43.3	35.0	98.4	39.2	68.8
ND19195	83.3	96.7	36.7	17.5	90.0	27.1	58.6
ND19196	83.3	93.3	13.3	30.0	88.3	21.7	55.0
Average	84.5	92.4	34.0	27.2	88.5	30.6	59.5
Std Dev.	11.7	12.0	9.1	17.9	8.3	11.7	8.9
Minimum	50.0	50.0	13.3	0.0	71.7	11.7	42.5
Maximum	100.0	100.0	53.3	65.0	100.0	59.2	76.3

Table 4. Mean Fusarium head blight incidence of entries grown in the 2001 MinnDak Nursery at three irrigated and two dryland locations in the Midwest U.S. expressed as a percentage of Robust.

	Fargo, ND	Langdon, ND	Osnabrock, ND	Park River, ND	Average		
LABEL	Irrigated	Irrigated	Dryland	Dryland	Irrigated	Dryland	Overall
	% Incidence of Robust						
Chevron	76.9	80.0	43.7	0.0	78.5	21.9	50.2
CIho4196	111.5	50.0	62.5	0.0	80.8	31.2	56.0
Conlon	88.5	96.7	68.9	53.8	92.6	61.4	77.0
MNBrite	80.7	96.7	62.5	34.6	88.7	48.5	68.6
Robust	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Stander	107.6	96.7	75.0	84.6	102.2	79.8	91.0
6B95-2482	96.1	96.7	68.9	69.2	96.4	69.0	82.7
6B96-3733	103.8	96.7	62.5	38.5	100.3	50.5	75.4
6B97-2037	103.8	100.0	68.9	76.9	101.9	72.9	87.4
6B98-9022	111.5	100.0	56.3	46.2	105.8	51.2	78.5
6B98-9170	107.6	100.0	81.2	73.1	103.8	77.2	90.5
FEG2-94	111.5	100.0	87.6	57.7	105.8	72.7	89.2
FEG14-76	76.9	96.7	43.7	53.8	86.8	48.8	67.8
FEG18-40	88.5	100.0	68.9	15.4	94.2	42.1	68.2
FEG31-91	57.7	93.3	31.3	19.2	75.5	25.3	50.4
FEG39-03	84.5	100.0	75.0	26.9	92.3	51.0	71.6
2ND18172	107.6	90.0	62.5	46.2	98.8	54.3	76.6
2ND18220	96.1	80.0	62.5	34.6	88.0	48.5	68.3
2ND18365	88.5	93.3	68.9	76.9	90.9	72.9	81.9
2ND19052	96.1	73.3	62.5	19.2	84.7	40.9	62.8
2ND19099	107.6	100.0	62.5	65.4	103.8	63.9	83.9
2ND19130	100.0	66.7	37.5	23.1	83.4	30.3	56.8
ND19191	100.0	100.0	81.2	30.8	100.0	56.0	78.0
ND19192	103.8	93.3	43.7	0.0	98.6	21.9	60.2
ND19193	115.3	100.0	75.0	0.0	107.7	37.5	72.6
ND19194	115.3	96.7	81.2	53.8	106.0	67.5	86.8
ND19195	96.1	96.7	68.9	26.9	96.4	47.9	72.1
ND19196	96.1	93.3	25.0	46.2	94.7	35.6	65.1
Average	97.5	92.4	63.9	41.9	94.9	52.9	73.9
Std Dev.	13.5	12.0	17.1	27.5	8.9	19.2	12.7
Minimum	57.7	50.0	25.0	0.0	75.5	21.9	50.2
Maximum	115.3	100.0	100.0	100.0	107.7	100.0	100.0

Table 5. Mean deoxynivalenol content of entries grown in the 2001 MinnDak Nursery at three irrigated and two dryland sites in the upper Midwest.

LABEL	Fargo Irrigated	Crookston, MN Irrigated	Osnabrock, ND Dryland	Park River, ND Dryland	Crookston, MN Dryland	Average Irrigated	Average Dryland	Average Overall
	ppm							
Chevron	1.3	4.2	3.6	1.8	0.1	3.0	1.0	2.2
CIho4196	0.3	16.9	1.0	2.6	0.1	6.1	1.3	4.2
Conlon	0.5	7.9	0.4	1.1	0.1	2.9	0.6	2.0
MNBrite	1.7	18.1	3.5	1.9	0.1	7.8	1.0	5.1
Robust	1.3	12.6	3.3	4.0	0.1	5.7	2.1	4.3
Stander	2.1	15.2	5.5	6.8	0.3	7.6	3.6	6.0
6B95-2482	2.3	10.8	2.1	5.9	0.2	5.1	3.0	4.3
6B96-3733	1.0	13.6	2.3	4.8	0.2	5.6	2.5	4.4
6B97-2037	1.5	13.8	5.4	6.0	0.1	6.9	3.0	5.4
6B98-9022	0.9	14.2	2.2	5.4	0.1	5.8	2.7	4.6
6B98-9170	1.2	18.4	4.1	4.2	0.3	7.9	2.2	5.6
FEG2-94	1.2	11.8	2.2	3.7	0.1	5.1	1.9	3.8
FEG14-76	0.6	10.4	2.1	3.1	0.2	4.4	1.7	3.3
FEG18-40	0.4	9.2	2.5	1.4	0.1	4.0	0.8	2.7
FEG31-91	0.8	13.5	2.6	4.7	0.3	5.6	2.5	4.4
FEG39-03	1.5	9.5	2.5	2.4	0.1	4.5	1.3	3.2
2ND18172	1.4	18.7	2.6	3.0	0.2	7.6	1.6	5.2
2ND18220	1.1	10.1	1.4	2.5	0.1	4.2	1.3	3.1
2ND18365	1.4	9.8	1.4	2.5	0.1	4.2	1.3	3.0
2ND19052	0.9	9.4	2.2	1.4	0.1	4.2	0.7	2.8
2ND19099	0.9	9.0	1.8	2.6	0.1	3.9	1.3	2.9
2ND19130	0.4	3.6	1.4	1.6	0.1	1.8	0.8	1.4
ND19191	2.0	29.1	13.2	6.3	0.6	14.8	3.4	10.2
ND19192	1.9	24.4	13.5	9.1	0.5	13.3	4.8	9.9
ND19193	2.3	18.4	12.5	5.4	0.4	11.1	2.9	7.8
ND19194	3.7	15.3	4.7	7.1	0.3	7.9	3.7	6.2
ND19195	0.8	15.9	5.7	4.2	0.2	7.5	2.2	5.4
ND19196	2.5	22.4	10.7	6.8	0.4	11.9	3.6	8.6
Average	1.4	13.8	4.2	4.0	0.2	6.4	2.1	4.7
Stnd. Dev.	0.8	5.8	3.7	2.1	0.1	3.1	1.1	2.2
Minimum	0.3	3.6	0.4	1.1	0.1	1.8	0.6	1.4
Maximum	3.7	29.1	13.5	9.1	0.6	14.8	4.8	10.2

Table 6. Mean deoxynivalenol content of entries grown in the 2001 MinnDak Nursery at three irrigated and dryland locations in the Midwest U.S. expressed as a percentage of Robust.

LABEL	Fargo Irrigated	Crookston, MN Irrigated	Osnabrock, ND Dryland	Park River, ND Dryland	Crookston, MN Dryland	Average Irrigated	Average Dryland	Average Overall
				% DON of Robust				
Chevron	100.0	33.3	109.1	45.6	75.0	66.7	76.6	72.6
CIho4196	23.1	134.1	30.3	65.6	50.0	78.6	48.6	60.6
Conlon	38.5	63.0	12.1	26.3	50.0	50.7	29.5	38.0
MNBrite	130.8	143.9	106.1	47.5	75.0	137.3	76.2	100.6
Robust	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Stander	161.5	120.9	166.7	170.6	225.0	141.2	187.4	168.9
6B95-2482	176.9	86.0	63.6	147.5	125.0	131.5	112.0	119.8
6B96-3733	76.9	107.9	69.7	120.6	150.0	92.4	113.4	105.0
6B97-2037	115.4	109.8	163.6	148.8	100.0	112.6	137.5	127.5
6B98-9022	69.2	112.4	66.7	133.8	100.0	90.8	100.1	96.4
6B98-9170	92.3	146.0	124.2	103.8	200.0	119.2	142.7	133.3
FEG2-94	92.3	93.4	66.7	93.1	100.0	92.8	86.6	89.1
FEG14-76	46.2	82.5	63.6	77.5	150.0	64.3	97.0	84.0
FEG18-40	30.8	72.8	75.8	34.4	100.0	51.8	70.0	62.7
FEG31-91	61.5	107.1	78.8	116.9	200.0	84.3	131.9	112.9
FEG39-03	115.4	75.1	75.8	59.4	100.0	95.3	78.4	85.1
2ND18172	107.7	148.1	78.8	73.8	150.0	127.9	100.8	111.7
2ND18220	84.6	80.4	42.4	63.1	75.0	82.5	60.2	69.1
2ND18365	107.7	77.5	42.4	63.1	75.0	92.6	60.2	73.2
2ND19052	69.2	74.9	66.7	35.6	50.0	72.0	50.8	59.3
2ND19099	69.2	71.7	54.5	65.0	50.0	70.5	56.5	62.1
2ND19130	30.8	28.3	42.4	40.0	50.0	29.5	44.1	38.3
ND19191	153.8	231.0	400.0	157.5	425.0	192.4	327.5	273.5
ND19192	146.2	193.9	409.1	226.3	375.0	170.0	336.8	270.1
ND19193	176.9	146.0	378.8	135.0	275.0	161.5	262.9	222.3
ND19194	284.6	121.4	142.4	178.1	200.0	203.0	173.5	185.3
ND19195	61.5	125.9	172.7	104.4	175.0	93.7	150.7	127.9
ND19196	192.3	177.8	324.2	170.0	300.0	185.0	264.7	232.9
Average	104.1	109.5	126.0	100.1	146.4	106.8	124.2	117.2
Stnd. Dev.	58.8	45.7	113.0	52.4	99.2	44.8	83.0	65.4
Minimum	23.1	28.3	12.1	26.3	50.0	29.5	29.5	38.0
Maximum	284.6	231.0	409.1	226.3	425.0	203.0	336.8	273.5

Table 7. Pedigree, Row type, and source of entries grown in the 2001 MinnDak Nursery.

Label	Entry	Pedigree	Row type	Source
Chevron	1	Unknown	6	Check
CIho4196	2	Unknown	2	Check
Conlon	3	BOWMAN*2/DWS1008/ND10232	2	Check
MNBrite	4	M90-89/M69	6	Check
Robust	5	Morex/Manker	6	Check
Stander	6	Robust*2/3/Cree/Bonanza//Manker/4/Robust/Bumper	6	Check
6B95-2482	7	6B89-2126/ND10981	6	Busch Agricultural Resources, Inc.
6B96-3733	8	6B88-3213//6B89-2126/ND11055	6	Busch Agricultural Resources, Inc.
6B97-2037	9	6B92-7098/6B91-6086	6	Busch Agricultural Resources, Inc.
6B98-9022	10	6B92-7098/6B92-7166	6	Busch Agricultural Resources, Inc.
6B98-9170	11	6B92-7098//6B92-7098/M75	6	Busch Agricultural Resources, Inc.
FEG2-94	12	SI4-29/M84	6	University of Minnesota
FEG14-76	13	M1100/AC Oxbow	6	University of Minnesota
FEG18-40	14	MNBrite/SI4-29	6	University of Minnesota
FEG31-91	15	PFC 88209/MNBrite	6	University of Minnesota
FEG39-03	16	Hor211/2*Lacey	6	University of Minnesota
2ND18172	17	ND15147//F103-105/ND14636	2	North Dakota State University – Two-rowed Barley Project
2ND18220	18	ND15491//LOGAN/ND15079	2	North Dakota State University – Two-rowed Barley Project
2ND18365	19	2B91-4947/ND15403	2	North Dakota State University – Two-rowed Barley Project
2ND19052	20	ND16050/ND16461	2	North Dakota State University – Two-rowed Barley Project
2ND19099	21	ND16680//CMB85-533-H/ND15403-3	2	North Dakota State University – Two-rowed Barley Project
2ND19130	22	ND15468/ND16092//ND16461	2	North Dakota State University – Two-rowed Barley Project
ND19191	23	ND15483/C97-21-38	6	North Dakota State University – Six-rowed Barley Project
ND19192	24	ND15483/C97-21-63	6	North Dakota State University – Six-rowed Barley Project
ND19193	25	ND15483/C97-21-63	6	North Dakota State University – Six-rowed Barley Project
ND19194	26	ND15483/C97-21-63	6	North Dakota State University – Six-rowed Barley Project
ND19195	27	ND15483/C97-24-130-1-1	6	North Dakota State University – Six-rowed Barley Project
ND19196	28	ND15483/C97-24-130-1-1	6	North Dakota State University – Six-rowed Barley Project