WHEAT (*Triticum aestivum*)
Fusarium head blight; *Fusarium graminearum*

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Reaction of Kansas, Nebraska, and South Dakota winter wheat accessions to Fusarium head blight (FHB), 2009.

A field experiment was conducted in Chase silty clay loam (pH=6.5) near Manhattan, KS. Experimental design was a randomized complete block comprising the Hard (red and white) Winter Wheat Fusarium Head Blight Nursery with 48 entries from the Kansas, Nebraska, and South Dakota breeding programs. There were four replications and plots were single rows 7.5 ft long spaced 20 in. apart. Seed was sown 3 Oct 08 (1 bu/A). Air-dried corn kernels colonized by a single, aggressive isolate of *Fusarium graminearum* were spread throughout the test area on 1 Apr, 15 Apr, and 1 May (0.25 oz/ft^2 total). During anthesis, heads were kept wet using overhead, impulse sprinklers applying water 3 min/hr from 9:00 pm until 6:00 am. For each plot, heading date (50% headed) was determined and visual estimations of percent symptomatic spikelets (FHB index) for each plot were taken on 1 Jun, 3 Jun, 5 Jun, and 8 Jun. Plots were harvested with a combine on 7 Jul and grain sub-samples were rated for Fusarium damaged kernels (FDK). Ground grain samples were also sent to the North Dakota State University Toxicology Lab for determination of deoxynivalenol (DON) levels. Data for each rating date, the mean of all rating dates, heading date, yields, FDK, and DON levels in grain were subjected to analysis of variance followed by Fisher's least significant differences (LSD, $P = 0.05$). Correlations among parameters were also calculated.

Severe FHB developed as evidenced by disease ratings from the susceptible check Overley. All entries had significantly lower mean FHB ratings compared with Overley. The line SD0111-9 had the lowest mean rating, although seven other entries were statistically similar including the moderately resistant check cultivar Hondo. The entry Wesley + 3BSQTL had the lowest DON levels although five other entries were statistically similar. Two entries involved the cultivar Wesley with the resistance gene *Fhb1* (=3BSQTL) added and this addition resulted in significant reductions in mean FHB index and DON. Reductions in DON were 60-76%. There were significant negative correlations between heading and mean FHB index ($n = 192$, $r = -0.4940$, $P < 0.0001$) and heading and yield ($n = 192$, $r = -0.3075$, $P < 0.0001$) indicating late maturing entries tended to have fewer symptoms and lower yields. There were also significant negative correlations between yield and FDK ($n = 192$, $r = -0.6148$, $P < 0.0001$) and yield and DON ($n = 192$, $r = -0.4201$, $P < 0.0001$) indicating that lower yielding entries tended to have high FDK and high DON. However, there were positive correlations between mean FHB index and FDK ($n = 192$, $r = 0.4649$, $P < 0.0001$), mean FHB index and DON levels ($n = 192$, $r = 0.2787$, $P < 0.0001$), and FDK and DON ($n = 192$, $r = 0.4227$, $P < 0.0001$) indicating positive associations among these disease parameters.

	FHB index (%)					Heading	Yield	FDK[x]	DON[w]
Entry[z]	1 Jun	3 Jun	5 Jun	8 Jun	Mean[y]	(Julian)	(oz/plot)	(%)	(ppm)
SD0111-9	1.3	3.0	5.3	11.0	5.1	134.0	8.3	36.3	13.0
SD08165	1.3	3.0	6.0	17.8	7.0	133.0	7.7	32.5	14.3
SD08175	1.0	3.5	6.8	21.8	8.3	133.8	6.4	43.8	15.5
Hondo	2.0	5.5	8.3	17.5	8.3	135.8	6.0	38.8	17.0
KS01080~1-2	2.8	6.5	9.3	20.3	9.7	132.5	8.3	50.0	17.5
NE05548	1.5	5.8	10.8	21.0	9.8	133.0	7.6	50.0	15.6
SD08W029	1.5	4.5	10.8	23.8	10.1	135.8	6.2	37.5	20.5
KS01080~1-1	2.3	7.5	11.0	21.5	10.6	133.3	8.1	33.8	13.7
Expedition	2.5	9.3	13.3	19.3	11.1	134.5	5.2	50.0	17.6
Wesley + 3BSQTL	3.5	10.5	16.3	23.5	13.4	133.8	5.3	75.0	5.5
KS970093-8-9-#1-1	2.8	7.0	18.0	26.3	13.5	127.0	7.2	25.0	6.7
SD08079	2.3	7.3	13.8	31.0	13.6	134.3	6.3	42.5	13.3
WESLEY FHB1 bulk	4.5	8.5	16.8	26.0	13.9	134.0	3.5	80.0	9.3
NE05418	2.5	16.5	18.3	18.8	14.0	129.0	9.9	33.8	7.1
SD08W014	3.8	8.3	13.8	30.8	14.1	131.0	6.9	35.0	18.6
NE01481	3.5	11.8	17.5	24.3	14.3	135.8	4.1	75.0	21.2
SD08160	3.3	9.5	16.3	30.8	14.9	132.8	4.7	50.0	12.1
KS020952~4	3.3	8.8	16.3	35.5	15.9	129.0	8.0	50.0	18.1
SD08162	3.3	11.8	17.5	32.0	16.1	136.3	4.2	57.5	27.0
Darrell	5.3	11.0	15.0	34.3	16.4	128.3	8.6	33.8	14.6
NE05459	4.8	10.5	18.8	34.0	17.0	131.3	7.5	48.8	17.6
KS011162-8	4.3	15.5	21.3	27.5	17.1	130.8	8.1	46.3	7.8

Entry[z]	FHB index (%)					Heading	Yield	FDK[x]	DON[w]
	1 Jun	3 Jun	5 Jun	8 Jun	Mean[y]	(Julian)	(oz/plot)	(%)	(ppm)
SD08W009	4.0	11.8	25.0	27.8	17.1	132.8	5.1	51.3	20.0
SD08138	4.0	13.5	21.0	31.0	17.4	134.5	4.4	63.8	19.6
NE06469	4.8	13.0	18.8	33.3	17.4	131.8	3.5	80.0	18.5
KS020319-4	2.8	13.8	18.3	36.8	17.9	131.5	6.4	72.5	19.2
NE06607	4.3	14.3	21.3	34.0	18.4	132.5	6.3	48.8	13.4
NE01643	5.0	13.0	20.0	36.8	18.7	132.0	7.8	53.8	17.0
NH03614	4.8	13.0	20.0	40.3	19.5	131.3	6.2	53.8	17.0
Karl 92	8.3	21.8	27.5	27.5	21.3	127.8	7.8	55.0	12.0
NI04427	4.3	20.0	26.3	36.3	21.7	130.8	6.3	57.5	12.9
SD08091	5.0	18.0	25.8	40.5	22.3	135.3	2.4	68.8	16.9
NI04421	7.0	14.0	24.3	46.0	22.8	133.0	5.9	75.0	20.6
KS020638~2	4.8	13.0	23.0	50.8	22.9	132.0	5.2	71.3	22.7
NE04490	7.0	20.0	27.0	39.5	23.4	129.5	5.4	87.5	15.8
KS0CW01M883T-2	8.5	21.3	30.3	35.3	23.8	127.8	4.2	77.5	17.2
SD06W049-3	6.3	24.3	28.8	38.0	24.3	129.8	8.4	35.0	10.1
KS010957-6	6.3	13.5	23.8	54.0	24.4	131.0	4.3	82.5	20.9
NI04420	7.8	22.0	27.5	44.3	25.4	129.3	6.9	58.8	19.2
WESLEY	8.5	23.3	30.0	40.8	25.6	134.0	4.0	87.5	23.1
SD08W015	8.5	24.5	28.3	44.5	26.4	129.5	5.2	56.3	16.6
KS020638~5	7.5	22.8	30.3	52.0	28.1	129.0	5.7	68.8	17.0
NE06471	9.3	25.8	32.5	57.5	31.3	132.5	2.5	86.3	22.1
KS020045-17	10.0	28.3	33.3	56.3	31.9	130.5	5.4	76.3	18.9
KS030039~3	13.8	28.3	37.5	53.3	33.2	127.5	6.6	56.3	14.2
KS011178-5	12.8	37.8	35.0	55.0	35.1	130.3	4.4	66.3	14.0
KS020942~7	14.3	30.8	35.8	68.0	37.2	128.5	5.1	80.0	17.5
Overley	23.8	45.0	52.5	86.0	51.8	126.8	6.8	77.5	24.2
Mean	5.5	15.2	21.3	35.7	19.4	131.7	6.0	57.8	16.3
LSD (*P*=0.05)	3.24	6.02	7.82	12.03	5.73	1.44	2.12	19.07	6.04
R^2	0.81	0.86	0.79	0.80	0.87	0.89	0.64	0.70	0.63
CV	41.9	28.3	26.2	24.1	21.1	0.8	25.0	23.6	26.5

[z]Sorted by data in "Mean" column.
[y]Mean of all rating dates.
[x]Fusarium damaged kernels.
[w]Deoxynivalenol.

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