

Reaction of Kansas, Nebraska, and South Dakota winter wheat accessions to Fusarium head blight (FHB), 2008.

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 5 Oct 07 (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 (0.28 oz/ft² 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 29 May, 31 May, 3 Jun, 6 Jun, and 10 Jun (two different raters). Plots were harvested with a combine on 1 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 Overlay. All entries, except NE01604, KS010209M-4, and KS01LR033-1M-2 had significantly lower mean FHB ratings compared with Overlay. The line NE05699 had the lowest mean rating, although three other entries were statistically similar including the cultivars Darrell and Lyman. Lyman had the lowest DON levels although 17 other entries were statistically similar. There were significant negative correlations between heading and mean FHB index ($n = 192, r = -0.4056, P < 0.0001$) and heading and yield ($n = 192, r = -0.2795, P < 0.0001$) indicating late maturing entries tended to have fewer symptoms and lower yields. There were also significant negative correlations between yield and FDK ($n = 192, r = -0.2603, P = 0.0003$) and yield and DON ($n = 191, r = -0.3653, P < 0.0001$) indicating that lower yielding entries tended to have high FDK and high DON. However, there were positive correlations between mean FHB index and FDK ($n = 192, r = 0.3031, P < 0.0001$) and mean FHB index and DON levels ($n = 191, r = 0.4491, P < 0.0001$) indicating positive associations among these disease parameters.

Entry ^z	FHB-symptomatic spikelets (%)						Mean	Heading (Julian)	Yield (oz/plot)	FDK ^x (%)	DON ^w (ppm)
	29 May	31 May	3 Jun	6 Jun	10 Jun (1) ^y	10 Jun (2) ^y					
NE05699	0.0	0.3	2.0	12.5	27.3	27.5	11.6	146.8	5.18	11.5	23.3
SD07025	0.0	1.8	6.0	19.8	35.3	30.0	15.5	141.3	4.98	13.5	14.1
Darrell	0.0	1.0	7.5	19.5	37.5	33.5	16.5	142.5	5.03	38.8	17.2
Lyman	0.5	3.5	13.0	22.5	33.3	29.5	17.0	140.8	4.96	12.3	13.6
KS01080~1-1	0.0	3.8	11.5	20.5	43.3	38.3	19.5	140.8	4.96	37.0	35.0
KS01080~1-2	0.0	3.5	13.8	25.8	48.8	30.5	20.4	139.8	4.93	20.0	25.7
SD07265	0.0	4.5	13.5	25.5	40.8	49.0	22.2	140.5	4.96	23.3	26.5
SD03164-1	0.3	5.3	13.5	27.5	44.0	44.8	22.5	137.5	4.85	21.3	18.9
SD07111	0.5	3.3	10.3	27.3	47.3	47.0	22.6	143.3	5.05	27.5	20.0
Hondo	0.5	4.0	13.5	34.5	44.5	42.5	23.3	141.8	5.00	20.8	23.5
SD07366	0.5	5.0	18.8	32.0	46.3	37.5	23.3	138.8	4.89	4.5	22.1
NE03490	0.5	6.0	15.8	29.3	52.0	62.8	27.7	139.0	4.90	30.5	30.1
SD07019	0.0	5.0	15.0	33.0	55.0	60.0	28.0	141.8	5.00	32.5	18.1
SD06158	0.0	2.8	17.0	39.3	63.3	63.0	30.9	142.8	5.04	20.8	25.0
SD07340	0.0	2.8	19.3	37.5	57.0	69.5	31.0	143.3	5.05	25.3	19.3
NE04449	0.8	6.3	21.3	37.0	60.0	65.0	31.7	138.8	4.89	45.0	21.2
Karl 92	1.3	8.5	20.0	38.3	63.3	67.8	33.2	137.8	4.86	18.5	23.6
SD07056	0.8	8.0	20.3	37.0	66.5	70.8	33.9	140.0	4.94	35.0	25.5
KS011188TM~1	1.0	12.3	26.3	44.0	66.3	66.8	36.1	138.0	4.87	43.8	30.0
NE05548	0.0	5.5	16.3	38.8	72.0	86.3	36.5	141.5	4.99	18.8	20.0
Expedition	2.0	11.5	27.5	47.8	63.3	70.5	37.1	138.3	4.88	18.8	28.1
SD07336	0.5	7.3	21.3	43.8	75.8	75.8	37.4	141.8	5.00	41.8	18.6
NI05713	0.3	3.5	17.0	41.3	73.3	91.3	37.8	144.0	5.08	28.0	20.6

Entry ^z	FHB-symptomatic spikelets (%)							Heading (Julian)	Yield (oz/plot)	FDK ^x (%)	DON ^w (ppm)
	29 May	31 May	3 Jun	6 Jun	10 Jun (1) ^y	10 Jun (2) ^y	Mean				
KS011676~5-1.....	1.0	9.3	20.8	46.3	78.8	71.8	38.0	135.5	4.78	11.8	14.6
SD01058.....	1.3	12.3	27.3	49.0	66.3	74.0	38.3	139.5	4.92	30.8	27.4
SD05118.....	0.5	4.5	27.5	49.3	70.8	80.5	38.8	143.0	5.04	25.5	21.8
NE06497.....	1.3	16.0	27.5	52.5	70.0	69.5	39.5	139.8	4.93	34.5	32.1
NE05403.....	1.0	10.0	28.8	50.0	75.3	81.3	41.0	138.3	4.88	23.8	24.6
KS011188TM~6.....	1.8	16.3	32.5	56.3	68.8	84.5	43.3	137.0	4.83	22.5	22.2
NE05430.....	0.5	13.8	28.0	53.8	75.0	89.8	43.5	138.5	4.89	24.0	28.8
KS011045~11-1.....	1.0	16.0	31.3	59.3	72.5	82.8	43.8	138.8	4.89	47.8	23.3
NE05569.....	3.5	14.8	33.8	56.3	73.8	85.8	44.6	140.0	4.94	21.0	25.1
NE04490.....	1.8	16.3	37.0	56.3	73.8	83.3	44.7	137.3	4.84	50.8	25.7
NM03666.....	0.8	13.8	30.5	53.0	85.0	87.8	45.1	140.3	4.95	11.3	24.1
KS011676~4-1.....	2.0	11.8	32.5	60.0	87.5	85.8	46.6	135.3	4.77	17.5	19.6
KS020363WM~2.....	2.0	18.8	40.0	60.5	78.8	86.3	47.7	138.0	4.87	18.0	25.0
NE05549.....	0.8	11.0	36.3	64.3	85.8	92.3	48.4	140.8	4.96	37.0	17.3
KS010170M-11.....	1.0	11.0	41.3	61.8	83.3	92.5	48.5	143.0	5.04	48.0	23.2
KS010957K~4.....	1.0	19.5	43.8	66.3	82.5	94.0	51.2	136.5	4.81	43.5	26.4
KS010241K-11.....	1.5	22.5	47.0	64.3	83.3	89.3	51.3	138.5	4.89	51.3	26.0
NE05425.....	5.0	21.3	51.3	69.5	87.5	91.5	54.3	138.0	4.87	45.0	21.1
NE04424.....	1.5	20.3	52.5	71.3	93.3	96.5	55.9	139.0	4.90	37.0	27.6
KS020150K~1.....	2.5	27.3	53.8	77.0	92.5	95.8	58.1	136.8	4.82	58.8	46.8
KS021008~2.....	3.8	24.0	58.8	76.3	92.5	97.3	58.8	138.0	4.87	32.8	30.2
NE01604.....	3.5	31.3	62.5	77.5	91.3	98.3	60.7	140.8	4.96	23.5	26.8
KS010209M-4.....	4.0	32.5	62.5	81.3	93.8	97.8	62.0	138.8	4.89	30.0	30.4
KS01LR033-1M-2.....	4.0	28.3	68.8	85.8	99.0	99.3	64.2	140.8	4.96	39.3	38.0
Overley.....	6.8	40.0	71.3	86.3	98.8	99.0	67.0	136.8	4.82	33.3	43.4
Average.....	1.3	12.0	29.3	48.3	68.2	72.2	38.6	139.8	4.93	29.3	24.8
LSD (<i>P</i> =0.05).....	1.7	7.3	10.7	11.8	12.2	14.7	6.9	1.30	0.05	27.9	9.6
R ²	0.66	0.81	0.88	0.87	0.87	0.86	0.92	0.90	0.75	0.36	0.60
CV.....	95.3	43.5	26.1	17.5	12.8	14.6	12.9	0.66	0.02	68.0	27.5

^zSorted by data in "Mean" column.

^yRated by two different people on 10 Jun.

^xFusarium damaged kernels.

^wDeoxynivalenol.

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