

Reaction of Kansas, Nebraska, and South Dakota winter wheat accessions to Fusarium head blight (FHB), 2012.

A field experiment was conducted in a Chase silty clay loam (pH = 6.5) near Manhattan, KS. The 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 on 3 Oct 2011 (1 bu/A). Air-dried corn kernels colonized by two aggressive isolates of *Fusarium graminearum* were spread throughout the test area on 1 Apr, 15 Apr, and 1 May (0.25 oz/ft² total). During anthesis, heads were kept wet using overhead, impulse sprinklers applying water 3 min per hour 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 the entire plot were taken on 8 May, 15 May, 18 May, 22 May, 24 May, 29 May, and 1 Jun. The mild winter spaced out the heading dates for early- and late-maturing cultivars more than normal because of differences in vernalization and photoperiod requirements. As a result, some entries began to mature on 22 May and could no longer be rated for FHB index while other entries were rated as late as 1 Jun. Therefore, the last four rating dates did not include all entries, which made comparisons among all entries difficult on those dates. Data from the last two rating dates are not presented. Additionally, because of the large differences among entries in heading date (over 22 days), comparisons among lines had a large bias toward late-maturing entries (see correlations below). Plots were harvested with a combine on 14 Jun and grain subsamples were rated for *Fusarium*-damaged kernels (FDK). Ground grain samples were sent to the North Dakota State University Toxicology Lab for determination of deoxynivalenol (DON) concentrations. Data for heading date, each rating date, mean of the first four rating dates, FDK, and DON concentrations 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 and the susceptible check Overley had the greatest mean FHB index (58.7%). All entries had significantly lower mean index values than Overley. Line SD09113 had the lowest index rating (1.6%), although 3 other entries were statistically similar. Entries listed above had late heading dates that essentially biased the results. However, the moderately-resistant check cultivar Everest had a mean rating below 10% even though it had an early heading date. Line SD05085-1 had the lowest DON levels although 15 other entries were statistically similar including the moderately-resistant check Everest. There were significant negative correlations between heading and mean FHB index ($n = 151, r = -0.7337, P < 0.0001$) indicating late-maturing entries tended to exhibit reduced symptoms. There were also significant positive correlations between mean FHB index and FDK ($n = 151, r = 0.5992, P < 0.0001$), mean FHB index and DON ($n = 151, r = 0.3534, P < 0.0001$), and FDK and DON ($n = 192, r = 0.5017, P < 0.0001$) indicating positive associations among these pathological parameters.

Entry ^z	Heading (Julian)	FHB index (%)						FDK ^x (%)	DON ^w (ppm)
		8 May	15 May	18 May	22 May	24 May	Mean ^y		
SD09113	124.8	0.0	0.3	0.5	2.8	1.5	1.6	1.3	3.2
NE09637	123.0	0.0	0.5	0.5	3.5	1.8	3.1	1.8	2.9
NE08659	122.3	0.3	0.8	0.8	5.0	4.3	3.3	2.3	5.3
SD06158	123.8	0.0	0.8	1.5	7.8	3.5	3.6	5.0	5.9
SD08200	123.0	0.0	3.8	0.8	9.3	2.8	8.0	2.0	5.4
SD09118	122.3	0.3	2.3	1.5	11.0	11.3	8.5	4.5	5.7
SD09117	121.8	0.0	2.8	2.8	12.0	17.3	8.7	3.5	6.2
NE10514	120.3	0.0	4.8	2.3	15.5	14.5	8.9	4.0	4.4
Overland.....	118.8	0.8	6.0	4.3	16.0	16.3	9.2	5.0	6.6
Everest	102.0	3.3	12.8	11.5	.	.	9.8	3.0	2.2
Bakhsh-35	117.3	0.5	7.0	3.8	21.3	16.3	9.8	5.5	6.1
KS061406-LN~D	102.3	2.0	12.5	15.0	.	.	10.2	2.5	3.8
NE10449	116.8	0.3	5.5	5.0	19.0	19.8	10.9	4.0	4.2
SD08196	122.5	0.3	5.0	2.0	21.5	21.0	10.9	6.0	7.3
NHH09655	121.3	0.0	6.3	2.5	21.5	20.8	11.1	4.0	7.3
Bakhsh-24	113.8	0.5	6.8	4.0	25.0	16.8	11.4	4.8	5.3

Entry ^z	Heading (Julian)	FHB index (%)						Mean ^y	FDK (%) ^x	DON (ppm) ^w
		8 May	15 May	18 May	22 May	24 May				
SD07W083-7.....	120.5	0.3	5.0	3.8	18.8	26.8	11.8	8.5	7.2	
SD05085-1	107.0	1.0	11.5	4.8	27.3	.	11.9	3.5	2.1	
KS060750-BE~C.....	103.8	2.3	15.0	17.0	^y	.	12.0	4.3	2.8	
SD08080	119.8	0.5	7.3	5.3	20.0	25.8	12.6	6.0	7.0	
KS061406-LN~7	107.3	1.5	10.5	13.0	23.0	.	12.7	6.0	8.6	
NE10628	110.5	1.3	11.0	12.8	25.3	.	13.1	6.5	4.0	
KS061406-LN~47	109.3	1.8	13.0	8.3	27.8	.	13.3	6.5	5.2	
NE06607	117.3	0.8	9.0	5.5	24.3	24.8	13.6	4.3	4.7	
SD07184	117.0	0.5	9.8	5.3	29.3	20.7	13.8	3.8	6.8	
SD07W083-4.....	119.3	0.3	7.0	6.5	20.8	31.3	14.2	5.5	6.7	
KS060750-BE~6	106.5	2.3	14.0	15.5	22.7	.	14.2	3.5	6.0	
KS060638-BE~24	103.5	2.5	12.0	28.0	.	.	14.6	2.5	2.2	
NE10418	107.5	1.5	11.3	11.3	32.8	.	14.6	3.8	3.7	
SD09192	115.5	2.3	12.5	9.3	28.8	20.0	16.0	6.5	6.9	
KS061406-LN~9	106.5	1.5	15.8	25.0	25.0	.	16.8	5.5	7.5	
KS060750-BE~27	105.3	2.0	17.3	13.3	35.0	.	16.9	2.8	3.9	
KS061406-LN~1	106.0	5.5	21.5	24.3	.	.	17.1	4.5	7.0	
NW10401	105.3	0.8	14.5	11.8	41.5	.	17.1	4.0	3.0	
KS061406-LN~35	106.5	2.3	15.3	18.0	34.5	.	17.5	6.0	7.5	
KS061406-LN~29	107.8	1.3	16.8	21.3	32.0	.	17.8	9.0	8.3	
SD07165	115.3	2.8	16.5	16.8	35.3	.	17.8	8.0	6.4	
Karl 92	106.0	1.8	19.5	19.0	35.0	.	18.8	4.0	4.6	
KS061406-LN~13	106.8	3.3	20.8	17.5	35.0	.	19.1	8.0	7.0	
Bakhsh-33	109.5	2.0	20.3	14.5	34.3	30.0	20.2	5.0	5.1	
KS061406-LN~40	108.5	2.0	17.5	24.3	40.0	.	20.9	8.0	9.2	
KS061406-LN~20	104.0	4.5	19.3	21.3	39.3	.	21.1	6.0	5.1	
NI09706	111.0	4.8	20.0	22.5	38.3	.	21.4	7.0	6.4	
KS061406-LN~33	106.5	2.3	18.5	29.3	37.0	.	21.8	6.5	9.2	
SD09034	107.3	3.0	21.5	24.3	41.5	.	22.6	5.5	3.4	
NE01481 (McGill).....	112.3	2.3	20.0	21.8	40.3	37.5	24.4	6.0	5.5	
SD08141	112.3	1.3	19.0	23.3	39.3	40.0	24.6	8.0	11.3	
Overley.....	103.8	24.5	58.8	60.0	91.5	.	58.7	20.0	11.3	
Mean	112.5	2.0	12.5	12.8	25.4	16.6	12.1	5.29	5.77	
<i>P</i> value	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	
LSD (<i>P</i> =0.05).....	1.68	2.2	6.0	5.2	9.1	10.0	3.5	4.09	2.87	
<i>R</i> ²	0.98	0.87	0.87	0.92	0.90	0.80	0.96	0.57	0.62	
CV.....	1.07	82.0	34.4	29.4	21.6	36.3	17.3	55.3	35.6	

^zSorted by data in FHB index "Mean" column. Everest (MR) and Overley (S) were used as the moderately resistant and susceptible checks, respectively.

^yMean of first four rating dates.

^x*Fusarium*-damaged kernels.

^wDeoxynivalenol.

^vEntry was mature and could not be rated.

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