

Reaction of Kansas, Nebraska, South Dakota, and North Dakota winter wheat accessions to Fusarium head blight (FHB), 2015.

A field experiment was conducted in a Chase silty clay loam soil (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 64 entries from Kansas, Nebraska, South Dakota, and North Dakota breeding programs. There were four replications and plots were single rows 7.5 ft long spaced 20 in. apart. Seed was sown on 7 Oct 2014 (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 10:00 p.m. until 5:00 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 26 May, 29 May, 1 Jun, 5 Jun, and 8 Jun. Plots were harvested with a combine on 30 Jun and grain sub-samples were visually rated for percent *Fusarium*-damaged kernels (FDK). Ground grain samples from all plots 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 all five rating dates, FDK, and DON concentrations in grain were subjected to analysis of variance followed by Fisher's protected least significant differences (LSD, $P = 0.05$). Correlations among parameters were also calculated.

Severe FHB developed and the susceptible check Overlay exhibited the greatest mean FHB index (62.2%). All entries had significantly lower mean index values than Overlay. The moderately-resistant check Everest exhibited 25.1% which was about 40% of Overlay. Nevertheless, there were 28 entries with average index values significantly lower than Everest. However, these entries were 4 to 27 days later heading than Everest with an average of 12.7 days later. There was a significant negative correlation between heading date and mean FHB index ($n = 251$, $r = -0.7183$, $P < 0.0001$); therefore, direct comparisons among entries with very different heading dates are not valid. Everest was in the group with the lowest FDK ratings, although 46 other entries were statistically similar. Everest also had a relatively low DON level (9.5 ppm) although 21 other entries were statistically similar. The susceptible check Overlay had high DON levels (29.0 ppm) although one entry (NDSU-1) was statistically higher, and 19 other entries were statistically similar to Overlay. There were significant correlations between heading date and FDK, and heading date and DON ($n = 256$, $r = 0.3904$, $P < 0.0001$ and $n = 256$, $r = 0.5377$, $P < 0.0001$, respectively); therefore, direct comparisons among entries with widely different heading dates are not valid. There was a significant negative correlation between mean FHB index and DON levels ($n = 251$, $r = -0.2098$, $P = 0.0008$), but a positive correlation between FDK and DON ($n = 256$, $r = 0.5329$, $P < 0.0001$). There was no significant correlation between mean FHB index and FDK ($n = 251$, $r = 0.0026$, $P = 0.9672$).

Entry ^z	Heading (Julian) ^y	FHB index (%)						FDK ^w (%)	DON ^v (ppm)
		26 May	29 May	1 Jun	5 Jun	8 Jun	Mean ^x		
NDSU-2	149.5	0.0	0.0	0.3	0.5	2.0	0.6	37.5	32.9
NDSU-1	149.3	0.0	0.0	0.3	2.0	11.0	2.7	57.5	45.8
NDSU-4	139.0	0.3	0.3	0.8	6.0	6.5	2.8	28.8	27.5
NDSU-12	139.0	0.3	0.0	0.8	9.5	7.8	3.7	27.5	19.0
NDSU-9	138.5	0.3	0.3	1.3	11.8	14.5	5.6	22.5	25.5
SD11023-8	136.0	0.5	2.0	3.5	15.0	14.5	7.1	14.0	30.8
NDSU-7	136.8	0.5	0.8	3.8	16.0	20.0	8.2	27.5	21.0
KS12FHB(A-)-1	128.3	1.5	2.5	6.8	14.5	21.3	9.3	5.5	10.4
SD09113	137.3	0.0	1.0	3.8	19.8	27.0	10.3	36.3	33.4
KS12FHB(A-)-23	128.5	1.5	4.8	9.0	17.8	18.8	10.4	5.5	12.9
SD110085-1	136.0	0.8	0.5	4.0	19.0	28.5	10.6	43.8	32.1
NDSU-5	134.3	0.8	5.0	6.0	19.5	23.0	10.9	25.0	18.5
Overland FHB4	134.0	0.5	2.5	6.5	21.0	24.3	11.0	11.5	11.3
NDSU-14	131.0	1.0	2.3	4.0	19.3	29.8	11.3	16.3	17.7
NDSU-13	135.3	0.3	3.0	3.5	24.0	25.8	11.3	37.5	26.2
SD10257-2	131.8	0.8	3.8	7.5	27.3	22.0	12.3	13.8	24.0
SD09192	136.8	0.5	4.5	7.5	23.3	29.0	13.0	48.8	32.1
NDSU-11	132.8	0.5	2.8	6.8	25.0	30.8	13.2	38.8	22.7

Entry ^z	Heading (Julian) ^y	FHB index (%)						FDK ^w (%)	DON ^v (ppm)
		26 May	29 May	1 Jun	5 Jun	8 Jun	Mean ^x		
NDSU-10	135.0	0.3	3.8	5.3	30.3	29.5	13.8	23.8	22.0
SD13238-3	133.0	1.0	2.8	8.5	32.3	29.3	14.8	20.0	18.6
NDSU-15 (MT1078)	137.5	0.5	2.0	8.0	31.0	35.0	15.3	56.3	32.5
SD09227	136.3	0.8	3.3	6.8	30.3	37.0	15.6	32.5	23.8
SD13099-8	134.8	0.3	1.8	8.8	31.3	40.5	16.5	28.8	30.6
KS12FHB(A-)-10	126.3	1.8	9.3	15.0	22.0	35.8	16.8	6.5	7.2
Overland FHB8	132.3	1.3	6.0	11.5	31.5	34.0	16.9	28.8	16.0
Overland FHB1	132.8	1.0	8.3	14.3	32.3	30.3	17.2	20.0	15.3
Overland FHB5	133.8	2.0	6.8	14.3	33.0	33.8	18.0	28.8	18.9
NDSU-3	130.8	1.5	8.0	12.3	31.3	39.0	18.4	23.8	16.3
NE13625	129.5	1.3	9.3	13.5	38.0	37.3	19.9	18.8	20.5
SD110060-7	131.5	2.0	8.8	12.3	30.0	46.8	20.0	26.3	26.3
SD08200	129.3	1.0	4.5	14.8	33.0	47.5	20.2	25.0	34.6
NE13511	133.5	0.8	6.8	10.5	37.8	47.8	20.7	27.5	29.7
SD09118	132.0	1.5	6.3	12.5	36.8	48.0	21.0	30.0	24.5
SD13134-3	127.8	3.5	10.0	20.0	36.0	40.0	21.9	21.3	23.3
SD13117-1	136.0	1.0	4.8	10.0	39.5	55.5	22.2	38.8	22.9
NW13455	127.3	2.3	11.0	20.0	31.8	46.3	22.3	18.8	31.2
KS080194-M-3	122.8	2.8	9.5	12.5	34.8	53.5	22.6	7.8	10.0
Karl 92	124.0	6.3	10.3	19.3	32.0	53.3	24.2	11.5	13.7
Everest (MR Check) ^u	122.5	8.5	14.5	21.0	30.8	50.5	25.1	13.8	9.5
KS080194-K-2	124.5	5.0	14.3	19.8	38.3	49.0	25.3	22.5	14.0
NE06545	126.8	3.0	10.5	23.0	37.3	56.3	26.0	35.0	27.7
NDSU-6	126.8	4.3	15.5	21.3	39.0	51.0	26.2	10.3	12.2
NE05548	130.5	1.3	7.3	17.0	57.0	62.5	29.0	41.3	29.5
SD13137-1	123.8	10.5	15.8	22.3	43.3	57.7	29.9	22.5	11.9
NE12589	127.8	2.0	12.3	21.0	57.5	60.0	30.6	17.5	20.0
NE10589	129.0	2.5	12.3	20.5	56.5	68.8	32.1	25.0	28.3
KS080662-K-7	124.5	10.8	17.3	27.5	41.8	68.8	33.2	10.0	7.3
NDSU-8	126.0	2.3	12.0	20.0	52.0	80.0	33.3	21.3	10.8
NE09521	126.5	5.8	14.3	22.5	55.0	70.0	33.5	25.0	22.5
KS080195-M-3	126.3	4.3	13.5	29.8	53.3	68.0	33.8	20.0	20.1
SY Wolf	124.0	7.3	17.3	28.8	63.5	60.3	35.4	17.5	14.5
KS080662-K-3	122.8	15.8	20.5	26.3	48.8	70.5	36.4	14.0	10.8
KS080195-K-6	126.8	6.0	16.3	27.5	59.5	75.0	36.9	18.8	18.0
SD10W153	126.8	6.5	15.0	26.8	65.3	80.0	38.7	28.8	33.2
NE07531	129.0	3.8	17.8	33.3	77.0	76.3	41.6	46.3	23.5
KS080608-K-1	123.3	22.0	22.5	34.3	61.0	70.5	42.1	9.3	8.6
KS080195-K-2	127.0	5.8	17.3	35.5	74.5	83.0	43.2	31.3	15.0
NE10478	124.0	16.3	26.5	31.5	67.0	77.5	43.8	16.3	10.3
KS080737-K-1	128.5	7.5	19.8	36.3	75.0	82.0	44.1	41.3	31.4
NI04421	127.0	10.0	17.8	37.0	84.0	81.0	46.0	21.3	15.3
KS080477-M-3	125.3	17.8	21.5	39.5	71.3	81.3	46.3	33.8	20.4
KS080477-K-1	126.8	19.5	29.5	43.3	72.0	90.0	50.9	26.3	21.4
KS080477-M-4	125.3	22.0	36.8	51.3	77.8	85.0	54.6	40.0	22.0
Overley	124.0	26.8	45.5	61.5	88.3	88.8	62.2	40.0	29.0
Average	130.5	4.5	10.2	17.2	38.9	47.1	23.6	25.64	21.37
LSD (<i>P</i> =0.05)	2.12	2.99	4.94	6.94	11.67	13.91	5.48	16.51	7.12

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

^yDays from January 1

^wMean of all rating dates.

^w*Fusarium*-damaged kernels.

^vDeoxynivalenol concentration in ground grain samples.

^uMR = moderately resistant; S = susceptible.

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