

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

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Reaction of selected winter wheat cultivars in Kansas to Fusarium head blight (FHB), 2024.

The experiment was conducted at Kansas State University, Rocky Ford Research Station, Manhattan, KS. The field soil type was Chase silty clay loam (pH = 6.5). A randomized complete block design was used with four replicates of 35 wheat cultivars (entries), including Everest as moderately resistant, Karl92 as moderately susceptible, and Overlay as susceptible checks. Experimental plots consisted of seven rows, 0.5 m wide and 2.3 m long, and were seeded on 12 Oct. Corn kernel inoculum was prepared using a native isolate of *Fusarium graminearum* isolate GZ-3639 and air-dried. Sterile corn kernels were used for corn spawn inoculum production. Field application of the inoculum was made in early spring on 15 Apr, 1 May, and 15 May at a rate of 53 g/m². Moisture conditions in the nursery necessary for *F. graminearum* perithecia, spore development, and infection were maintained with mist irrigation throughout the nursery for approximately 15 min at 4-h intervals during flowering. Heading dates for entries were taken at 50% headed tillers. The mean heading date of the nursery was 28 Apr. The incidence of symptomatic wheat plants from natural infection of Fusarium head blight (FHB) was visually estimated for each plot during the flowering period. The FHB incidence (%) was rated every other day, namely 16 May, 20 May, 22 May, 27 May, 29 May, and 31 May, by rating the percentage of infected spikelets presenting symptoms associated with head blight. The area under the disease progressive stairs (AUDPS) (quantitative intensity of FHB) was calculated for all entries, and the least significant differences (LSD) ($\alpha=0.05$) were determined using ‘Agricolae’ R package tool version 1.3-3 (R-Development Core Team). Plots for various entries were harvested on 25 Jun, and the Fusarium damaged kernels (FDK) were estimated (in percentage) through visual inspection after cleaning. Kernels of all entries were evaluated for mycotoxins, deoxynivalenol (DON), and zearalenone concentrations (ppm).

Pathogen infectivity across the nursery was due to optimal conditions necessary for pathogenicity. The entry KS21HD158 had the highest cumulative FHB severity, AUDPS (885.63 units) over the time frame, followed by the early susceptible check Overlay, with the high disease severity accumulating AUDPS of 856.25 units. Entry KS150720-6 had the lowest AUDPS of 223.25 units, which outperformed the moderately resistant check Everest (with AUDPS of 244.50 units), ranked second; however, KS150720-6 had a greater DON and ZEN concentrations of 26.53 and 4.13 ppm compared to the lowest 1.70 ppm and 2.25 ppm concentrations, respectively of the moderately resistant check Everest. The moderately susceptible check Karl92 had a cumulative FHB disease severity, AUDPS of 474.75 units with a DON and ZEN concentration of 6.20 ppm and 5.50 ppm, respectively. The average FHB severity ranged between 15.83 % and 43.08%. Average FDK estimations ranged between 0.50 % to 95.75 % and correlated with evaluated AUDPS and DON concentrations at 0.76 and 0.64, respectively. The disease severity metrics measured were statistically significant (p -value < 0.001).

Entry	Heading	Average FHB (%) ^z	FDK (%) ^y	DON (ppm) ^x	ZEN (ppm) ^w	AUDPS ^v
KS170025D-11	119.50	43.08	95.75	33.45	59.05	694.50
KS160786S-6	119.25	25.42	14.75	17.38	10.08	395.00
KS170013D-19	118.50	32.50	45.00	12.98	15.88	515.50
KS150286C-5	120.00	25.17	28.75	12.10	4.13	395.88
KS150286C-9	119.50	27.21	37.50	15.50	4.20	423.00
KS150721C-4	117.25	24.79	13.75	10.33	2.98	392.00
KS150826C-2	116.75	21.13	1.75	10.60	4.93	331.25

KS150167-18	119.00	19.29	23.75	15.58	12.98	305.13
KS170604S-4	118.75	31.00	25.00	17.38	30.95	490.88
KS150720-6	120.00	14.21	6.50	26.53	4.13	223.25
KS170778S-6	116.00	43.04	24.25	10.05	2.73	702.63
KS150523-6	117.00	35.67	37.50	15.58	15.10	576.00
KS150261-1	123.00	30.46	55.00	32.05	13.25	486.88
KS150380-1	119.00	30.58	42.50	17.88	18.43	478.75
KS150167-17	118.50	23.04	22.00	17.75	5.90	361.00
KS150288-4	123.00	21.04	47.50	20.98	7.68	324.63
KS150167-19	118.75	27.04	12.50	13.00	5.58	421.13
KS20H106	116.25	33.21	4.13	9.30	3.88	532.25
KS20H124	118.00	40.67	47.50	19.83	10.05	646.25
KS20HD134	116.75	43.25	55.00	23.10	22.13	698.88
KS20HDW185	120.50	25.38	12.50	21.20	2.85	399.75
KS21H30	120.25	42.08	60.00	28.98	16.30	674.50
KS21H36	120.25	44.54	67.50	17.58	18.43	713.63
KS21HD158	121.75	53.71	87.00	17.83	16.63	885.63
KS21HD173	119.50	27.25	27.00	12.15	6.00	425.75
KS22H19	118.25	19.96	18.88	9.38	8.38	312.13
KS22H28	118.00	31.04	25.50	12.60	7.90	490.50
KS22H40	119.75	21.54	15.13	19.85	5.28	335.75
KS22H53	120.75	35.88	56.25	21.53	20.75	561.50
KS22H84	118.50	20.83	7.75	12.65	6.58	326.63
KS22H88	119.75	24.38	11.75	13.53	4.73	383.75
KS22H126	121.50	40.88	56.25	18.55	32.98	650.38
Everest	115.00	15.83	0.50	1.70	2.55	244.50
Overley	115.75	52.13	55.00	18.38	20.68	856.25
Karl92	115.50	29.83	1.88	6.20	5.50	474.75
Average	118.85	30.77	32.66	16.67	12.27	489.43
<i>p-value</i>	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
LSD ($\alpha=0.05$)	0.78	20.01	53.46	34.99	97.79	20.62

^zAverage percentage of wheat plants showing Fusarium head blight symptoms

^yFusarium Damaged Kernel (FDK)

^xDeoxynivalenol (DON)

^wZearalenone (ZEN)

^vArea Under Disease Progress Steps (AUDPS)