

EFFECTS OF VARIETY RESISTANCE AND FUNGICIDE APPLICATION ON FHB IMPACT

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Frequent soaking rains and warm temperatures during flowering contributed to the highest levels of head scab or *Fusarium* head blight (FHB) since 2005, resulting in a 10% reduction in average yield from 2008. The natural epidemic of FHB made it possible to evaluate breeding lines at all of our testing locations, and helped further the effort to advance only breeding lines with moderate or better resistance to FHB.

For the third year in a row, fungicide tests were conducted in the Princeton and Lexington, KY scab nurseries. Entries in the 2009 tests were grown in 6-row plots, 4 ft. long planted with conventional tillage after corn. There were 2 replications and 2 treatments (fungicide treated and not treated) at each location. The test consisted of 50 entries, most of which were also entries in the state wheat variety trial. Nurseries were inoculated with scabby corn, and the Lexington nursery was mist irrigated from just before flowering into early grain fill. Fungicide treated plots were sprayed at flowering with Prosaro (6.5 fl. oz./A) and Induce (0.125% w/v). Plots were rated for field symptoms at 21 days after flowering using a 0-9 scale. Plots were combine-harvested, and test weight, yield, *Fusarium* damaged kernels (FDK) were measured. FDK is the percentage of scabby seed or tombstones in a grain sample and is an indicator of potential yield loss. Grain samples were sent to a testing lab at the University of Minnesota for measurement of deoxynivalenol (DON), the mycotoxin

produced in the seed by *Fusarium graminearum*.

Fungicide treatment resulted in significantly less scab as indicated by lower values for rating, FDK, and DON, when compared with the untreated plots. In addition, significantly higher test weights and yields were associated with the fungicide treatment (Table 1). With fungicide treatment, there were 9 lines with DON levels below 2 ppm (Table 2). Without fungicide, only 1 line had DON below 3 ppm. The average percent reduction in DON with fungicide treatment was 44% (Table 3). Several lines, (e.g. AgriPro Coker 9511), showed little reduction in DON, but fungicide application was still associated with a yield increase.

The lessons of the 2009 epidemic are to use the best management practices by planting varieties with FHB resistance and applying fungicides when weather is favorable for disease development. In a moderate epidemic, these practices may be enough to avoid a discount for low test weight or high toxin levels at the elevator.

TABLE 1. EFFECT OF FUNGICIDE TREATMENT AVERAGED OVER 50 WHEAT VARIETIES, PRINCETON, KY 2009

	Rating*	FDK	DON (ppm)	Test Wt (lb/bu)	Yield (bu/ac)
Not treated	3.14a	7.12a	8a	47.6b	72.0b
Treated	1.57b	1.92b	4.3b	53.3a	86.9a

*Rating = 0-9 rating of symptoms in the field, FDK = percent *Fusarium* damaged kernels by weight. Letters denote significant difference.

**TABLE 2. INDIVIDUAL WHEAT VARIETY RESULTS, SORTED BY FUNGICIDE-TREATED DON
PRINCETON, KY 2009.**

NAME	Fungicide Treated					Not Treated				
	Rating*	Don (ppm)	FDK	Test Weight (lb/bu)	YIELD (bu/A)	Rating	Don (ppm)	FDK	Test Weight (lb/bu)	YIELD (bu/A)
SC 1348	1.5	1.2	0.9	53.3	107.78	2.5	3.0	2.7	51.4	73.61
AgriPro COKER 9511	0.5	1.5	0.4	56.7	104.13	1.0	1.6	1.6	56.2	79.62
Delta Grow 4500	1.5	1.5	0.6	53.6	97.61	2.5	3.4	3.4	51.6	80.51
Delta Grow 5200	0.0	1.5	0.9	55.9	95.78	2.0	3.4	2.8	52.9	82.37
Dixie 907	0.0	1.6	1.5	53.6	108.92	3.5	3.7	3.0	50.7	75.50
Bess	0.5	1.6	1.0	56.1	100.31	1.5	4.8	4.5	53.1	76.78
Delta Grow 1600	1.0	1.8	1.0	54.9	96.18	2.5	3.4	2.3	50.3	74.85
Exsegen Dinah	0.5	1.9	0.6	56.6	90.73	3.0	4.8	3.9	51.8	91.06
USG 3350	1.0	1.9	1.7	54.2	87.56	3.5	3.9	3.4	51.0	85.85
Truman	0.0	2.1	0.4	57.1	114.21	0.0	4.1	2.4	54.6	95.68
Progeny 166	1.5	2.3	2.2	54.0	88.32	4.0	3.9	4.7	49.7	75.70
AgriPro Branson	2.0	2.4	0.9	52.8	102.11	3.0	6.1	4.6	49.0	79.52
Progeny 117	1.0	2.4	0.9	54.6	101.44	3.5	4.6	2.8	52.5	82.98
Clark	2.5	2.5	0.8	53.7	74.27	4.5	4.1	3.9	50.3	67.36
SS 8309	0.0	2.5	0.7	55.3	99.64	3.0	3.6	4.9	49.5	81.24
Dixie 989	2.0	2.8	1.8	53.2	87.03	3.5	6.6	6.7	47.9	65.74
Progeny 185	1.0	3.1	1.3	51.3	87.47	3.5	3.3	4.2	51.7	74.30
SC 1318	2.0	3.1	2.4	51.1	72.96	4.5	7.6	10.9	44.7	68.07
BECK 122	1.5	3.4	0.5	53.6	99.49	2.5	7.3	6.6	48.1	66.64
SC 1298	2.5	3.4	0.4	52.5	93.90	3.0	5.2	4.7	47.5	69.52
AgriPro W1377	1.5	3.5	1.0	56.9	96.15	1.5	6.2	4.1	52.7	76.41
Pembroke	1.5	3.5	1.5	53.8	95.83	2.0	4.6	2.7	49.9	75.92
SC 1325	0.5	3.7	1.3	56.5	78.39	3.0	5.4	3.3	51.4	71.80
Exsegen Candace	1.5	3.7	0.2	52.6	84.90	4.0	6.3	4.7	47.4	72.54
Cumberland	1.0	3.8	1.0	52.6	88.17	4.0	9.7	8.0	46.5	74.17
SC 1339	3.5	3.8	4.1	50.7	80.31	4.0	5.3	6.7	44.9	67.35
KY00C-2697-04	2.5	4.1	2.9	52.5	58.84	3.0	7.7	8.2	46.3	39.79
SS 8302	1.5	4.2	1.7	54.3	93.43	4.0	6.7	6.1	51.7	90.20
SS 548	1.5	4.3	2.0	53.0	80.16	5.0	7.4	7.5	47.1	75.92
SS 8404	2.0	4.3	1.6	55.3	86.89	4.0	9.0	9.7	50.6	76.59
Delta King 9108	1.5	4.6	2.3	53.6	89.03	3.0	6.0	4.2	51.8	74.70
Exsegen Lydia	2.5	4.9	2.6	49.8	91.52	4.0	11.8	11.6	44.1	62.83
KY97C-0540-01-03	2.0	4.9	2.3	51.8	76.23	2.5	12.2	7.9	51.6	70.32
Pioneer variety 25R63	1.0	5.1	3.5	52.2	76.11	3.0	8.2	7.7	48.1	78.53
KY97C-0508-01-01A-1	1.0	5.2	2.2	54.0	98.51	2.5	6.8	4.7	49.3	73.48
Pioneer variety 26R22	2.5	5.4	2.1	51.9	85.14	3.0	12.4	7.0	23.4	70.10
KY97C-0519-04-07	1.5	5.5	2.5	50.6	81.64	2.0	10.0	11.2	44.1	58.29
Delta King 9577	3.5	5.5	1.9	51.5	90.39	4.5	9.1	10.4	46.5	65.34
KY00C-2175-10	1.5	5.5	2.6	54.1	93.14	3.5	10.0	8.8	47.0	64.75
SS MPV-57	1.5	5.6	5.2	51.9	72.76	3.0	9.3	11.1	46.9	83.68
SS 520	3.5	5.9	1.8	51.8	75.49	6.0	10.7	10.2	45.0	58.36
Pioneer variety 26R15	2.0	6.3	3.7	52.1	95.70	2.5	8.2	4.9	50.5	91.44
Red Ruby	2.0	6.4	3.3	53.2	68.59	3.0	13.0	16.2	44.8	62.60
MO 011126	2.5	6.7	2.5	55.3	68.12	4.0	15.8	4.6	49.8	66.84
KY97C-0574-01-04	0.5	7.6	1.9	55.7	83.82	3.0	14.0	9.2	49.2	73.82
KY00C-2567-01	1.5	8.1	2.1	54.2	79.72	1.5	8.1	7.1	50.4	64.94
SS 8641	2.0	8.1	5.2	49.0	50.56	4.5	24.2	30.2	ND	49.66
KY97C-0321-02-01	3.0	8.6	5.6	46.6	64.37	3.0	16.5	17.5	42.7	51.39
KY00C-2109-01	2.0	9.6	2.9	51.9	76.76	4.0	18.1	18.8	45.3	52.74
KY00C-2059-24	1.5	11.6	1.5	52.7	74.97	3.0	18.4	7.7	49.5	60.60
AVERAGE	1.6	4.3	1.9	53.3	86.9	3.1	8.0	7.1	48.6	72.0

*Rating = 0-9 rating of symptoms in the field, FDK= percent *Fusarium* damaged kernels by weight

ND = no data

TABLE 3. RESPONSE TO FUNGICIDE TREATMENT IN 50 WHEAT VARIETIES AND BREEDING LINES, PRINCETON, KY 2009.

NAME	Percent Change with Fungicide Treatment				
	Rating*	Don (ppm)	FDK	Test Weight (lb/bu)	YIELD (bu/A)
AgriPro Branson	-33.3	-60.3	-79.9	7.8	28.4
AgriPro COKER 9511	-50.0	-3.2	-72.2	1.0	30.8
AgriPro W1377	0.0	-44.4	-74.9	8.0	25.8
BECK 122	-40.0	-53.8	-92.4	11.4	49.3
Bess	-66.7	-67.4	-76.9	5.7	30.7
Clark	-44.4	-40.2	-80.7	6.8	10.3
Cumberland	-75.0	-61.1	-87.5	13.1	18.9
Delta Grow 1600	-60.0	-47.1	-54.6	9.3	28.5
Delta Grow 4500	-40.0	-55.2	-81.0	3.9	21.2
Delta Grow 5200	-100.0	-55.2	-69.7	5.7	16.3
Delta King 9108	-50.0	-23.3	-46.1	3.5	19.2
Delta King 9577	-22.2	-39.6	-82.1	10.6	38.3
Dixie 907	-100.0	-58.1	-50.2	5.7	44.3
Dixie 989	-42.9	-58.0	-73.3	11.0	32.4
Exsegen Candace	-62.5	-41.3	-95.0	11.1	17.0
Exsegen Dinah	-83.3	-60.4	-85.1	9.4	-0.4
Exsegen Lydia	-37.5	-58.5	-77.6	13.1	45.7
KY00C-2059-24	-50.0	-37.0	-80.1	6.4	23.7
KY00C-2109-01	-50.0	-46.8	-84.6	14.5	45.5
KY00C-2175-10	-57.1	-44.7	-70.6	15.0	43.8
KY00C-2567-01	0.0	-0.6	-70.5	7.4	22.8
KY00C-2697-04	-16.7	-46.8	-64.4	13.5	47.9
KY97C-0321-02-01	0.0	-48.0	-68.0	9.3	25.3
KY97C-0508-01-01A-1	-60.0	-23.0	-54.4	9.4	34.1
KY97C-0519-04-07	-25.0	-45.5	-77.9	14.7	40.1
KY97C-0540-01-03	-20.0	-59.8	-70.7	0.4	8.4
KY97C-0574-01-04	-83.3	-45.7	-79.8	13.2	13.5
MO 011126	-37.5	-57.9	-44.9	11.1	1.9
Pembroke	-25.0	-23.9	-43.6	7.8	26.2
Pioneer variety 25R63	-66.7	-38.4	-54.6	8.4	-3.1
Pioneer variety 26R15	-20.0	-23.3	-24.1	3.3	4.7
Pioneer variety 26R22	-16.7	-56.9	-69.8	122.1	21.5
Progeny 117	-71.4	-47.8	-67.5	4.0	22.2
Progeny 166	-62.5	-41.0	-54.2	8.8	16.7
Progeny 185	-71.4	-7.6	-68.6	-0.7	17.7
Red Ruby	-33.3	-51.2	-79.3	18.6	9.6
SC 1298	-16.7	-34.0	-91.6	10.4	35.1
SC 1318	-55.6	-59.6	-78.4	14.3	7.2
SC 1325	-83.3	-31.8	-58.6	9.8	9.2
SC 1339	-12.5	-28.3	-38.5	12.9	19.2
SC 1348	-40.0	-61.5	-67.0	3.7	46.4
SS 520	-41.7	-44.6	-82.3	15.1	29.3
SS 548	-70.0	-42.2	-73.0	12.5	5.6
SS 8302	-62.5	-36.8	-72.7	5.0	3.6
SS 8309	-100.0	-30.6	-85.4	11.6	22.7
SS 8404	-50.0	-52.2	-84.0	9.3	13.4
SS 8641	-55.6	-66.5	-82.8	ND	1.8
SS MPV-57	-50.0	-40.0	-52.8	10.6	-13.1
Truman	0.0	-49.4	-84.8	4.5	19.4
USG 3350	-71.4	-50.6	-50.4	6.3	2.0
AVERAGE	-50.0	-46.4	###	9.6	20.6

*Rating = 0-9 rating of symptoms in the field, FDK= percent *Fusarium* damaged kernels by weight
 ND = no data