

EVALUATION OF YIELD, TEST WEIGHT AND SCAB PROFILES OF ADVANCED WHEAT BREEDING LINES TREATED WITH A FUNGICIDE

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In 2007, scab pressure was very low across Kentucky for the third year in a row. This break from disease pressure is due primarily to weather because the causal fungus, *Fusarium graminearum*, needs warm and wet weather during flowering in order to develop into an epidemic. The potential for an epidemic is increased when susceptible varieties are grown. An important goal of the UK wheat breeding project is to develop varieties that have increased scab resistance with competitively high yields. When wheat breeders evaluate scab resistance of wheat breeding lines they tend to focus on the genetic component of resistance. This approach ignores the possible benefits of management practices such as fungicide applications. The purpose of this study was to evaluate the response to scab of a set of UK wheat advanced breeding lines in the presence and absence of the fungicide Prosaro.

Twenty-five advanced breeding lines and four check varieties (Cumberland, Truman, McCormick and Agripro Branson) were evaluated in this experiment. The study was grown at Princeton and Lexington, KY. The Princeton plots were not irrigated but they were inoculated with a single application of scabby corn (applied at the boot stage) and two conidial spore sprays applied at flowering and one week later. The Lexington location was mist-irrigated and

inoculated with a single application of scabby corn. Rainfall across Kentucky was inadequate for scab development in farmer's fields, but measurable levels of disease were achieved in both nurseries.

There were 3 replications at both locations for each of two treatments, fungicide-treated plots and non-treated controls. The Princeton plots were conventional 6-row yield plots, 15 ft. long. At Lexington, plots were 4 rows wide and 4 ft. long, planted with a headrow planter. The fungicide-treated plots at each location were sprayed at flowering with a tank mix of Prosaro fungicide (6.5 fl. oz. acre⁻¹) with Induce (0.125% w/v). Scab symptoms were evaluated 21 days after flowering using a 5 point visual rating scale based on disease severity and incidence. After harvest, percentage *Fusarium* damaged kernels (FDK), deoxynivalenol concentration (DON), yield and test weight were measured.

In Princeton, where rain was a limiting factor, there was no significant difference between fungicide-treated and control plots for disease rating, FDK, DON, and test weight (Table 1). There was a significant difference in yield, with the control plots yielding 11.5 % less than the fungicide-treated plots. In the irrigated Lexington nursery, FHB rating, FDK and DON were

all significantly lower in treated than in controls (Table 1). Yield and test weight were significantly higher in the treated plots than in the controls. While there was no statistically significant entry x fungicide interaction on average, some breeding lines and varieties differed in their response to fungicide application. For example, Truman did not respond to fungicide application for any trait measured. On the other hand, entry 11, KY98C-1518-02-2, showed a 48% reduction in DON in the fungicide-treated plots (Table 2). Certain lines such as entry

23, had a DON value that was not significantly different from that of Truman when treated with the fungicide. The study suggests that advanced breeding lines should routinely be screened with a fungicide as part the process of evaluating the lines for possible release as varieties.

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Table 1. Average of 29 wheat breeding lines and varieties for each variable by location, 2007

Variable [†]	BOTH LOCATIONS				LEXINGTON				PRINCETON			
	Fungicide-treated		Not treated		Fungicide-Treated		Not treated		Fungicide-treated		Not treated	
Rating (1-5)	1.7	b [†]	2.2	a	2.2	b	3.0	a	1.2	a	1.4	a
FDK (%)	7.9	b	14.0	a	11.0	b	22.3	a	5.8	a	5.0	a
DON (ppm)	9.9	b	12.4	a	16.5	b	21.7	a	3.6	a	3.2	a
Yield (bu/A)	57.1	a	52.5	b	63.2	a	58.9	b	51.3	a	46.0	b
Test Wt (lb/bu)	54.0	a	52.8	b	53.2	a	51.1	b	54.7	a	54.6	a

[†] FDK = Fusarium damaged kernels; Disease Rating 1 = <10% disease, 2 = 11-25%, 3 = 26-75%, 4 = 76-90%, 5 = >90% disease; DON = deoxynivalenol or vomitoxin concentration.
^{††} Variable means followed by different letters within the same location are significantly different (P<0.05) from one another.

Table 2. Average yield, test weight and scab data of advanced wheat breeding lines and check varieties grown at Lexington and Princeton, 2007.

Entry	Name	Fungicide-Treated					Not-Treated				
		FDK (%) [†]	Rating (1-5)	Yield (bu/A)	Test Weight (lb/bu)	DON (ppm)	FDK (%)	Rating (1-5)	Yield (bu/A)	Test Weight (lb/bu)	DON (ppm)
1	CUMBERLAND	11.33	1.67	50.29	54.62	9.87	13.97	2.17	47.03	53.87	10.92
2	TRUMAN	6.14	1.00	65.25	55.95	4.74	5.33	1.00	66.74	55.55	4.29
3	MCCORMICK	6.95	1.00	51.03	57.48	5.83	7.69	1.50	44.92	57.18	7.54
4	BRANSON	6.60	1.50	71.19	55.73	3.10	8.89	2.00	64.83	53.18	5.85
5	KY98C-1324-01-1	5.02	1.67	65.44	53.83	11.02	12.65	1.67	58.17	52.07	13.98
6	KY98C-1324-01-3	6.20	1.83	51.75	54.83	9.68	16.23	2.00	46.07	52.52	18.78
7	KY98C-1421-01-2	9.13	1.83	54.16	55.73	9.55	23.23	2.00	48.09	53.75	14.02
8	KY98C-1446-02-1	8.00	1.80	56.52	53.84	14.13	16.65	1.67	53.43	51.77	15.68
9	KY98C-1446-02-2	6.24	1.67	57.96	54.23	10.40	12.25	1.67	59.19	52.70	14.65
10	KY98C-1474-02	5.45	1.20	70.15	56.16	6.64	12.06	1.17	63.93	55.72	9.10
11	KY98C-1518-02-2	5.44	1.50	57.73	56.00	9.07	11.86	2.17	51.28	54.95	17.58
12	KY99C-1008-10-1	4.98	2.00	50.30	53.50	6.82	11.60	2.83	51.54	50.90	15.38
13	KY99C-1155-04-1	12.34	1.67	59.16	53.67	11.90	16.90	2.17	57.07	52.67	11.46
14	KY99C-1175-01-3	10.21	2.50	50.61	52.95	15.15	18.63	3.17	43.95	49.33	19.95
15	KY99C-1205-06-1	4.99	1.00	60.98	57.27	7.88	8.35	1.83	56.72	56.00	8.80
16	KY99C-1298-08-1	6.56	1.60	57.73	54.14	7.30	18.63	2.00	49.57	52.18	10.45
17	KY99C-1008-13-1	7.62	2.00	54.49	52.28	10.58	17.83	2.67	49.93	51.72	15.40
18	KY99C-1051-03-1	7.15	2.20	65.35	54.66	10.10	23.29	3.00	55.44	51.25	14.65
19	KY99C-1176-02-1	8.19	1.50	59.55	52.23	10.85	18.91	2.00	46.95	49.63	12.38
20	KY99C-1197-03-1	4.78	1.67	51.47	54.72	10.88	18.08	2.00	45.58	51.90	14.18
21	KY97C-0277-03-01	8.38	2.00	49.49	53.90	13.47	11.35	2.83	48.36	53.25	15.42
22	KY97C-0316-01-01	10.09	2.00	48.27	52.83	12.95	13.01	2.67	44.20	51.97	14.27
23	KY97C-0508-01-01A-1	5.44	1.17	52.88	45.30	6.42	13.72	1.83	54.13	54.40	8.31
24	KY97C-0519-04-05	14.59	1.83	61.65	50.75	12.00	15.11	3.00	52.83	50.02	12.38
25	KY97C-0540-01-03	6.40	1.83	63.86	55.57	11.10	9.70	2.33	54.41	53.62	11.55
26	KY97C-0546-17-01	12.98	2.00	44.66	50.47	15.27	18.34	2.67	43.21	50.00	14.27
27	KY97C-0554-04-05	9.71	1.50	57.40	55.53	9.23	13.79	1.83	52.94	55.00	5.75
28	KY97C-0321-05-2	9.95	2.17	65.63	53.55	11.13	9.50	3.17	62.70	52.12	10.87
29	KY97C-0067-2	7.87	1.67	53.14	54.65	9.83	7.88	1.83	48.88	53.10	10.13
Average		7.89	1.69	57.18	54.01	9.89	13.98	2.17	52.49	52.84	12.34

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