

BREEDING FOR FUSARIUM HEAD BLIGHT RESISTANCE IN AN EPIDEMIC YEAR

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In 2004 ideal temperatures and abundant rainfall led to an FHB epidemic in Kentucky. Extreme disease pressure in our irrigated FHB screening nursery made it impossible to find breeding lines with even moderate levels of resistance. Severity and incidence were recorded in the 2004 scab nursery at 21 days after flowering. Symptoms were slow to develop but after June 1 symptom expression exploded. The data collected at 21 days after flowering had almost no predictive value; 7 days later, many lines rated moderately resistant at 21 days after flowering had been obliterated by FHB. Given these circumstances we wanted to know what, if any, value could be assigned to the data we collected.

Because the head symptoms from the FHB nursery were not informative, we hoped that Fusarium damaged kernels (FDK) and DON would be good indicators of resistance. Unfortunately, the frequency of tombstone kernels was so high that there was often not enough seed to submit for DON analysis.

We also decided to inoculate bagged heads outside of the irrigated nursery in 2004. This study was evaluated at two locations (Lexington and Woodford County, KY), which were not irrigated. Approximately 120 heads per location of Clark were inoculated at flowering. Water was injected into 120 heads per location as the control. Both sets were bagged with glassine bags and stapled closed for 48 hours before removing. Data were collected at 7-day intervals after inoculation.

The best data collected in 2004 was from non-irrigated plots (Tables 1, 2). Seed damage was more variable and susceptibility levels were more prominent without irrigation, so we were able to find differences among varieties and lines. Results from point-inoculated bagged heads were promising. This technique allowed disease severity to be read and analyzed from an off-site station without irrigation. This could be useful in testing advanced breeding lines in different locations in Kentucky. In 2005 we will use a small air sprayer instead of point inoculations to deliver spores.

TABLE 1. BREEDING MATERIAL EVALUATED UNDER IRRIGATION AND NATURAL ENVIRONMENT					
NAME	Lexington Irrigated Severity	Princeton Irrigated Severity*	Woodford County		
			Scab Wt. (g)	Total Wt. (g)	% Scab
McCormick	34.3	20.8	19	1527	1.23
Allegiance	37.4	22.6	68	1212	5.31
25R37	57.7	30.9	18	1818	0.98
25R23	59.6	25.5	29	864	3.25
97C-0062-1	49.2	35.5	79	1470	5.10
97C-0062-1	71.3	41.3	71	1009	6.57
96C-0770-3	60.6	44.1	73	1034	6.59
97C-0067-2	63.9	44.5	37	1540	2.35
97C-0067-3	68.6	38.4	18	1474	1.21
97C-0077-1	74.2	54.3	34	977	3.36
97C-0077-1	45.1	26.8	102	706	12.62
97C-0092-2	72.9	60.3	62	1263	4.68
97C-0092-3	51.3	47.6	28	1379	1.99
97C-0092-3	69.5	51.8	57	1104	4.91
97C-0111-1	57.7	27.9	34	1946	1.72
97C-0111-3	44.8	29.4	14	1533	0.90
97C-0111-3	62.2	44.1	16	1102	1.43
97C-0149-4	61.7	61.8	35	1683	2.04
97C-0165-3	65.8	54.7	40	1207	3.21
97C-0173-1	83.0	38.9	29	1408	2.02
97C-0232-2	59.2	23.6	45	1065	4.05
97C-0232-2	56.5	41.0	36	1282	2.73
97C-0232-2	44.4	17.6	42	1326	3.07
97C-0232-2	70.0	38.2	68	1084	5.90
AVERAGE	59.2	38.4	44	1292	3.63

TABLE 2. BREEDING MATERIAL EVALUATED UNDER IRRIGATION AND NATURAL ENVIRONMENT

NAME	Lexington Irrigated Severity*	Princeton Irrigated Severity*	Woodford County		
			Scab Wt. (g)	Total Wt. (g)	% Scab
McCormick	29.1	25.4	13	775	1.65
Allegiance	30.6	18.2	49	1758	2.71
25R37	28.8	29.5	29	1269	2.23
25R23	48.8	24.3	41	1268	3.13
96C-0399-5	32.2	31.9	77	980	7.28
96C-0498-2	35.5	21.3	115	626	15.52
96C-0727-1	20.8	30.9	84	1167	6.71
96C-0727-1	23.4	18.2	123	1166	9.54
96C-0763-1	51.5	35.1	24	1621	1.46
96C-0766-4	46.8	40.5	95	728	11.54
96C-0767-1	57.6	60.2	33	2064	1.57
96C-0767-1	60.2	37.1	73	1372	5.05
96C-0768-2	43.5	51.1	57	1479	3.71
96C-0769-4	49.9	19.1	49	918	5.07
96C-0769-7	55.8	29.3	56	909	5.80
96C-0769-7	45.1	23.1	68	1231	5.23
96C-0769-7	40.7	41.7	48	1039	4.42
96C-0770-3	36.2	32.1	57	1275	4.28
96C-0772-2	39.8	24.5	19	1131	1.65
96C-0772-6	49.3	35.9	61	1440	4.06
96C-0778-1	59.5	46.6	45	1285	3.38
96C-0786-3	33.5	42.4	77	1246	5.82
96C-0786-3	38.6	33.9	47	1486	3.07
96C-0787-2	39.7	45.0	32	1580	1.99
97C-0062-1	31.7	26.2	39	1669	2.28
AVERAGE	41.1	32.9	56	1259	4.77
* Severity was taken on spikes that were frozen at 21 DAA.					

