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QUARTERLY PROGRESS REPORT to
National Peanut Board
North Carolina Peanut Growers Association

TITLE: Breeding peanuts for resistance to Sclerotinia blight, early leafspot, *Cylindrocladium* black rot, and tomato spotted wilt virus

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REPORT: Since the last quarterly report, disease data recorded for the 2006 Disease Selection Tests [CBR tests with no application of metam sodium at an infested site at the Upper Coastal Plains Research Station (UCPRS) at Rocky Mount, NC; early leafspot tests at the Peanut Belt Research Station (PBRS) at Lewiston, NC in plots that received no fungicide application, and tomato spotted wilt virus tests at PBRS in plots that received no insecticide treatment to manage thrips and that were planted at 20" seed spacing to maximize TSWV incidence; Sclerotinia tests with no application of fluazinam at an infested site in Bertie County, NC] were used to identify families to undergo further selection in the next cycle. Each of the four Disease Selection Tests had two replications and 182 genetic entries including F₄ progeny of 85 F₂ plant selections from 33 crosses made in 2004, 39 F_{4:6} selections from superior F_{2:4} families derived from 6 crosses made in 2003, and 48 F_{6:8} families selected from superior F_{4:6} families derived from 7 crosses made in 2002. The F_{6:8} families also were planted in replicated yield trials (Disease Preliminary Tests) at PBRS and the Upper Coastal Plains Research Station at Rocky Mount to assess yield and grade. Those families will not be subjected to further within-family selection. For each F_{2:4} and F_{4:6} family identified as having superior resistance across two or more diseases, individual plants were selected on the basis of pod and seed characteristics from a plot at PBRS. Seeds from the selections were planted at the project's winter nursery at Juana Diaz, Puerto Rico in November, as were selections from BC₁F₂ populations from crosses made in 2005 as part of this project. This set of crosses was made by backcrossing hybrids between disease-resistant selections from earlier cycles and lines with the high oleic fatty acid trait patented by the University of Florida back to the disease-resistant parent. BC₁F₁ plants were grown in the Puerto Rico nursery in the winter of 2005-2006 to provide BC₁f₂ plants for selection in October of 2006.

Pod samples from the two-location Disease Preliminary Test have not yet been graded. However, yield data has been analyzed (Table 1), and of the 48 F_{6:8} families, 7 were not significantly different in yield from N03073FT, a disease-resistant line also used as a check (3855 lb/A). In fact, two F_{6:8} families had yields that were numerically superior to that of N03073FT. Note that although no expense was spared to control diseases in these yield trials, Sclerotinia blight was a factor in the trial at the Peanut Belt Research Station in the 2006 growing season. However, the spectrum of disease resistance in the multiply resistant selections as measured in the disease trials was superior to any virginia-type cultivar. Three F_{6:8} families combined superior resistance to all four diseases with superior yield. We will be checking the reactions of selected F_{6:8} families to Sclerotinia blight in a greenhouse test during the winter of 2006.

The Disease Advanced Tests had 64 common entries tested for all four diseases: five advanced lines selected separately for resistance to one or more of the four diseases; 19 F_{6:12} families selected from the 2002 Disease Preliminary Test (DPT) for further testing of yield, grade, and disease resistance; one F_{6:11} families selected from the 2003 DPT for further testing; one F_{6:10} families selected from the 2004 DPT for further testing, 16 F_{6:9} families selected from the 2005 DPT for further testing, and 12 checks including 11 released cultivars (NC 7, NC-V 11, NC 12C, Gregory, Perry, Phillips, Brantley, VA-C 92R, VA 98R, Wilson and CHAMPS) and release candidate N01013T, and 12 lines derived from interspecific crosses between cultivated peanut and wild *Arachis* species from South America. Five of the 19 lines from the 2002 DPT and the one selected from the 2003 DPT were also selected for entry into the 2006 NCSU Advanced Yield Test, a replicated yield trial conducted at three locations.

As for the Disease Preliminary Test, grade data for the sprayed and unsprayed replicates of the Disease Advanced Test for leafspot are not yet available, but yields have been analyzed as have reactions to the four diseases. All of the 20 best lines for disease resistance came from the accelerated resistance selection program (Table 2), seven of them selections from the 2002 DPT (lines with experimental designations beginning "N03" in Figure 1) and the remaining 13 selections from the 2005 DPT (lines with "DPT" designations in Figure 1). Although it is often the case that the most disease-resistant lines are not the highest yielding or have the best grade, the 2002 DPT selections have been tested reasonably extensively for yield and grade, and some of them yield better than existing cultivars and grade well. As one would expect for a set of lines yield-tested for the first time,

among the 13 selections from the 2005 DPT are several with poor yields. The commercial value of these selections cannot be known with certainty until they have passed through a multiple-year multiple-location testing program.

A ninth group of crosses was made in 2006. In the winter of 2005-2006, a set of disease-resistant selections, including lines from the first through fourth groups of crosses subjected to this program of breeding for multiple disease resistance, was crossed with a set of elite high-oleic lines. Thirteen F₁ hybrids were backcrossed to the disease-resistant parents in the summer of 2006, and the 203 BC₁F₁ seeds were planted in the Puerto Rico winter nursery in November.

SUMMARY OF EXPENDITURES

Expenditures to date on this project total \$171,349, including \$137,825 for graduate stipends, tuition, and insurance and \$33,524 in costs associated with the research plots.

Table 1. Performance summary for lines entered in the 2006 Disease Preliminary Test.

Line	Pod yield			Defoliation score	Tomato spotted wilt virus		Sclerotinia blight		Cylindrocladium black rot	
	PBRS lb/A	UCPRS lb/A	Across locations lb/A		incidence	√incidence	incidence	√incidence	incidence	√incidence
				1=none to 9=complete						
06 DPT 001	4835 ^{1a}	3041 ^a	4114 ^a	6.01 ^{**}	0.1964 ^{*az}	0.4023 ^a	0.1137 ^{1a}	0.1790 ^{1a}	0.0945 ^{1a}	0.2126 ^{1a}
06 DPT 002	4639 ^{1a}	2579 ^a	3613 ^a	6.53	0.2390 ^{**az}	0.4454 ^z	0.3037 ^{**a}	0.5206 ^{az}	0.1002 ^{1a}	0.2429 ^{1a}
06 DPT 003	4409 ^{**a}	3050 ^a	3872 ^a	7.28 ^z	0.2354 ^{**az}	0.4419 ^z	0.2496 ^{**a}	0.4292 ^a	0.1133 ^{1a}	0.2919 ^{1a}
06 DPT 004	4377 ^{**a}	2787 ^a	3624 ^a	5.53 ^{1a}	0.3438 ^z	0.5387 ^z	0.1777 ^{1a}	0.1790 ^{1a}	0.2417 ^{*az}	0.5255 ^z
06 DPT 005	3003	1979 ^z	2469 ^z	5.65 ^{*a}	0.2953 ^z	0.4974 ^z	0.1590 ^{1a}	0.1790 ^{1a}	0.1123 ^{1a}	0.2887 ^{*a}
06 DPT 006	3644	2387 ^a	3036 ^z	6.09 ^{**}	0.3173 ^z	0.5165 ^z	0.2447 ^{**a}	0.4192 ^a	0.1431 ^{†az}	0.3679 ^{**az}
06 DPT 007	3251	2506 ^a	3054 ^z	5.90 ^{**}	0.1170 ^{1a}	0.3089 ^a	0.2611 ^{**a}	0.4512 ^a	0.0881 ^{1a}	0.1338 ^{1a}
06 DPT 008	3364	2413 ^a	3037 ^z	5.74 [*]	0.1200 ^{1a}	0.3129 ^a	0.2897 ^{**a}	0.4995 ^a	0.0951 ^{1a}	0.2163 ^{1a}
06 DPT 009	4409 ^{**a}	2922 ^a	3620 ^a	6.54	0.0352 ^{1a}	0.1784 ^{*a}	0.3565 ^a	0.5907 ^z	0.0942 ^{1a}	0.2106 ^{1a}
06 DPT 010	2683	2714 ^a	2757 ^z	5.73 [*]	0.3997 ^z	0.5830 ^z	0.5541 ^z	0.7849 ^z	0.1088 ^{1a}	0.2770 ^{*a}
06 DPT 011	2476 ^z	2322 ^z	2498 ^z	6.15	0.2485 ^{**az}	0.4545 ^z	0.1998 ^{*a}	0.2921 ^{**a}	0.1094 ^{1a}	0.2791 ^{*a}
06 DPT 012	2638	2178 ^z	2567 ^z	6.46	0.1278 ^{1a}	0.3229 ^a	0.3378 ^a	0.5673 ^{az}	0.1403 ^{†az}	0.3632 ^{**az}
06 DPT 013	3482	1983 ^z	2683 ^z	6.64	0.0541 ^{1a}	0.2140 ^{**a}	0.2603 ^{**a}	0.4497 ^a	0.0883 ^{1a}	0.1338 ^{1a}
06 DPT 014	2885	2174 ^z	2806 ^z	6.06 ^{**}	0.3534 ^z	0.5465 ^z	0.2886 ^{**a}	0.4977 ^a	0.0423 ^{1a}	0.1338 ^{1a}
06 DPT 015	3938	2245 ^z	3018 ^z	5.58 ^{*a}	0.1677 ^{1a}	0.3708 ^a	0.4892 ^z	0.7287 ^z	0.1035 ^{1a}	0.2571 ^{*a}
06 DPT 016	3432	2590 ^a	2960 ^z	5.53 ^{1a}	0.2813 ^z	0.4849 ^z	0.3544 ^a	0.5881 ^z	0.0890 ^{1a}	0.1603 ^{1a}
06 DPT 017	3097	2499 ^a	2997 ^z	6.59	0.2054 ^{**az}	0.4117 ^a	0.2549 ^{**a}	0.4396 ^a	0.1022 ^{1a}	0.2517 ^{1a}
06 DPT 018	2982	2418 ^a	2666 ^z	6.70	0.1905 ^{*az}	0.3960 ^a	0.2060 ^a	0.3168 ^{**a}	0.0600 ^{1a}	0.1338 ^{1a}
06 DPT 019	3211	2155 ^z	2713 ^z	6.14 ^{**}	0.3316 ^z	0.5286 ^z	0.2872 ^{**a}	0.4955 ^a	0.1590 ^{†az}	0.3997 ^{**az}
06 DPT 020	3194	2189 ^z	2892 ^z	5.54 ^{1a}	0.3221 ^z	0.5206 ^z	0.3448 ^a	0.5762 ^z	0.1035 ^{1a}	0.1338 ^{1a}
06 DPT 021	3293	2290 ^z	2804 ^z	5.38 ^{1a}	0.1022 ^{1a}	0.2888 ^a	0.2842 ^{**a}	0.4908 ^a	0.0886 ^{1a}	0.1511 ^{1a}
06 DPT 022	3208	2775 ^a	2972 ^z	5.67 ^{*a}	0.0968 ^{1a}	0.2812 ^a	0.3462 ^a	0.5780 ^z	0.0877 ^{1a}	0.1338 ^{1a}
06 DPT 023	1795 ^z	2469 ^a	2285 ^z	5.87 ^{**}	0.0832 ^{1a}	0.2613 ^a	0.3792 ^a	0.6174 ^z	0.1023 ^{1a}	0.2521 ^{1a}
06 DPT 024 [§]	3134	2574 ^a	2809 ^z	6.79	0.2732 ^{az}	0.4776 ^z	0.1684 ^{1a}	0.1790 ^{1a}	0.2696 ^{**az}	0.5596 ^z
06 DPT 025 [§]	3818	2584 ^a	3258	6.60	0.1654 ^{1a}	0.3682 ^a	0.4395 ^z	0.6815 ^z	0.1136 ^{1a}	0.2929 ^{*a}
06 DPT 026 [§]	3736	2006 ^z	2755 ^z	7.27 ^z	0.2614 ^{**az}	0.4667 ^z	0.2819 ^{**a}	0.4871 ^a	0.1176 ^{1a}	0.3050 ^{*a}
06 DPT 027 [§]	3916	2866 ^a	3316	7.19	0.3478 ^z	0.5420 ^z	0.2448 ^{**a}	0.4194 ^a	0.1984 ^{†az}	0.4656 ^{az}
06 DPT 028 [§]	3440	2723 ^a	3221	6.21	0.0548 ^{1a}	0.2152 ^{**a}	0.3311 ^a	0.5586 ^{az}	0.0971 ^{1a}	0.2276 ^{1a}
06 DPT 029 [§]	3371	3018 ^a	3358 ^a	7.16	0.2035 ^{*az}	0.4097 ^a	0.3570 ^a	0.5913 ^z	0.1826 ^{†az}	0.4409 ^{az}
06 DPT 030 [§]	3569	2799 ^a	3229	6.96	0.1938 ^{az}	0.3995 ^a	0.2727 ^{**a}	0.4717 ^a	0.1454 ^{†az}	0.3728 ^{**az}
06 DPT 031 [§]	3614	2348 ^z	3242	7.34 ^z	0.1331 ^{1a}	0.3296 ^a	0.1586 ^{1a}	0.1790 ^{1a}	0.1250 ^{1a}	0.3254 ^{**a}
06 DPT 032 [§]	3196	3202 ^a	3456 ^a	7.28 ^z	0.1787 ^{*a}	0.3831 ^a	0.2929 ^{**a}	0.5044 ^a	0.0900 ^{1a}	0.1751 ^{1a}
06 DPT 033 [§]	3817	2428	3287	7.53 ^z	0.3603 ^z	0.5521 ^z	0.1694 ^{1a}	0.1790 ^{1a}	0.1838 ^{†az}	0.4429 ^{az}
06 DPT 034	3406	2428 ^{az}	2993 ^z	5.87 ^{**}	0.3904 ^z	0.5758 ^z	0.4015 ^a	0.6421 ^z	0.2136 ^{*az}	0.4878 ^{az}
06 DPT 035	3119	1930 ^z	2883 ^z	5.16 ^{1a}	0.1827 ^{*a}	0.3875 ^a	0.2631 ^{**a}	0.4549 ^a	0.0788 ^{1a}	0.1338 ^{1a}
06 DPT 036	4067	1868 ^z	2873 ^z	4.86 ^{1a}	0.4343 ^z	0.6090 ^z	0.5048 ^z	0.7427 ^z	0.1434 ^{†az}	0.3686 ^{**az}
06 DPT 037	3440	2394 ^a	2959 ^z	6.28	0.2799 ^z	0.4837 ^z	0.1026 [†]	0.1790 ^{1a}	0.0940 ^{1a}	0.2093 ^{1a}
06 DPT 038	3115	1821 ^z	2660 ^z	6.09 ^{**}	0.2516 ^{**az}	0.4575 ^z	0.4153 ^{az}	0.6568 ^z	0.0630 ^{1a}	0.1338 ^{1a}
06 DPT 039	3726	2195 ^z	3094 ^z	5.26 ^{1a}	0.1715 ^{1a}	0.3751 ^a	0.2566 ^{**a}	0.4428 ^a	0.1541 ^{†az}	0.3903 ^{**az}
06 DPT 040	3330	1945 ^z	2613 ^z	5.19 ^{1a}	0.4065 ^z	0.5882 ^z	0.1056 ^{1a}	0.1790 ^{1a}	0.0269 ^{1a}	0.1338 ^{1a}
06 DPT 041	3550	1781 ^z	2632 ^z	5.20 ^{1a}	0.1927 ^{*az}	0.3983 ^a	0.7223 ^z	0.9106 ^z	0.0881 ^{1a}	0.1338 ^{1a}
06 DPT 042	3467	1839 ^z	2755 ^z	5.65 ^{*a}	0.3573 ^z	0.5497 ^z	0.2548 ^{**a}	0.4394 ^a	0.0736 ^{1a}	0.1338 ^{1a}
06 DPT 043	3135	2018 ^z	2843 ^z	5.45 ^{1a}	0.2102 ^{**az}	0.4167 ^a	0.3207 ^a	0.5446 ^{az}	0.0596 ^{1a}	0.1338 ^{1a}
06 DPT 044	2780	2262 ^z	2789 ^z	6.71	0.1813 ^{*a}	0.3860 ^a	0.2053 ^{*a}	0.3143 ^{**a}	0.0867 ^{1a}	0.1338 ^{1a}
06 DPT 045	3272	2465 ^a	2956 ^z	5.77 ^{**}	0.1594 ^{1a}	0.3613 ^a	0.2469 ^{**a}	0.4237 ^a	0.0811 ^{1a}	0.1338 ^{1a}
06 DPT 046	2672	2039 ^z	2566 ^z	5.30 ^{1a}	0.2379 ^{**az}	0.4443 ^z	0.2432 ^{**a}	0.4161 ^a	0.1075 ^{1a}	0.2724 ^{*a}
06 DPT 047	2882	2240 ^z	2676 ^z	4.64 ^{1a}	0.2182 ^{**az}	0.4248	0.4092 ^{az}	0.6504 ^z	0.1145 ^{1a}	0.2957 ^{*a}
06 DPT 048	2377 ^z	1602 ^z	2229 ^z	5.94 ^{**}	0.1764 ^{*a}	0.3806 ^a	0.4303 ^z	0.6722 ^z	0.1136 ^{1a}	0.2929 ^{*a}
Gregory	2270 ^z	2067 ^z	2463 ^z	6.89	0.2519	0.4559	0.3863	0.5821	0.2040	0.4289
Perry	2898	1649 ^z	2429 ^z	6.67	0.3945 ^z	0.5719 ^z	0.2821 ^a	0.4697	0.1586 ^a	0.3582 ^z
GP-NC 343	4071	2903 ^a	3331 ^a	4.80 ^a	0.3186 ^z	0.5151	0.3531 ^a	0.5475	0.1634 ^a	0.3964
N96076L	4284 ^{**a}	1815 ^z	3130	5.99	0.1542 ^a	0.3685	0.1608 ^a	0.3227 ^a	0.1049 ^a	0.2590 ^a
N03073FT	4878 ^{1a}	2938 ^a	3855 ^a	5.39	0.1107 ^a	0.3098 ^a	0.2420 ^a	0.4134 ^a	0.0255 ^{1a}	0.1631 ^{**a}
N03078FT	3924	2630 ^a	3172	5.33	0.1630 ^a	0.3565	0.2004 ^a	0.3262 ^a	0.1235 ^{**a}	0.3671 ^z
N03081T	3766	3006 ^a	3597 ^a	5.64	0.0718 ^{**a}	0.2650 ^a	0.2219 ^a	0.3344 ^a	0.0991 ^{**a}	0.2881 ^a
N03091T	4521 ^{*a}	2418 ^a	3483 ^a	5.89	0.2073	0.4144	0.2971 ^a	0.4899	0.0951 ^{*a}	0.2932 ^a
Critical value	5000	5000	5000	4.50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

†, **, a, z Denote means not significantly different from the critical value by t-test at P<0.10, P<0.05, and P<0.01, respectively.
 a, z Denote means not significantly different by t-test (P,0.05) from the best and worst, respectively, among all lines tested in 2006.

Table 2. Adjusted means from the 2006 Disease Selection Tests: best ten F_{2.4}, F_{4.6} and F_{6.8} families compared with checks. Early leafspot tested at PBRS in plots without fungicide; TSWV at PBRS in plots with 20" seed spacing and without insecticide, CBR at UCPRS on infested soil without metam sodium. Sclerotinia plots were grown near Roxobel in Bertie Co., but disease did not develop well, and no data was recorded.

Entry	Defoliation score	Rank among 182	Rank among 182	Sclerotinia blight incidence	Rank among 182	TSWV incidence	Rank among 182	Arithmetic disease index [§]	Rank among families	Overall rank	
	1 to 9 rating		CBR incidence	incidence		incidence		0 to 1			
F_{2.4} families											
X04056 (F2-02: F04)	4.73±0.43 ^{†a}	7	-0.026±0.055 ^{†a}	104	-0.027±0.099 ^{†a}	27	0.208±0.110 ^a	64	.8143	1	9
X04028 (F2-01: F04)	6.53±0.43	141	-0.057±0.055 ^{†a}	2	-0.009±0.099 ^{†a}	39	0.029±0.110 ^{†a}	4	.8046	2	12
X04032 (F2-01: F04)	4.93±0.43 ^{†a}	15	-0.005±0.055 ^{†a}	34	-0.028±0.099 ^{†a}	26	0.263±0.110 ^{**a}	89	.8045	3	13
X04012 (F2-01: F04)	5.52±0.43 ^{**a}	60	0.091±0.055 ^{†a}	152	0.009±0.171 ^{†a}	47	-0.023±0.110 ^{†a}	2	.7813	4	18
X04012 (F2-03: F04)	4.94±0.43 ^{†a}	16	-0.044±0.055 ^{†a}	7	0.202±0.099 ^{**}	148	0.150±0.110 ^{†a}	36	.7785	5	20
X04013 (F2-02: F04)	5.91±0.43	91	0.002±0.055 ^{†a}	53	0.026±0.099 ^{†a}	56	0.106±0.110 ^{†a}	17	.7674	6	24
X04031 (F2-02: F04)	5.35±0.43 ^a	43	0.015±0.055 ^{†a}	81	0.080±0.099 ^{†a}	89	0.139±0.110 ^{†a}	29	.7640	7	26
X04050 (F2-01: F04)	6.28±0.43	123	-0.003±0.055 ^{†a}	41	-0.044±0.100 ^{†a}	15	0.143±0.110 ^{†a}	30	.7623	8	27
X04023 (F2-04: F04)	6.01±0.43	104	-0.005±0.055 ^{†a}	35	0.081±0.099 ^{†a}	91	0.131±0.110 ^{†a}	26	.7367	9	40
X04021 (F2-01: F04)	6.38±0.43	132	-0.011±0.055 ^{†a}	27	-0.014±0.099 ^{†a}	34	0.189±0.110 ^a	53	.7355	10	41
F_{4.6} families											
X03155 (BC1F1-04-01-S-01: F06)	4.66±0.43 ^{†a}	4	0.010±0.055 ^{†a}	75	-0.021±0.099 ^{†a}	29	-0.032±0.110 ^{†a}	1	.9029	1	1
X03155 (BC1F1-04-01-S-04: F06)	4.54±0.43 ^{†a}	3	-0.047±0.055 ^{†a}	5	-0.036±0.099 ^{†a}	18	0.176±0.110 ^{†a}	46	.8876	2	2
X03155 (BC1F1-08-02-S-03: F06)	5.16±0.43 ^{†a}	33	-0.049±0.055 ^{†a}	4	-0.072±0.099 ^{†a}	7	0.197±0.110 ^a	59	.8565	3	3
X03157 (BC1F1-02-01-S-03: F06)	4.80±0.43 ^{†a}	8	-0.031±0.055 ^{†a}	10	-0.007±0.099 ^{†a}	42	0.160±0.110 ^{†a}	40	.8545	4	4
X03155 (BC1F1-04-02-S-02: F06)	5.00±0.43 ^{†a}	20	-0.003±0.055 ^{†a}	39	-0.064±0.099 ^{†a}	11	0.165±0.110 ^{†a}	41	.8436	5	5
X03157 (BC1F1-04-01-S-02: F06)	5.20±0.43 ^{†a}	36	-0.004±0.055 ^{†a}	38	-0.017±0.099 ^{†a}	32	0.074±0.110 ^{†a}	9	.8427	6	6
X03157 (BC1F1-04-01-S-05: F06)	4.84±0.43 ^{†a}	13	0.003±0.055 ^{†a}	54	0.054±0.099 ^{†a}	68	0.072±0.110 ^{†a}	8	.8354	7	7
X03153 (BC1F1-04-01-S-01: F06)	5.47±0.43 ^{**a}	55	-0.054±0.055 ^{†a}	3	0.030±0.100 ^{†a}	59	0.122±0.110 ^{†a}	21	.8257	8	8
X03161 (BC1F1-04-02-S-02: F06)	4.95±0.43 ^{†a}	17	0.018±0.055 ^{†a}	88	-0.067±0.125 ^{†a}	9	0.230±0.110 ^{**a}	75	.8135	9	10
X03153 (BC1F1-01-02-S-02: F06)	5.07±0.43 ^{†a}	26	-0.012±0.055 ^{†a}	25	0.115±0.099 ^{†a}	112	0.097±0.110 ^{†a}	15	.7985	10	15
F_{6.8} families											
X02085 (F2-02-S-03-S-03: F08)	5.04±0.43 ^{†a}	22	-0.061±0.055 ^{†a}	1	-0.081±0.099 ^{†a}	4	0.433±0.110	157	.8010	1	14
X02085 (F2-02-S-01-S-02: F08)	5.01±0.43 ^{†a}	21	-0.010±0.055 ^{†a}	29	0.076±0.099 ^{†a}	88	0.209±0.110 ^a	66	.7799	2	19
X02081 (F2-03-S-01-S-03: F08)	5.23±0.43 ^a	37	0.000±0.055 ^{†a}	50	0.097±0.099 ^{†a}	103	0.129±0.110 ^{†a}	25	.7778	3	21
X02056 (F2-01-S-01-S-01: F08)	5.86±0.43	88	0.006±0.055 ^{†a}	62	-0.073±0.099 ^{†a}	6	0.223±0.110 ^{**a}	72	.7687	4	23
X02086 (F2-02-S-01-S-02: F08)	5.62±0.43 ^{**a}	68	-0.007±0.055 ^{†a}	32	0.060±0.099 ^{†a}	73	0.186±0.110 ^a	50	.7539	5	31
X02069 (F2-01-S-02-S-01: F08)	5.75±0.43	79	0.000±0.055 ^{†a}	48	0.074±0.099 ^{†a}	86	0.143±0.110 ^{†a}	31	.7490	6	32
X02085 (F2-02-S-03-S-06: F08)	5.30±0.43 ^a	41	-0.029±0.055 ^{†a}	11	0.134±0.099 ^{†a}	122	0.237±0.110 ^{**a}	79	.7438	7	35
X02069 (F2-01-S-02-S-03: F08)	5.59±0.43 ^{**a}	67	0.007±0.055 ^{†a}	63	0.103±0.099 ^{†a}	107	0.146±0.110 ^{†a}	34	.7427	8	36
X02086 (F2-02-S-03-S-01: F08)	5.15±0.43 ^{†a}	31	0.019±0.055 ^{†a}	90	0.056±0.099 ^{†a}	70	0.264±0.110 ^{**a}	90	.7424	9	37
X02081 (F2-03-S-01-S-04: F08)	5.52±0.43 ^{**a}	61	-0.001±0.055 ^{†a}	45	0.159±0.099 [†]	131	0.123±0.110 ^{†a}	22	.7379	10	39
Checks											
NC-V 11	6.48±0.43	138	0.165±0.0550	170	0.175±0.099 [†]	138	0.470±0.110 ^z	164	.4525	10	177
Gregory	6.90±0.43	160	0.040±0.0550 ^{†a}	120	-0.067±0.126 ^{†a}	9	0.187±0.110 ^a	52	.6894	4	68
Perry	6.71±0.43	153	0.009±0.0550 ^{†a}	71	0.194±0.100 [†]	144	0.391±0.110	144	.5579	7	152
Phillips	6.39±0.43	133	0.192±0.0550 ^z	176	0.164±0.101 ^{††}	132	0.319±0.110	114	.4931	9	172
Brantley	6.81±0.43	157	0.200±0.0550 ^z	177	0.067±0.099 ^{†a}	78	0.291±0.110	104	.5069	8	167
GP-NC 343	4.83±0.43 ^{†a}	9	0.035±0.0551 ^{†a}	114	0.357±0.099 ^z	171	0.312±0.110	112	.6235	6	117
N96076L	5.77±0.43	81	0.020±0.0550 ^{†a}	92	0.088±0.099 ^{†a}	97	0.137±0.110 ^{†a}	28	.7310	3	43
N03073FT	5.08±0.43 ^{†a}	27	0.006±0.0550 ^{†a}	61	0.033±0.099 ^{†a}	60	0.132±0.110 ^{†a}	27	.8065	1	11
N03078FT	4.84±0.43 ^{†a}	13	0.170±0.0550 ^z	171	0.017±0.099 ^{†a}	50	0.367±0.110	131	.6456	5	104
N03081T	5.95±0.43	99	-0.009±0.0550 ^{†a}	30	0.018±0.099 ^{†a}	51	0.167±0.110 ^{†a}	43	.7558	2	29
Mean	5.95		0.040		0.104		0.281		.6556	91.5	31.1
Mean of F _{2.4} families	6.23±0.05	4	0.050±0.007	3	0.109±0.011	3	0.323±0.014	4	.6155	111.9	43.0
Mean of F _{4.6} families	5.31±0.08	1	0.024±0.011 ^{**}	1	0.081±0.017	1	0.224±0.021	1	.7326	53.3	20.0
Mean of F _{6.8} families	5.95±0.07	2	0.026±0.009	2	0.112±0.015	4	0.253±0.019	2	.6702	83.8	24.5
Mean of checks	5.98±0.17	3	0.083±0.021	4	0.105±0.034	2	0.277±0.043	3	.6262	104.0	5.5
Standard value	4.50		.000		.000		.000				

§ Average of four disease scores, each adjusted to a 1 (best) to 0 (worst) scale.

**,* ,† Indicate means not significantly different from the standard value at the 1%, 5%, and 10% levels of probability, respectively, by t-test from a standard value.

a,z Denote means not significantly different from the best and worst in the test, respectively, at the 5% level by t-test.

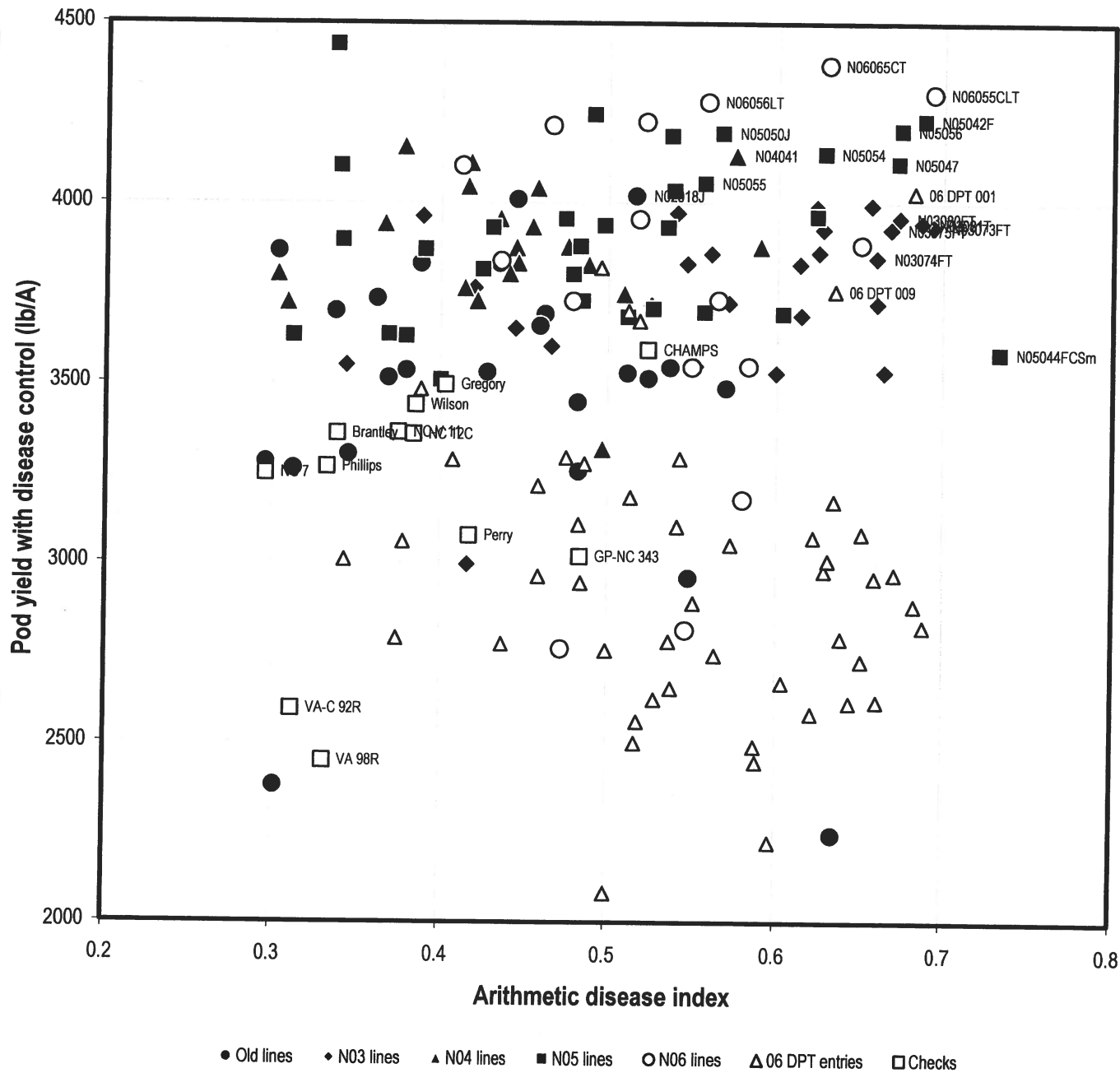


Figure 1. Pod yield with disease control versus arithmetic disease resistance index (mean of four disease scores adjusted to a scale of 0=worst to 1=best).