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

LEADER: T.G. Isleib, Department of Crop Science

REPORT: Since the last quarterly report, disease data recorded for the 2005 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 leaf spot 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 did not produce useful data because dry weather in the growing season prevented development of disease in the plots] were used to identify families to undergo further selection in the next cycle. Each Disease Selection Test had two replications and 289 genetic entries including F2 progeny of 172 F1 plant selections from 20 crosses made in 2003, 60 F2A selections from superior F2A families derived from 17 crosses made in 2002, and 53 F2A families selected from superior F2A families derived from 6 crosses made in 2001. The F2A 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. No further plant selection is to be made within those families. For each F2A and F2A 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 F2 populations from crosses made in 2004 as part of this project. This factorial set of crosses was made between a set of disease-resistant selections from earlier cycles and a set of lines with the high oleic fatty acid trait patented by the University of Florida.

The Disease Advanced Tests had 42 common entries tested for all four diseases: five advanced lines selected separately for resistance to one or more of the four diseases: 21 F2B1 families selected from the 2002 Disease Preliminary Test (DPT) for further testing of yield, grade, and disease resistance; six F2B1 families selected from the 2003 DPT for further testing; three F2B0 families selected from the 2004 DPT for further testing and 14 checks including released cultivars (NC 7, NC-V 11, NC 12C, Gregory, Perry, Phillips, Brantley, VA-C 92R, VA 89R, and Wilson), disease-resistant lines GP-NC 343 and N6076L, and two candidates for release, N99103C and N01013T. Five of the 21 lines from the 2002 DPT, one of the six selected from the 2003 DPT, and one of the three selected from the 2004 DPT were also selected for entry into the 2005 NCSU Advanced Yield Test, a replicated yield trial conducted at three locations.

Of the 53 F2A families entered in the two-location Disease Preliminary Test, 45 were not significantly different in yield from N01013T, a TSWV-resistant line also used as a check (3503 lb/A). Note that no expense was spared to control diseases in these yield trials and that TSWV was not a major factor limiting yield in the 2004 growing season. However, the spectrum of disease resistance in the multiply resistant selections as measured in the disease trials was superior to any of the checks. N01013T is susceptible to Sclerotinia blight that was controlled in the yield trials by application of fluazinam or iprodione. In contrast to 2003, when most of the high-yielding lines were not the most resistant to diseases, several of the F2A families tested in 2005 were both high yielding and disease resistant. We will be checking the reactions of selected F2A families to Sclerotinia blight in a greenhouse test during the winter of 2006.

An eighth group of crosses was made in 2005. In the winter of 2005, a set of disease-resistant selections, including lines from the first, second and third groups of crosses subjected to this program of breeding for multiple disease resistance, was crossed with a set of elite high-oleic lines. The F1 plants were backcrossed to the disease-resistant parents in the summer of 2005, and following harvest the 651 BC-F1 seeds were assayed for fatty acid profile to identify the 300 or so carrying the high-oleic gene. Those 317 seeds were planted in the Puerto Rico winter nursery in November.
SUMMARY OF EXPENDITURES

Expenditures to date on this project total $146,440, including $118,939 for graduate stipends, tuition, and insurance and $27,501 in costs associated with the research plots.