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National Peanut Board Check-Off Research
Quarterly Reports and Final Report- 2007

I. Title: Breeding Peanut for Reduced Input

II. Investigators:

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III. Objectives:

The cost of growing peanut increased dramatically over the past year. Reducing costs and/or increasing yields continue to be very important factors to help peanut farmers maintain economically viable businesses and keep US grown peanuts competitive in the global market. High yielding, disease resistant cultivars are one method of reducing costs and increasing yields. The ongoing University of Florida Peanut Breeding program is focused on developing varieties with disease resistance, high yield and good grades.

We screen germplasm for resistance to tomato spotted wilt (TSWV), leafspots, white mold, CBR (Cylindrocladium black rot) and nematodes. We have the capability to screen large numbers of genotypes for reaction to TSWV and leafspot and, in 2006, with assistance from the SPRI-NPB, we implemented screening programs for CBR, nematodes and white mold for much larger breeding populations. Screening for nematode resistance and CBR are being conducted in farmer's fields, whereas white mold nurseries are on the research station in Marianna.

In addition to the on-going program, in 2007, we propose to continue on-farm screening for CBR and nematodes and begin screening for limb rot on our research station. We also propose to pilot test a large scale DNA marker program to detect the nematode resistance gene in our breeding material. If this is successful, and economical, we could screen early generation breeding lines for nematode resistance without the time and expense of off-station testing or rearing nematodes.

A. On-going University of Florida Breeding Program
   a. Test University of Florida peanut breeding lines for resistance to late leafspot, white mold, TSWV, CBR, and root knot nematodes, as well as for pod yield, grades, and maturity.
   b. Evaluate advanced University of Florida breeding lines for, fatty acid composition.
   c. Variety management
      i. Evaluate advanced lines and varieties in leafspot fungicide management studies (i.e., 0, 4, 8 leafspot sprays), to determine which ones could perform well in a reduced leafspot spray program.
      ii. Evaluate advanced lines and varieties for white mold resistance in plots with and without inoculation with *S. rolfsii*.

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Report of Activities- Part A:

Quarter 1: For all of the above, experiments were designed, seed was shelled and field sites were located in preparation for planting. Seed samples from the 2006 season were screened for fatty acid content and tests were prepared containing high oleic and normal oleic lines.

Quarter 2: **CBR Tests:** On May 17, 2007, 119 plots were planted in a field infested with CBR near Marianna, Florida. A lack of rainfall for about 6 weeks after planting significantly delayed the crop and reduced the incidence of CBR disease throughout the season.
White Mold Tests: During May and June 2007, 600 plots were planted in Marianna for evaluation of white mold resistance.
Leaf spot Tests: During May and June 2007, 624 plots were planted in Marianna for evaluation of leafspot resistance. No fungicides were applied to these tests for the entire season.
Nematode Tests: During June, 2007, 267 plots were planted in Columbia County Florida in a field with a high population of root knot nematodes.
TSWV screening: All plots in the breeding program were rated for reaction to TSWV. The disease was severe in 2007 on the research station in Marianna. There were some lines that showed very high levels of resistance to TSWV and these will be evaluated further in 2008.

Quarter 3: During July – September, 2007, tests were evaluated for disease and other characteristics. The white mold tests were inoculated with *S. rolfsii* during this time and various spray treatments were applied to some of the leafspot tests to evaluate response of varieties to frequency of fungicide sprays. Harvest began late in Quarter 3 and continued through Quarter 4. Yields were generally good, but were suppressed by TSWV. Development of white mold was enhanced by the very warm temperatures and some varieties showed good resistance while others were nearly killed by the disease.

Final Report (Q4): Harvest was completed in November 2007 and grading and seed processing will be underway through December 2007.

B. Research to enhance breeding efficiency and effectiveness
   a. Evaluate a DNA marker system for testing early generation breeding lines for the nematode resistance gene.
   b. Continue work to understand the physiological and genetic basis of poor seed quality that is often associated with late maturing, disease resistant cultivars. This work is in its second year and we have two goals, 1) develop a screening method that can be used in the breeding program to eliminate genotypes that have poor seed quality, and 2) determine the critical points during seed storage and processing where seed quality breaks down and find ways to mitigate the problems.

Report of Activities- Part B:

DNA marker for nematode resistance: During the 1st and 2nd quarters, we evaluated a DNA marker for its utility, expense and easy of routine use in the Florida Breeding Program. We have concluded that using the marker system would be advantageous, but will require considerable expense in equipment and consumable materials. As funding becomes available, we will acquire the needed equipment that will allow us to implement marker selection in the Marianna location.

Seed quality experiments: Barry Morton, the student who worked on the seed quality problem graduated in the 2nd quarter of 2007 with a Ph.D. His work identified a rapid loss of seed vigor as the most likely cause of the seed quality problem with late maturing peanut varieties. The cause of reduced vigor is still not known although we think antioxidants may play a role. Standard germination methods did not detect the loss in vigor which helps to explain why the seed industry was caught by surprise. Methods that can be used by seed testing labs were tested and could become valuable for seed producers.