

Breeding Improved Soybean Cultivars for Alabama

Research Report 2007

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The testing and development of new soybean (*Glycine max* L.) experimental lines continues to be an ongoing project of the Alabama Agricultural Experiment Station. Since its inception, the project has resulted in the release of three cultivars (Stonewall, Carver and Kuell), and two germplasm lines. While we are deemphasizing cultivar development efforts, we continue to work on evaluation of experimental lines, and germplasm development and evaluation.

During 2007, experimental soybean lines were tested only in regional, USDA tests. The development and testing of new experimental genotypes has been discontinued, except for cooperative work with Clemson University on the development of improved germplasm with photoperiod insensitivity (long juvenile lines). Advanced lines in Maturity Groups VI, VII and VIII, were tested at multiple locations in the Southeast in the USDA Cooperative Preliminary and Uniform Tests. As a cooperator in these USDA tests, we tested the best breeding lines from all southern public programs (total of 178 lines) at from one to three locations. Our material included in these tests consisted of four of our best advanced lines tested in the Preliminary 7 test and three in the Preliminary 8 test. A total of five lines were advanced to 2007 Uniform Tests based on 2006 performance in the Preliminary Tests. One line was tested in Uniform 6, one in Uniform 7 and three in Uniform 8. Preliminary data on Uniform 8 lines indicates the performance of Auburn lines was outstanding. Complete data are not yet available as of the writing of this report, however, preliminary reports indicate that two Auburn lines that ranked 1st and 3rd in yield in the Uniform test in 2006 have continued that outstanding performance at several locations in 2007. It is likely that one of these lines will be released as a cultivar or germplasm after one more year of testing. One of these lines (Au02-2814) has shown high oil content, almost 24% oil at Fairhope, significantly better than any other line and may have potential benefits as a cultivar grown for biofuel production. Current plans do not call for developing future populations with the objective of cultivar development.

In a cooperative project with Clemson University, we tested approximately 80 advanced lines with a combination of the long-juvenile trait (lack of photoperiod response, or photoperiod insensitive) and Roundup-Ready technology. Lines were tested in replicated, multiple-row plots at one location in Alabama and two locations in South Carolina. In spite of drought in Alabama, good yields were obtained, and data are being analyzed by the Clemson group. Soybean cultivars that do not begin reproductive growth in response to daylength (photoperiod insensitive) have the potential to expand the range of planting dates with no detrimental effects on yield. This trait would allow lines to be planted either very early to avoid late-summer drought, or planted late, in a double-cropping system following small grains or maize. Previous experiments have shown that these lines produce well at both planting dates, and outperformed check cultivars at these extreme planting dates. Other traits carried by this material are resistance to soybean cyst nematode and root-knot nematode. A germplasm or cultivar release is anticipated within the next year when all data become available. We have conducted several years of yield tests with experimental long-juvenile lines, and are now in the process of combining the long-juvenile trait with Roundup Ready technology for commercial production.

In cooperation with the USDA, we evaluated 293 plant introductions from a wide range of maturity groups (groups IV, V, VI, VII, VIII, and IX) that have been previously screened at several locations in 2006, along with several check cultivars. These lines were evaluated in the field at Fairhope for resistance to Asian soybean rust. Conditions for development of rust were again very good at Fairhope in 2007, and good data were obtained. Several lines were identified that consistently showed low development of rust symptoms at several locations across the Southeast. These evaluations will be used in conjunction with data obtained from other locations across the South to determine which genotypes have the highest levels of resistance and will be useful in developing rust-resistant germplasm. This is part of a region-wide, ongoing USDA cooperative project.

We also are continuing to be a cooperator in the USDA Uniform Cooperative Tests, growing 12 tests in 3 locations (Tallasse, Belle Mina, and Fairhope) and evaluating over 200 public breeding lines of Maturity Groups V, VI, VII and VIII in both Preliminary and Uniform Tests. This continues to be a major resource of genetic material, as well as a great testing network for evaluation of new genotypes from all public breeding programs in the Southeast. However, extensive resources, in terms of labor and materials, are required to conduct these tests. We receive no money from USDA. These tests are conducted with support from the Alabama Agricultural Experiment Station and soybean checkoff funding.