

137 final
2006
TX 43
397
Carried forward
to 2007

Subject: Peanut Breeding **March 13, 2007**

Title: Heritability Estimates for High Yield Traits transferred from Wild Species Hybrids to a Conventional Variety

Personnel: Michael R. Baring, Soil and Crop Sciences Dept., 2474 TAMU, College Station, Tx. 77843-2474. Ph#979-845-4273 m-baring@tamu.edu
C.E. Simpson, Soil and Crop Sciences Dept., Texas Agricultural Experiment Station, Stephenville, Tx. 76401. Ph#254-968-4144 c-simpson@tamu.edu
Mark D. Burow, Soil and Crop Sciences Dept., Texas Agricultural Experiment Station, Route 3, Box 219 Lubbock, Tx. 79403. Ph#806-746-4025 m-burow@tamu.edu

Final Report

Seed harvested from the F₁ plants in the 2005 heritability studies were planted as F₂ populations in 2006 along with F₁'s, which were generated over the winter in the 2005-06 winter crossing block. The newly generated F₁ seeds enabled us to repeat the heritability study for a second year at the same location. The study must be duplicated if we are to make inferences about the heritability of the high yield trait. Additionally, the harvested F₂ plants from the 2005 tests were increased during the winter and summer growing seasons using the single seed decent method. This increase enabled us to produce the F₃ generation in the winter green house and the F₄ generation in the 2006 field plots. The 2006 field study included several different generations and the parents which we had planned to use in a generation means analysis.

The study included 30 individual plants of each parental component of the original cross (P₁=Tamrun OL 01, and P₂=TP301-209). It also included 30 F₁ progeny, 150 F₂ progeny, 150 F₃ progeny, and 150 F₄ progeny. We were going to perform a heritability study for a second straight year using the parents, the F₁ progeny and the F₂ progeny. Additionally, we were going to calculate generation means to run a generation means analysis which will provide a more definite estimate of the heritability of the high yield trait. The generation means analysis would have helped to determine the most effective and efficient point at which individual plant selections should be made verses family selections.

However, several factors had adverse effects on the study and we were unable to gather uniform data for the analysis. The F₄ generation which was harvested from the greenhouse two weeks prior to planting the study in the field had fresh seed dormancy problems and many of the individual plants germinated up to 5 weeks after the other populations and never caught up in terms of growth or yield.

The study was under harsh weather conditions in 2006 including high temperatures and little rainfall resulting in multiple irrigations using high sodium content water.

Due to the weather conditions throughout the year, food supplies for the birds and animals were scarce and as a result, animal feeding on the study affected the yields of individual plants. In some cases, only a few pods were eaten and in other cases 90% of

the pods were eaten off of the individual plant. The feeding was not uniform and therefore, without uniformity, we are unable to conduct any type of scientific analysis on the study. The feeding occurred during the last 2 to 3 weeks of the growing season while we were harvesting other studies across the state.

We managed to harvest enough seed from the individual plants to re-plant the study in 2007 with each of the generations represented. We are already ordering bird netting materials to cover the study to prevent as much animal damage as is possible for 2007.

In addition to the heritability estimates that we hope to obtain from this study, we have generated approximately 200 plant row selections. Twenty-five of these plant rows generated enough seed for early generation yield testing in 2006. The following table is an abbreviated version showing the top performing lines.

**Top Five Yielding Selections from the Heritability
Study using Wild Species-derived Parents.**

Cultivar	Yield Lbs/A
05L250-2	5688
05L228-4	5677
Tamrun OL01	5579
05L328-3	5505
05L250-5	5419
05L228-6	5284

The top two lines 05L250-2 and 05L228-4 were the highest yielding lines numerically in the test, but there was no statistical difference between Tamrun OL01 and the top performing lines in the test. Some of these lines will be back-crossed in an attempt to further improve yield characteristics. Additionally, some of the selections from the F_{2,3} plant rows in 2006 yielded better than the check varieties. These selections will be yield tested in 2007.

In conclusion, several factors in 2006 ruined the test data for the heritability study, but we were able to harvest enough seed to re-plant the test in 2007. The test for 2007 will be better protected from animal damage with the new bird netting that is ordered. Finally, we have been able to begin yield testing on lines selected as a direct result of this study in hopes of providing peanut growers with a higher yielding runner-type peanut.