

# Identification and Utilization of Exotic Germplasm to Improve Genetic Diversity and productivity of Southern Soybean

2007 Project Report for the Arkansas Soybean Promotion Board

**Soybean Breeder:** Pengyin Chen

**Soybean Research Specialists:** Caroline Gray, Tina Hart, Tet Ishibashi, Eddie Gordon, Joe Shafer, Bill Apple, Jonathan McCoy, and Scott Hayes

An important aspect of the U of A soybean research program is to develop diverse germplasm that will broaden the genetic background and improve the southern soybean gene pool. The specific goal is to incorporate genetic diversity, unique quality traits, disease resistance, and abiotic stress tolerance from exotic germplasm collections into adapted lines. The following are a few highlights of our research accomplishments:

## 1. Identification of Genes for Disease Resistance

We have identified two independent genes in PI 80837 for resistance to *Phomopsis* seed decay and purple seed stain. These two genes are being introgressed into our early-maturing breeding lines. In a screen of 303 popular Arkansas cultivars, we identified 28 cultivars carrying the *Rsv1* gene, 16 cultivars containing *Rsv3*, and nine cultivars carrying the *Rsv4* gene for SMV resistance. Two gene combinations (*Rsv1* and *Rsv3*) were also found in a Chinese variety. In another screen for reactions to *Tobacco ringspot virus*, 52 out of 303 cultivars showed high levels of tolerance.

## 2. Release of High Protein Germplasm “R95-1705”

Conventional, MG 5.5, 46% protein, 80-85% of commercial yield, good adaptation, value-added for specialty niche market.

## 3. Release of Drought Tolerant Germplasm “R01-416F” and “R01-581F”

Conventional, MG 5.2 and 5.6, drought tolerant, prolonged nitrogen fixation ability under drought stress, good adaptation, 95-100% commercial yields with irrigation, 116-127% commercial yields on dryland.

## 4. Mid-Oleic and Low Linolenic Lines for Low Trans Fat Oil

Lines with >60% mid-oleic and <1% linolenic acid are being developed; 6 mid-oleic genes incorporated into UA4805 and a RR line using marker-assisted selection; lines with <3% linolenic and 3% saturated fat identified.

## 5. Low Phytate Lines Being Developed

Identified 3 lines with low phytate and good yields; they were tested in 2007 and crossed with high protein lines.

## 6. Lines with Low Non-digestible Sugars Identified

Identified 5 lines with low oligosaccharides; this trait being incorporated into food-grade beans and low phytate beans for feed.