## FINAL REPORT TO THE TENNESSEE SOYBEAN PROMOTION BOARD

**TITLE:** SOYBEAN BREEDING AND GENETICS, Project # 19-12-R

**PRINCIPAL INVESTIGATOR**: VINCE PANTALONE

**GRANT FUNDING**: $ 54,000

We graduated one Ph.D. and one M.S. from the Soybean Breeding & Genetics Program this year. We also graduated two Ph.D.s co-advised by Dr. Pantalone this year.

Each year the USDA meets to discuss and vote on high yield check varieties for the year. For 2020 three of our varieties were honored as checks: Ellis, TN11-5140, and TN09-008. These become the benchmarks that other breeders strive to match or beat for seed yield. TN09-008 was nominated by the director of the USDA Southern Uniform Testing program in 2020. Most checks in the USDA testing program are high yielding Bayer varieties. Most programs never have a variety suitable to be a USDA check. It is gratifying that three Tennessee varieties were chosen as checks for 2020. We have had one or more checks in the USDA tests each and every year since 2002.

During the past 5 years (2015-2019), approximately 135,089 acres were grown by farmers using UT AgResearch soybean varieties developed by our program. By estimating each year’s seed sales × that year’s state average yield × that year’s soybean commodity price, the impact of your investment in our new variety development efforts was **>$58.9 million in revenue directly to producers**. The existence of our program has real world impact.

Ag economists estimate that soybean commodity production results in about a 9-fold increase in revenue due to soybean barge and train shipment, silo and container storage, oil crushing and protein meal extraction plants and biodiesel processing plants. Thus the $58.9 million in revenue generated by seed sales and productive performance of our varieties translates to **$530 million in realized economic impact for the past 5 years**. Investment in Tennessee Soybean Breeding & Genetics brings strong returns on the dollar.

We are currently in the process of harvesting thousands of yield trial plots, thousands of progeny rows, and thousands of single plants from 2020 field evaluations. Data analyses, DNA technologies, and laboratory analyses will move forward the best materials for further research.

**Personnel:**

Research and Education Centers across the state: East Tennessee Research & Education Center (Knoxville, TN), the Highland Rim Research & Education Center (Springfield, TN), the Research & Education Center at Milan (Milan, TN) and the West Tennessee Research & Education Center (Jackson, TN) provided valuable assistance with field plot management and harvests.

The Pantalone field program and lab currently consists of one M.S. level Research Associate as applied field manager, one Ph.D. level Research Associate as DNA marker assisted lab manager, and one B.S. level Research Associate as gas chromatography lab manager. We had 2 Ph.D. students and 1 M.S. student in our program this year. In addition we had one Norman Bourlaug Scholar Ph.D. student and one plant breeding Ph.D. student co-advised by Pantalone. We had five part-time Undergraduate Research Assistants who participate in various aspects of our seed lab, field trials, greenhouse production, DNA marker lab, and gas chromatography lab.

**2020 publications supported by the Tennessee Soybean Promotion Board:**

We won the 2020 Archer Daniels Midland / American Oil Chemists' Society Best Paper in Chemistry & Nutrition for our work on protein and oil using near-isogenic lines.

We earned the Article of the Month in January 2020 with the American Oil Chemists' Society for our work on High Oleic soybeans using near-isogenic lines.

Darr, L., M. Cunicelli, H. Bhandari, K. Bilyeu, F. Chen, T. Hewezi, Z. Li, C. E. Sams, and V. R. Pantalone. 2020. Field performance of high oleic soybeans with mutant FAD2-1A and FAD2-1B genes in Tennessee. J. of the Amer. Oil Chem. Soc. 97:49-56.

Pantalone, V., M. Cunicelli, and C. Wyman. 2020. Registration of soybean cultivar ‘TN15-5007’ with high meal protein. J. of Plant Regist. 2020:1-5.

Pantalone, V. and C. Wyman. 2020. Registration of TN15-4009 soybean germplasm with resistance to soybean cyst nematode, southern root knot nematode, and peanut root knot nematode. J. of Plant Regist. 14:77-81.

Rambani, A., V. Pantalone, S. Yang, J.H. Rice, Q. Song, M. Mazarei, P. Arelli, K. Meksem, C.N. Stewart, and T. Hewezi. 2020. Identification of introduced and stably inherited DNA methylation variants in soybean associated with soybean cyst nematode parasitism. New Phytologist. doi: 10.1111/NPH.16511