

# 2022 Research Progress Report

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## ***Soybean breeding with new herbicide tolerance technologies, RR2 Xtend and Enlist E3:***

We accessed RR2 Xtend (Bayer) and Enlist E3 technologies (Corteva) in spring 2019. Using our best elite lines as recurrent parents, we have developed one Enlist E3 line and 4 RR2 Xtend lines and entered them into advance yield trials in 2022 (Table 1).

Table 1. Advanced breeding lines developed at the University of Georgia

Line ID	Herbicide technology	Maturity Group	Tests in 2022
G21-209E3	Enlist E3	MG VII	USDA Uniform & SVT
G21-229R2X	RR2 Xtend	MG VII	USDA Uniform & SVT
G21-230R2X	RR2 Xtend	MG VII	USDA Uniform & SVT
G21-245R2X	RR2 Xtend	MG VIII	USDA Uniform & SVT
G21-241R2X	RR2 Xtend	MG VIII	USDA Uniform & SVT
G16-8779	Conventional	MG VI	USDA Uniform & SVT
G17-11315	Conventional	MG VII	USDA Uniform & SVT

The seed of these five lines were increased in Puerto Rico in the past winter for a large scale of tests including USDA Uniform Tests and State Variety Tests in southeast in 2022. Breeder plant rows were planted in 2022 at IHF or J.P. Campbell West Unit to create breeder seeds in this fall. Harvesting the breeders plant rows have been completed. Based on the yield test results, we plan to submit one Enlist E3 line and 2 RR2 Xtend lines to the CAES Cultivar and Germplasm Committee for approval of release in January, 2023.

## ***Conventional Soybean Cultivar development***

Two conventional lines G16-8779 (MG VI) and G17-11315 (MG VII) have been tested in multiple environments in USDA Uniform Tests and State Variety Tests (Table 1). Breeder plant rows were planted in 2022 at IHF to create breeder seeds in this fall. Harvesting the breeders plant rows have been completed. Based on the yield test results, we plan to submit these two lines to the CAES Cultivar and Germplasm Committee for approval of release.

## ***Advanced breeding lines in the regional tests:***

A total of 70 high-yielding RR2Y, conventional and LibertyLink soybean lines were advanced to USDA Southern Uniform Tests/Prelim Uniform Tests, State Variety Tests or USB Protein Diversity Tests in maturity groups VI, VII, and VIII. Most of these lines have good resistance to southern root-knot nematode and race 3 of SCN. Based on the performance of these lines in 2022 tests, top performing lines will be advanced to a subsequent year of testing.

## ***Soybean pipeline materials:***

Based on 2021 yield data, we have advanced a total of 204 lines including 102 conventional lines, 34 RR2Y lines, 34 LibertyLink Lines and 34 high oleic and low linolenic

lines, to the UGA advanced yield tests (AYT) at three locations in GA or LA in 2022. We also advanced a total of 1628 lines including 612 conventional lines, 510 high-yield RR2Y, 340 LibertyLink, and 124 high oleic lines, into the UGA preliminary yield trials at two locations, Athens and Plains in 2022. These lines are resistant to Southern root-knot nematode, race 3 of soybean cyst nematode, stem canker and frogeye leaf spot. Over 10,000 rows of materials at different generations were planted for evaluation and selection in 2022. Harvest has been completed and data analysis is being conducted

***Impact of GACC Funding Support:***

Funding from GACC for Soybeans has resulted in the commercialization of conventional, Roundup, LibertyLink and HOLL soybean cultivars with improved quality and pathogen resistance. We have developed strong pipeline materials using RR2 Xtent and Enlist E3 technologies. The funding has allowed us to utilize the Puerto Rican nursery for two generation advancement, molecular tools for early generation selection, and introgression of new traits into our varieties. The funding also allowed expansion of our capacity of yield trials by reducing one year of yield testing prior to cultivar release. The funds from GACC have been spent or encumbered for salary, winter nursery and lab and field supplies.