SCSB Quarterly Report

General Information
Principal Investigator(s) Name(s): Zenglu Li
Organization: University of Georgia
Date: 2021 April 15
Quarter: 1

Proposal Information
Title: Accelerating development of soybean cultivars with advanced herbicide-tolerance technologies and pest resistance for Southeastern growers.

Amount Expended to Date: Nothing to report on budget spending at this time.

Progress Assessment
Report the progress toward the situation described in the proposal summary. Include progress against budget, timeline and scope.

Despite challenges we are currently facing due to COVID-19 outbreak, work is going well towards all KPIs. BC3F1 plants were harvested from the growth chamber and the BC3F2 seeds were genotyped prior to February planting. Additionally, leaf tissue from BC3F2 plants was later collected and also genotyped to verify they were true carriers of the herbicide tolerance and will not segregate. BC3F2 plants were grown in both Griffin Growth Chamber (GGC) and Athens since attempting to increase as much as possible and not needed for crossing. Seed chipping was also conducted for all other generations before planting mid-February to ensure maximum space efficiency for targeted backcrossing in growth chambers. Crossing is currently in progress.

Key Performance Indicators
What KPI(s) are being used to measure project success? How are KPI(s) being measured? Will KPI(s) not be met? Are KPI(s) on track? Will KPI(s) be exceeded? Explain the key circumstances that are impacting achieving or not achieving KPI(s).

1) Complete backcrossing for 4 RR2 Xtend lines
This quarter, we genotyped RR2 Xtend seed from four backcrosses with the goal of reaching BC3F2:3 seed to plant in the Summer 2021 field as plant rows. BC3F2 seeds from lines G12-2062R2 and G13-2114R2 were selected for true breeding trait with genomic technologies and planted in both GGC and Athens Greenhouse. Leaf tissue was also collected several weeks later to confirm genotype (Table 1).

BC3F1 seed from G10PR-56444R2 (4) x Dicamba RR2X did not germinate last quarter so we allowed the BC2F1 plants to self and produce BC2F2 seeds. BC2F2 seed was genotyped prior to planting to select for true-breeding lines to use for crossing. Ten homozygous mutant seeds

were discovered and seven germinated in the GGC. We are currently attempting to make new BC3F1 crosses.

Due to low population and delay in genotyping due to COVID-19 outbreak, BC2 was not successful for G13-2842R2. Last quarter we made 29 BC2F1 attempts which produced 14 seed, and genotyping identified five true crosses, all of which germinated in GGC. These five BC2F1 plants are currently being used to make BC3F1.

2) Complete backcrossing for 3 Enlist E3 lines

This quarter, we genotyped three Enlist lines with the goal of reaching BC3F2:3 seed to plant in the Summer 2021 field as plant rows. BC3F2 seeds were genotyped from backcrosses with lines Woodruff and G17-11319 to select homozygous, true-breeding individuals which are now growing to self and produce BC3F2:3 seed. Seed will be harvested and planted next quarter in Athens fields. We also genotyped BC3F1 seed from G14-6063 to confirm true hybrids. We found six hybrid seed and five germinated in the GGC (Table 1).

3) Form additional crosses with best UGA germplasm

There is limited space in Griffin Growth Chamber, therefore additional backcrossing advancement is limited until the next field growing season. Of the additional eight RR2 Xtend backcrosses, seven LibertyLink crosses or backcrosses, and 10 Enlist crosses or backcrosses made in the 2020 Summer crossing block in Athens, GA, one RR2 Xtend and four Enlist crosses were genotyped, planted (four Enlist crosses were planted but one did not germinate), and are being advanced in the Griffin Growth Chamber 2020-2021.

4) Advance 3 high yielding LibertyLink lines into USDA Uniform Tests

Last year's 2020 Summer planting season was harvested and data was compiled. Two LibertyLink lines, G15PRLL-953 and G15PRLL-989, were yield tested in GA SVT, with average yields of 59.1 and 59.3 bu/ac, respectively, across seven locations in GA. These lines are again being entered into the Gerogia State Variety Trial in 2021. Seed has been shipped to collaborators and we expect yield data back at the end of harvest 2021.

This past year we also yield tested experimental line G15LL-9205 in the USDA Uniform Test MG8, with an average yield of 72.0 bu/ac with six reps across 2 locations. G15LL-9205 is again being entered into the UT 8 in 2021. Additionally in 2021, we have one line in USDA Preliminary Test MG7, three lines in USDA Preliminary Test MG8, three lines in USDA Uniform Test MG6, two lines in USDA Uniform Test MG7, and two additional lines (three total) in USDA Uniform Test MG8. Seed has been shipped to collaborators and we expect yield data back at the end of harvest 2021.

Next Steps

Explain the next steps of the projects and what you hope to achieve during the next quarter.

Next quarter, plants will be harvested from the Griffin growth chamber as part of KPIs 1, 2, and 3. Harvested BC3F2:3 seed will be planted in the Summer 2021 field as plant rows.

Additional Information

Table 1. Lines currently growing in 2020-2021 Griffin Growth Chamber Cycle 2 and Athens, GA Greenhouse

Project	Line	Gen.	2020-2021 Griffin Growth Chamber Plan	Number of Plants in GGC/Athens
Enlist E3	Woodruff (4) x Enlist CTV-DVR-1001	BC3F2	Grow selected BC3F2 plants; self to produce BC3F2:3 seed for summer field	20/19
Enlist E3	G17-11319 (4) x Enlist CTV-DVR 1002	BC3F2	Grow selected BC3F2 plants; self to produce BC3F2:3 seed for summer field	14/13
Enlist E3	G14-6063 (4) x Enlist CTV-DVR-1001	**BC3F1**	Increase to produce BC3F2 seed; make selections on BC3F2 plants in summer	5/0
RR2 Xtend	G12-2062R2 (4) x Dicamba RR2X	BC3F2	Grow selected BC3F2 plants; self to produce BC3F2:3 seed for summer field	14/16
RR2 Xtend	G13-2114R2 (4) x Dicamba RR2X	BC3F2	Grow selected BC3F2 plants; self to produce BC3F2:3 seed for summer field	12/20
RR2 Xtend	G10PR-56444R2 (3) x Dicamba RR2X	**BC2F2**	Crossing to remake BC3F1 with remnant seed (no germ previous cycle)	7/0
RR2 Xtend	G13-2842R2 (3) x Dicamba RR2X	**BC2F1**	Crossing to make BC3F1	5/0