

PROGRESS REPORT TO THE SOUTH CAROLINA SOYBEAN BOARD  
April 2018

TITLE:

Evaluation of SC Soybean Breeding Lines in 2017  
Award# 2011967

PRINCIPAL INVESTAGATOR:

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OBJECTIVES:

The research objectives of the program include:

- a) Incorporating genetic diversity to broaden and improve sources of pest resistance, seed composition and yield in soybean.
- b) Using molecular markers to improve selection for important agronomic traits. This includes QTL identification and implementation of statistical software necessary for marker assisted selection.
- c) Releasing varieties and germplasm adapted to the southeast with improved traits and economic value. Current traits in development include: high oleic acid and low linolenic acid (>75% oleic acid & <3% linolenic acid), improved meal protein (>48%) and oil content (>20%), drought tolerance, LL, RR1 and RR2Y technology, insect and rust resistance in maturity groups 5, 6, 7, and 8 soybeans.
- d) Utilizing the long juvenile trait in soybean to improve soybean production in early and late season planted soybeans.
- e) Making research related findings easily accessible to farmers and the public.
- f) Promoting agriculture in the classroom.
- g) Training plant breeders for both the public and private sector.

## PROGRESS:

### **April 2018**

Breeding trials in 2017 went well. So far, everything that has been cleaned and germ tested has looked really good. Most of the material we tested last year did well. Please see below for a few tables displaying some of the results from last year. We did test two RR1 MG6 breeding lines, but neither line performed as well as we had hoped. We know this is one area that local growers have shown an interest in and we want to be able to provide for that need. As well any other need that may arise. So, please if you or anybody you know has a suggestion please let me know. We do plan to test two new breeding lines that are MG6 RR1 soybeans in the SCOVT this year. We do have a very good yielding MG5.7 RR1 soybean (TN13-5746RR1) that has tested well in the past and if it tested well again next year, we should be able to release that variety and a RR2Y MG 5.5 (TN12-5523R2). These two lines are in Table 1, which depicts the results from the Stress OVT at the PDREC in Florence, SC. TN12-5523R2 was also tested in the USDA Regional Southern Soybean Trials in 2017, which included testing in 5 states, each with field trials replicated 3 times. Right now, we have 3 soybean lines for potential release in 2019. The two lines mentioned above and one more MG5.7.

We were also able to start testing new breeding lines in preliminary yields trials in 2017. These are lines that we begin developing in 2013, when I first arrived at Clemson. In these yield trials we included commercial entries as check varieties. Tables 3&4 depict the results from the high protein and breeding preliminary yield trials. There was also a high oleic preliminary yield trial but yield data from that trial was somewhat distorted because of a delayed harvest and is not presented below.

We continue to add more diverse germplasm into the program. We just received ~30 lines we selected from GRIN based on their diverse environments in which they originated. This ranges from hot, arid environments in China to cold, harsh environments in Russia. We hope to field test some of these lines in 2018. All new material developed under the objective of improved seed composition has been cleaned, packaged and is currently being tested using a Perten 7250 NIR. We should have the results back by mid-April. This includes both high oleic and high protein material. The last thing I wanted to mention is we have had a good bit of interest in some of our newly released varieties. One farmer in Darlington will be planting Agustina behind corn. So, I am interested to see what the yields will be from this test. Material with the long juvenile material has done very well in the GA Ultra Late Planted OVT, which typically gets planted in August. The gamble seems to be if an early frost hits, yields can be impacted dramatically. We are also still have seed available for Paul and Cheraw, which are RR1 maturity group 8s, as well as a few other conventional lines.

**Table 1. Results From The 2017 Stress OVT At The PDREC In Florence, SC**

TABLE . DRY LAND SOYBEAN VARIETY PERFORMANCE: COASTAL PLAIN: STRESSED ENVIRONMENT TRIAL PEE DEE RESEARCH AND EDUCATION CENTER, FLORENCE, SC 2017 DATA					
COMPANY OR BRAND NAME	VARIETY OR STRAIN	YIELD (BU/A)	MATURITY (DATE)	PLANT HEIGHT (IN)	LODGING
MATURITY GROUP V EARLY					
C.U.	TN13-5745RR1	47.4	10/23	32	1.5
C.U.	TN12-5523R2	44.2	10/14	27	1.5
C.U.	TN13-5746RR1	42.9	10/23	32	1.8
Pioneer	P55T81R	39.9	10/11	32	1.5
CREDENZ	CZ 5147 LL	37.9	10/ 5	21	1.0
CREDENZ	CZ 5375 RY	36.5	10/10	26	1.5
Dyna-Gro	S52RS86	36.1	10/11	28	1.8
AGS	537LL	35.4	10/10	29	1.3
CREDENZ	CZ 5150 LL	35.1	10/ 8	28	1.3
UARK	UA 5414RR	33.5	10/12	26	1.8
CREDENZ	CZ 5515 LL	33.2	10/10	39	2.5
UARK	UA 5814HP	28.5	10/10	25	1.0
CREDENZ	CZ 5242 LL	28.4	10/ 8	26	1.8
UARK	UA 5014C	27.2	10/10	21	1.0
UARK	UA 5115C	21.2	10/12	21	1.0
Dyna-Gro	SX17651XS	18.8	10/ 6	23	1.0
AVERAGES		34.1	10/11	27	1.4
L.S.D. (.10)		4.0			
C.V. (%)		9.9			
STD. ERROR OF ENTRY MEAN		1.9	DF=48		
R-SQUARED		0.88			

**Table 2. Results From The 2017 USDA Regional Southern Soybean Trials.**

STRAIN/ VARIETY	SEED		AVG. RANK	MAT. INDEX	LOD	HT	SCN Cyst Score (1-5)†			SC RATING	SC SCORE
	YIELD	RANK					Race 2	Race 3	Race 5		
UA 5612	53.9	12	10	0	2.0	35	.	5	4	MR	2
TN11-5140	58.9	2	5	7	1.7	37	.	5	5	R	1
JTN-5203	54.6	11	10	0	1.4	31	.	1	1	SS	3
AG 5335	58.8	3	5	-3	1.4	37	.	4	5	R	1
R11-7999	56.9	7	8	5	1.6	34	.	5	4	R	1
R11-8346	57.6	4	7	1	1.3	30	.	5	3	R	1
R11-8397	53.7	13	10	-2	1.3	28	.	5	5	R	1
R12-6751RR	55.6	8	9	2	1.7	33	.	5	5	R	1
SC10-258	51.0	15	13	-2	1.7	35	.	2	5	R	1
TN12-5523R2	59.8	1	5	5	1.8	34	.	5	1	MS	4
TN12-5712R2	57.1	5	7	6	1.5	36	.	4	1	S	5
TN13-5508R2	55.5	9	9	2	1.3	33	.	3	3	S	5
TN13-5745RR1	55.2	10	9	8	1.6	38	.	5	5	SS	3
TN13-5746RR1	57.1	6	8	9	1.5	37	.	5	5	R	1
TN15-5503	50.8	16	12	5	1.9	34	.	5	5	R	1
TN16-5109	51.9	14	11	3	1.7	35	.	5	5	R	1
UARK-288	45.0	17	15	0	1.9	30	.	5	4	R	1
Mean	54.9	.	.	3	1.6	34	.	.	.	.	.
LSD(0.05)	6.1	.	.	5	.	3	.	.	.	.	.
CV(%)	11.7	.	.	143	.	9	.	.	.	.	.

**Table 3. Roundup Ready Breeding Lines Tested in 2017**

Line	AVG MAT	AVG HT	AVG WT	AVG MST	MAX TSWT	Yield
SC17-6521	10/30/17	32.67	7.55	13.40	62.20	55.27
SC17-6515	11/7/17	37.33	6.98	14.63	60.30	51.07
SC17-6509	11/6/17	38.33	6.70	13.40	60.50	49.02
SC17-6504	10/30/17	43.67	6.66	13.20	60.70	48.75
SC17-6508	10/30/17	35.33	6.59	13.53	62.20	48.21
AG 7231	10/29/17	34.33	6.46	13.10	61.70	47.26
SC17-6519	11/2/17	37.33	6.12	13.90	58.80	44.82
SC17-6511	10/30/17	33.00	6.06	12.90	61.00	44.33
SC17-6518	11/1/17	47.67	5.96	14.07	57.80	43.60
SC17-6502	10/28/17	44.00	5.90	13.53	59.00	43.16
SC17-6514	11/7/17	44.33	5.81	15.17	56.70	42.53
AGS-738RR	10/30/17	28.33	5.58	13.13	59.30	40.87
SC17-6506	11/2/17	38.67	5.55	13.70	58.70	40.60
SC17-6520	11/6/17	43.67	5.50	15.53	56.40	40.26
SC17-6503	10/27/17	39.33	5.45	12.93	59.80	39.87
AG 6534	10/30/17	29.00	5.35	12.17	58.30	39.16

**Table 4. High Protein Lines Tested In 2017**

PRO PYT 2017							
LINE	TSWT	YIELD	PROTEIN (DW)	Oil (DW)	PROTEIN (13%)	Oil (13%)	MEAL PROTEIN
SC17-7029	58.60	43.40	47%	20%	40.9%	17.0%	51.2%
SC17-7008	56.30	40.20	49%	21%	42.6%	18.0%	53.4%
SC17-7003	59.80	39.28	48%	22%	41.8%	19.0%	52.3%
SC17-7016	60.10	38.17	42%	21%	36.5%	18.0%	45.7%
SC17-7013	57.00	36.29	49%	20%	42.6%	17.0%	53.4%
NC-ROY	56.50	35.72	43%	22%	37.4%	19.0%	46.8%
SC17-7031	56.40	35.72	47%	21%	40.9%	18.0%	51.2%
SC17-7015	54.90	32.90	45%	21%	39.2%	18.0%	49.0%
SC17-7028	46.20	31.64	48%	20%	41.8%	17.0%	52.3%
SC17-7004	51.90	31.62	48%	22%	41.8%	19.0%	52.3%
DILLON	52.00	31.35	44%	21%	38.3%	18.0%	47.9%
SC17-7027	54.00	30.99	49%	20%	42.6%	17.0%	53.4%
SC17-7001	43.20	29.76	50%	20%	43.5%	17.0%	54.5%
SC17-7007	57.60	29.26	46%	22%	40.0%	19.0%	50.1%
SC17-7020	57.70	28.80	47%	21%	40.9%	18.0%	51.2%