MISSISSIPPI SOYBEAN PROMOTION BOARD
PROJECT NO. 67-2017 (YEAR 2)
FINAL REPORT

Title: **Agronomic Evaluation of USDA Heat-Tolerant Maturity Group III Soybean Germplasm for Use in the Early Soybean Production System (ESPS)**

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BACKGROUND

About half of the soybean in Mississippi are produced without irrigation, and yield of dryland soybean is significantly lower than that of irrigated soybean. The Early Soybean Production System (ESPS) has helped to increase yields of both irrigated and dryland soybean. However, there is opportunity to increase dryland soybean yield above current levels.

Soybeans maturing in the summer heat tend to have issues with seed quality such as seed size because seed fill occurs during the annual summer drought. Dryland soybean also exhibits increased heat damage and in some cases increased seed wrinkling and green seed, as well as poor germination.

The use of Maturity Group (MG) III soybeans that have been bred to be heat tolerant could offer a solution to decreased yield and grain quality associated with dryland production. The proposed research is designed to agronomically and economically evaluate heat-tolerant MG III soybean genotypes that have been recently developed by the USDA-ARS, as well as commercially available MG III soybeans.

OBJECTIVES

Objective 1: Compare productivity and grain quality of three newly developed ARS late MG III soybean lines to three traditional late MG III soybean cultivars.

Objective 2: Compare narrow row to wide row soybean production for MG III varieties.

Objective 3: Examine the economic considerations of the using both commercially available and USDA- bred MG III soybeans.

REPORT OF PROGRESS/ACTIVITY

When data were averaged over variety and row spacing, soybean yields were higher with late planting date in both years, likely due to delayed emergence for the May planting date and to very dry weather conditions coupled with dry soil at planting (Table 1).
An interaction between variety and planting date was found in 2016 (Table 2). Seed yield of DS 65-1 was significantly lower than that of all other varieties for both planting dates used in this study. No yield differences were observed for varieties in 2017.
When averaged across varieties and planting dates, narrow row spacing (20 in.) increased soybean yield by 3.6 bu/acre compared to soybeans planted on wide rows (40 in.) in 2016 only (Table 1). An interaction between row spacing and planting date in 2017 showed that soybean yields were 12.2 bu/acre greater with wide row spacing than with narrow row spacing for the late planting date (Table 3). However, no differences were observed for yield due to row spacing for the early planting date in 2017.

Germination and seed quality tests are still being conducted on the seed collected at harvest. Preliminary seed pathogen tests have been completed. Fusarium and charcoal rot were not detected on seed from either the

commercial or USDA varieties. Slightly more Cercospera seed stain and Phomopsis were found on the commercial varieties; however, total levels of both pathogens were low, likely due to dry conditions during seedfill of all varieties.

IMPACTS AND BENEFITS TO MISSISSIPPI SOYBEAN PRODUCERS

This effort will aid dryland soybean farmers in Mississippi by evaluating the performance of existing and new MG III soybean genetics grown under different agronomic management practices. If the use of MG III varieties at early planting dates could allow dryland farmers to harvest soybean before the onset of summer drought, yields can be significantly improved.

Using MG III varieties may also allow dryland producers to sell their soybean into the old crop market and therefore receive a premium for their crop. Also, if the yield of the USDA varieties is similar to that of commercial varieties, the resulting increase in seed quality can result in soybean growers receiving little or no dockage at elevators. This will be especially important with depressed soybean prices. If the performance of USDA lines is satisfactory, the lines can be provided to seed companies who will have the ability to incorporate useful traits such as herbicide tolerance, eventually resulting in improved MG III soybean varieties available to producers.

END PRODUCTS- COMPLETED OR FORTHCOMING

The seed quality from this data is still being analyzed and will be reported in the future. The data from this project and the similar Mississippi Dryland Soybean Study are currently in the process of written up for publication in Agronomy Journal.

In the future, seed quality traits from these soybean could potentially be incorporated into soybean lines used in Mississippi for both irrigated and dryland soybeans.

Table 1. Soybean seed yield as affected by the main effects of planting date, row spacing, and variety.

		2016		2017	
		Yield	Grouping	Yield	Grouping
Planting Date	Early	31.4	B	21.8	B
	Late	33.2	A	42.4	A
Row Spacing	Narrow	34.1	A	29.7	A
	Wide	30.5	B	34.5	A
Variety	8003-212	30.7	C	37.8356	A
	DS 34-1	30.0	C	31.5022	A
	DS 65-1	19.6	D	30.6517	A
	AG3803*	33.9	BC	36.0673	A
	AG3934*	38.8	AB	27.8923	A
	CZ3841*	41.0	A	28.6556	A

* denotes commercial variety

Table 2. Soybean seed yield as affected by the interaction of planting date and variety in 2016.

Planting date	Variety	Yield	Grouping
Early	8003-212	32.3	CD
	DS 34-1	29.3	D
	DS 65-1	17.6	E
	AG3803*	34.5	BCD
	AG3934*	37.1	BC
	CZ3841*	37.8	BC
Late	8003-212	29.1	D
	DS 34-1	30.8	CD
	DS 65-1	21.6	E
	AG3803*	33.3	CD
	AG3934*	40.5	AB
	CZ3841*	44.2	A

* denotes commercial variety

Table 3. Soybean seed yield as affected by the interaction of planting date and row spacing in 2017.

Planting date	Row Spacing	Yield	Grouping
Early	Narrow	23.1	C
	Wide	20.4	C
Late	Narrow	36.4	B
	Wide	48.5	A