SOYBEAN VARIETY TESTS IN TENNESSEE

2022

Experimental Procedures

AgResearch & Education Center Tests: All soybean variety trials were conducted in each of the physiographic regions of the state. Tests were conducted at the Agricenter International Research Center (Memphis), Northeast Tennessee (Greeneville), East Tennessee (Knoxville), Middle Tennessee (Spring Hill), Highland Rim (Springfield), Milan (Milan), and West Tennessee (Jackson) AgResearch & Education Centers (REC). Entries were divided into the following tests based on relative maturity: **MG-3** (relative maturity 3.0-3.9), **MG-4E** (relative maturity 4.0–4.5), **MG-4L** (relative maturity: 4.6-4.9), and **MG-5** (relative maturity: 5.0-5.9). Each test was treated using conventional herbicides in order to provide a head-to-head comparison across herbicide tolerances. Tests of MG-3 were not grown at the Memphis location. Duplicate plantings of all tests were made at the **Milan and Highland Rim REC** for performance testing **with and without irrigation**.

The plot size at all REC locations was two, 30-ft. rows with 30-inch row spacing. All varieties were planted at approximately 6 seeds per foot of row (i.e., approximately 140,000 seed per acre in the REC tests). Plots were replicated three times at each location in a randomized complete block design.

Genetics plus Seed Treatments: Seed of all varieties included in the REC tests were treated with one or more fungicides plus an insecticide. Research has shown that seed treatments can influence yield, therefore **the yields of varieties reported herein are the combined result of the genetic potential of the varieties plus the seed treatment "packages".** The seed treatments that were included in each variety were determined by the company or organization and are listed in Table 29. Many soybean varieties are now being marketed with combinations of fungicides and insecticides on the seed, similar to corn. A decision was made to test the varieties in the UT soybean performance tests with the seed treatments so the results would be comparable to what producers could expect from seed they purchase.

County Standard Tests: The County Standard Soybean Tests were conducted in 17 counties in Tennessee and one in Kentucky. The number of county locations depended on the test (Table 2). The County Standard Tests were divided by herbicide tolerance into Glyphosate/Dicamba tolerance and Glufosinate tolerance and then further divided by relative maturity. Tests included **R2X-3** (relative maturity 3.6-3.9), **R2X-4E** (relative maturity 4.0-4.5), **R2X-4L** (relative maturity 4.6-4.9), **R2X- 5E** (relative maturity 5.0-5.5), **LL-4E** (relative maturity 4.0-4.5, **LL-4L** (relative maturity 4.6-5.2). Each variety was evaluated in a large strip-plot at each location, thus each county test was considered as one replication of the test in calculating the overall average yield and in conducting the statistical analysis to determine significant differences. At each location, plots were planted, sprayed, fertilized, and harvested with the equipment used in the cooperating producer's farming operation. The width and length of stripplots were different in each county; however, within a location in a county, the strips were trimmed on the ends so that the lengths were the same for each variety, or if the lengths were different then the harvested length was measured for each variety and appropriate harvested area adjustments were made to determine the yield per acre.

Interpretation of Data

The tables on the following pages have been prepared with the entries listed in order of yield performance, the highest-yielding entry being listed first. Mean separation was performed using the LSD

(Least Significant Difference) test. The mean trait value of any two entries being compared must differ by at least the LSD amount shown to be considered different at the 5% level of probability of significance. For example, given that the LSD for a test is 7 bu/a and the mean yield of Variety A was 55 bu/a and the mean yield of Variety B was 49 bu/a, then the two hybrids are not statistically different in yield because the difference of 6 bu/a is less than the minimum of 7 bu/a required for them to be significant. Similarly, if the average yield of Variety C was 63 bu/a, then it is significantly higher yielding than both Variety B (63 - 49 = 14 bu/a > LSD of 7 bu/a) and Variety A (63 - 55 = 8 bu/a > LSD of 7 bu/ac). Tests with an LSD value of N.S. indicate there were no significant differences in entry performance within that test.

To simplify interpretation, **Mean Separation Letters** have been listed next to each entry for the test of average yield across all locations. Varieties that have any letter in common are not significantly different in yield at the 5% level of probability based on the LSD test. Varieties with performance not significantly different from the top-performing hybrid will have an "A" included in the list of mean separation letters next to that entry.

The **coefficient of variation (C.V.)** values are also shown at the bottom of each table. This value is a measure of the error variability found within each experiment. It is calculated as the ratio of the square root of error variance to the mean yield. For example, a C.V. of 10% indicates that the size of the error variation is about 10% of the size of the test mean. Similarly, a C.V. of 30% indicates that the size of the error variation is nearly one-third as large as the test mean. A goal in conducting each yield test is to keep the C.V. as low as possible, preferably below 20 percent. The C.V. is not reported for traits, such as lodging, which are not on a ratio scale and/or have a mean value near zero.

<u>Results</u>

Yield and Agronomic Traits. Seventy-five soybean varieties were evaluated in the 2022 **Research & Education Center (REC)** tests in Tennessee. There were six varieties in the MG-3, 19 in the MG-4E, 37 in the MG-4L, and 13 in the MG-5 tests. Herbicide tolerance varied by entries with the majority falling into the XtendFlex (XF) category, either with or without STS (47 entries) (Table 1). A breakdown of herbicide tolerance by test is given in Table 1.

Fifty-seven varieties were evaluated in the **County Standard tests (CST)**, including the following number of varieties and counties within each test: Glyphosate / Dicamba tolerant tests: MG-3 - eight varieties at three locations, MG-4E R2X - 16 varieties at eight locations, MG-4L R2X – 19 varieties at nine locations, MG-5 – nine varieties at five locations; Enlist tests: MG-4E Enlist– nine varieties at six locations, MG-4L Enlist - four varieties at eight locations.

Table 1. Herbicide trait technology (A) and number of soybean entries within each herbicide trait class
and maturity group in the 2022 UT AgResearch and Education Center soybean variety trials (B).
A.

	Abbr.	Description/Trade Name	Sulfonylurea	Glufosinate	Glyphosate	Dicamba	2,4-D	HPPDi
Conv.	Conv.	No herbicide tolerance						
Single	STS	Sulfonylurea tolerant	х					
	LL	LibertyLink		х				
		Roundup Ready						
		Roundup Ready 2						
	RR/RR2	Roundup Ready 2 Yield			х			
Double		Roundup Ready 2 with						
	RR2+STS	STS	х		х			
	GTLL	GTLL		х	х			

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	R2X	Roundup Ready 2 Xtend			х	x		
Triple	LLGT27	LibertyLink GT27		х	х			х
	R2X+STS	Xtend with STS	х		х	х		
	XF	XtendFlex		х	х	х		
	E3	Enlist E3		х	х		x	
Quad	XF+STS	Enlist with STS	х	x	х	х		
	E3+STS	Enlist with STS	x	х	х		х	

B.

	Abbr.	MG-3	MG-4E	MG-4L	MG-5	Total
Conv.	Conv.			2	4	6
Single	STS					0
	LL					0
	RR/RR2		1			1
Double	RR2+STS					0
	GTLL					0
	R2X			1		1
	LLGT27					0
Triple	R2X+STS		3	3	1	7
Inple	XF	4	5	13	2	24
	E3		3	3	2	8
Quad	XF+STS	2	6	12	3	23
Quad	E3+STS		1	3	1	5
	Total	6	19	37	13	75

Irrigated vs. Non-irrigated Yields. Duplicate tests were conducted at the Milan and Springfield AgResearch and Education Center locations with and without irrigation. The irrigated tests at Milan exhibited a yield advantage compared to the non-irrigated tests, averaging 10.5 bu/ac higher yield: MG-3 (+ 8 bu/ac), MG-4E (+ 10 bu/a), MG-4L (+ 12 bu/a), and MG-5 (+ 12 bu/a). Springfield showed a similar yield advantage in irrigated tests compared to non-irrigated, except in the MG-3 test: MG-3 (-1 bu/ac), MG-4E (+ 6 bu/a), MG-4L (+ 10 bu/a), and MG-5 (+ 13 bu/a).

Growing Season: Soybean official variety trials were planted across all AgResearch and Education Center locations from mid-May through mid-June. Favorable planting conditions prevailed in May, allowing planting to occur across the state. Statewide soybean planting progress was on par with the five-year average, with 53 percent of soybeans planted by late May and 93 percent of soybean planted by late June. Drought conditions existed across the state from mid-June to mid-July, however, early August rains aided the growth of late-planted soybean. By late September, 56 percent of the soybeans rated good to excellent. In mid-October, 46 percent of soybeans had been harvested, which was on par with the five-year average. By the end of October, 73 percent of soybeans had been harvested, compared to the five-year average of 62 percent. By Mid-November, 87 percent of soybeans had been harvested. According to the National Agricultural Statistical Service, Tennessee growers planted 1.77 million acres of soybeans in 2022, up 250,000 acres from the previous year. Soybean production for 2022 is projected to be 77.9 million bushels, an increase of 2% from 2021. The state soybean yield average is projected to be 44 bu/a, down 6.0 bushels from a year ago and 7.9 bu/a less than the national average.