

HIGHER YIELD SOYBEANS WITH SKIP-ROW PLANTING?

M.A. McClure and D. Verbree

Plant Sciences Department, University of Tennessee, Jackson, TN

Introduction

Cultural practices such as row spacing are used to optimize the yield of soybean in the Mid South U.S. In Mississippi, a narrow row spacing of 15-inches (≤ 40 -cm) was important to optimize yields with indeterminate varieties as part of the Early Soybean Production System (Bowers et.al, 2000). In recent years, producers have utilized twin-row equipment for planting corn to plant other crops such as soybean. With respect to improved yields, results have been mixed for twin-row compared to single-row systems. Bell (2005) reported that twin-row seeded soybeans produced greater yields than single-row soybeans due to more pods per plant. Grichar (2007) compared yields for single- and twin-row soybeans at two locations in Texas and reported increased yields with twin rows of both MG IV and MG V cultivars. In Louisiana, Mascagni et.al. (2008) observed inconsistent yield increases in twin-row plantings with MG IV cultivars. Bruns (2011) reported twin rows resulted in more plants and seeds per meter of row than single rows, and resulted in significant yield increases in soybeans grown in a clay soil but not at a site with a sandy soil type.

Twin-row planters are not common in Tennessee because the equipment is expensive compared to traditional planters and because limited data does not consistently show better yields with the twin-row system on flat ground. Researchers in Tennessee became interested in skip-row planting systems as an alternative to twin-row planting for potential to increase yield. Skip-row planting can be accomplished by taking a 15-inch (40-cm) row planter and shutting off every third unit to obtain a 2:1 skip pattern. Growers would use equipment already on farm and also less seed would be planted which would be a cost savings of approximately \$20 to \$40 per acre depending on seeding rate and seed cost. At Jackson TN in 2013, skip-row planting out yielded 15-inch (40-cm) single-rows (Figure 1) at different planting rates with a MG III and MG IV cultivar on a silt loam soil, with yield increase due to increased pod production from branch pods. Subsequently, our objective in 2014 was to evaluate skip-row and 15-inch (40-cm) single-row systems on a large scale at multiple field sites.

Methods

Skip-row and 15-inch (40-cm) row systems were compared at 11 field sites across Tennessee in 2014 using cultivars chosen by the producer for each site with a minimum of three replications of each row pattern at 10 of 11 sites. Two locations included a 30-inch (76-cm) row comparison. Producers planted MG III (1), MG IV (7) and MG V (3) varieties using 12 to 28 row equipment. Equipment was set for the producer's desired seeding rate (140,000 to 165,000 seeds/acre) and single-row strips were planted. The same population settings were maintained while selected units were disabled to obtain the skip-row pattern. Plots were planted in May (5), June (5) or July (1). Five sites were irrigated and six were rainfed. Rainfall was excellent throughout the growing season and temperatures were moderate to below normal for the season. A university scout checked fields weekly and weeds, insects and diseases were managed according to University of Tennessee recommendations. Stand counts were made 30 to 40 days after emergence. Plant height, node, total pod and branch pods were counted just prior to harvest. Plots were harvested with producer equipment and harvest weights were measured with a calibrated weigh wagon (Par-Kan Company, Silver Lake, IN). Harvest data from eight of the eleven sites has been collected to date.

Each location was analyzed separately as a randomized complete block design (RCBD) using SAS Proc Mixed where block was a random factor, row configuration was a fixed factor, and the responses included yield, average plant height, average number nodes per plant, average total pods per plant, average branch pods per plant. Analysis of height, nodes, total pods, and branch pods was done on an average of 20 plants in each plot. All comparisons were done using a protected LSD at a 0.05 level.

Figure 1. Seeding rate and row configuration effect on soybean yield in small plot study Jackson, TN. Verbree and McClure, 2013.

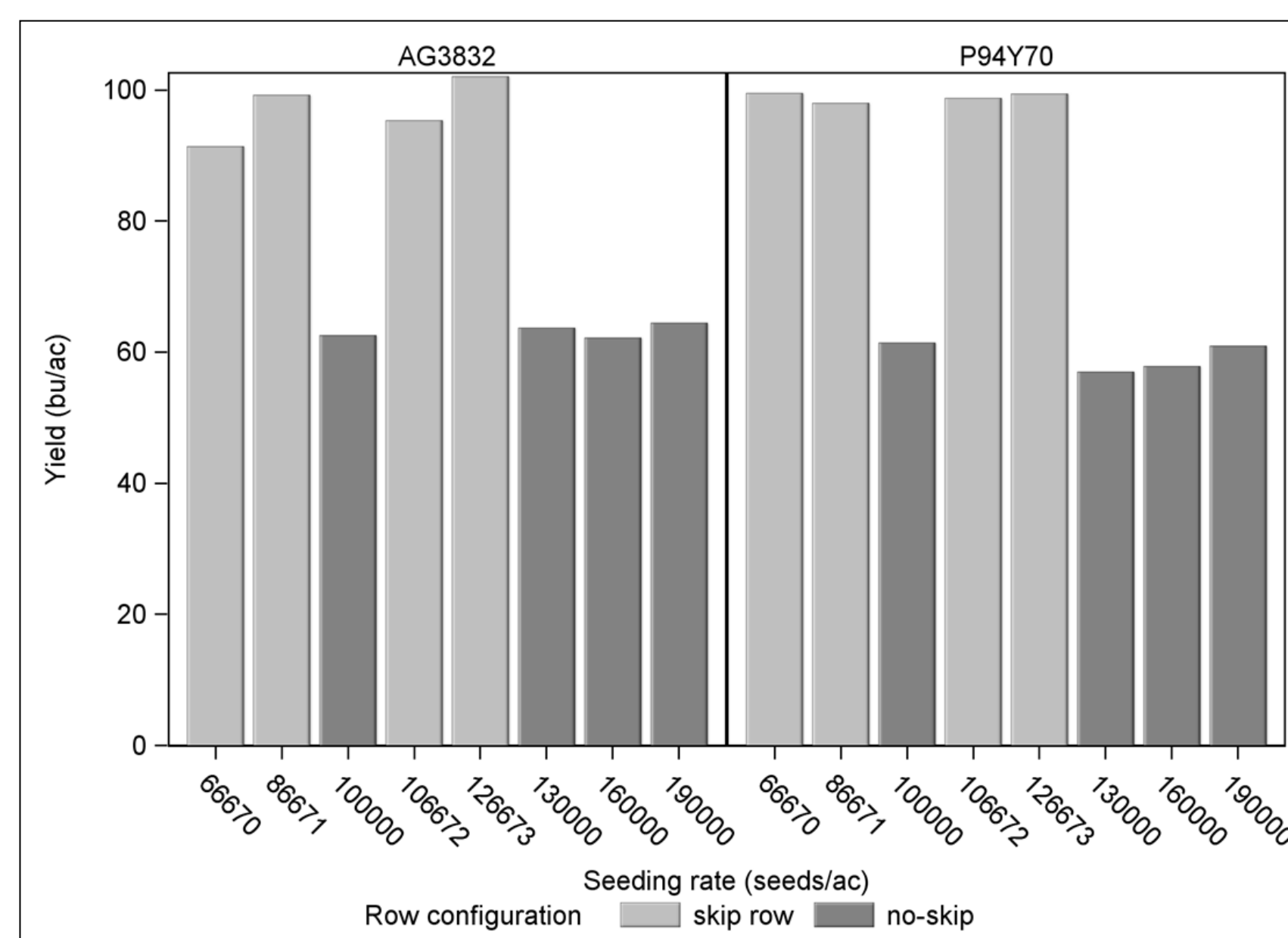


Figure 2. Effect of Row Configuration on Growth and Development (ANOVA)

County	Irrigation	Planting Date	Variety	Yield	Height	No. Nodes	No. Total Pods	No. Branch Pods
				p-values where significant				
Cannon	rainfed	6/4/2014	P49T97	ns	ns	ns	***	***
Coffee	rainfed	5/15/2014	P47T36	ns	ns	***	***	**
Dyer	rainfed	6/3/2014	AG4934	ns	N/A	N/A	N/A	N/A
Dyer	irrigated	6/21/2014	AG5234	ns	ns	*	ns	ns
Franklin	rainfed	5/29/2014	P49T97	**	ns	*	ns	ns
Giles	irrigated	5/5/2014	AG4232	ns	ns	ns	**	ns
Tipton	rainfed	5/21/2014	AG4632	**	ns	ns	***	**
Weakley	rainfed	5/6/2014	Terral 38R10	ns	ns	ns	**	**

* significant at the 0.1 level
 ** significant at the 0.05 level
 *** significant at the 0.01 level

Figure 3. Data Summary by Location for Yield, Node and Pod count.

Planting Configuration	Yield (bu/ac)						
	Cannon	Coffee	Dyer	Dyer Irr	Franklin	Giles	Tipton
Solid 15" rows	66.9	77.7	64.8	57.1	72.7a	70.8	72.4a
Skip 15" rows	65.5 ns	77.7 ns	67.2 ns	55.6 ns	68.8ab	70.1 ns	69.2b
Solid 30" rows				51.1	71.4b		
Avg. no. nodes per plant							
Solid 15" rows	16.0	14.3b		17.1	17.1	18.8	21.1
Skip 15" rows	16.4 ns	15.4a		18.6 ns	18.1 ns	19.4 ns	21.2 ns
Solid 30" rows				16.7	17.0		
Avg. total no. pods per plant							
Solid 15" rows	37.3b	37.2b		40.5	59.9	54.8b	62.5b
Skip 15" rows	55.0a	59.1a		54.7 ns	78.2 ns	79.1a	103.2a
Solid 30" rows				37.8	64.1		
Avg. no. branch pods per plant							
Solid 15" rows	2.9b	3.8b		3.9	25.4	9.9	12.0b
Skip 15" rows	16.8a	17.1a		10.1 ns	41.4 ns	26.3 ns	37.5a
Solid 30" rows				2.9	26.1		

Results (Figure 2 and 3)

- Skip-row yielded similarly in most cases but used less seed and at lower populations
- Skip-row resulted in numerically increased nodes in all environments
- Skip-row increased total pods numerically in all environments and statistically in 4/6 environments
- Skip row increased branch pods numerically in all environments and statistically in 3/6 environments
- In reduced branching (15-inch) treatments, yield components are more strongly influenced by stand with more significant correlation with nodes, pods, branch pods as compared with the skip-rows

Conclusions

On-farm results did not match what was observed in small plot research. Further research is planned to evaluate skip-row planting at higher populations and effect of variety on branching and yield in a skip-row system.

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References Cited

- Bell, A. 2005. Higher yields with twin-row soybeans. Delta Farm Press. Available at <http://deltafarmpress.com/higher-yields-twin-row-soybeans>.
- Bowers, G., J.L. Rabb, L.O. Ashlock and J.B. Santini. 2000. Row Spacing in the Early Soybean Production System. *Agron. J.* 92:524-531.
- Bruns, H. Arnold. 2011. Planting Date, Rate, and Twin-Row vs. Single-Row Soybean in the Mid-South. *Agron. J.* 103:1308-1313.
- Grichar, W.J. 2007. Row spacing, plant populations, and cultivar effects on soybean production along the Texas gulf coast. www.plantmanagemtnnetwork.org/cm/. *Crop Manage.* Doi:10.1094/CM-2007-0615-01-RS.
- Mascagni, H.J., E. Clawson, D. Lanclos, D. Boquet, and R. Ferguson. 2008. Comparing single-row, twin-row configurations for Louisiana crop production. *Louisiana Agric. Magazine.* Baton Rouge, LA <http://www.lsuagcenter.com/en/communications/publications/agmag/Archive/2008/Summer/Comparing+SingleRow+TwinRow+Configurations+for+Louisiana+Crop+Production.htm>

