



On-Farm Demonstration Trial: Crop Production Studies Soybean Population Trials

Mike Witt—on-farm trials coordinator and agronomist, ISU Extension and Outreach

Zachary Koopman—agricultural specialist, Department of Agricultural Engineering, Agronomy Research Farm

Craig Riesberg—agricultural specialist, Western Research and Demonstration Farm

Gary Thompson—agricultural specialist, McNay Memorial Research and Demonstration Farm

Objective

Determine the effects of soybean populations on yields to define best management practices.

Introduction

Soybean planting is one of the most critical operations of the season. Past studies have indicated soybean yields are similar across a wide range of populations, but too low of a population can result in reduced yields and too high of a population can reduce profits. Soybean tends to thrive in the space provided and does not have as many spatial needs as corn. The objective of these trials was to investigate the effect of various plant populations and various planting dates on soybean yield.

Materials and Methods

Crop Year—2021

Trial	210302	210303	210304	210007	210507	210508
Trial County	Monona	Monona	Monona	Lucas	Boone	Boone
Soil Type	Monona, Ida Silt Loam	Monona, Ida Silt Loam	Monona, Ida Silt Loam	Haig, Grundy	Webster, Clarion	Webster, Clarion
Previous Crop	Corn	Corn	Corn	Corn	Corn	Corn
Tillage	1 pass disk – 1 pass Vertical till	No-Till	No-Till	Fall disk Spring Cultivate	Conventional	Conventional
Current Crop	Soybean	Soybean	Soybean	Soybean	Soybean	Soybean
Hybrid–Variety Number	TP28E8	TP25E8	TP25E8	31A22X	P26T23E	2393 E3
Hybrid–Variety Company	Titan Pro	Titan Pro	Titan Pro	Pioneer Corteva	Pioneer Corteva	Miller
Row Spacing	30 in.	30 in.	30 in.	30 in.	30 in.	30 in.
Seeding Rate	70,000/ac. 90,000/ac. 110,000/ac. 140,000/ac.	80,000/ac. 100,000/ac. 120,000/ac.	80,000/ac. 100,000/ac. 120,000/ac.	80,000/ac. 110,000/ac. 140,000/ac. 170,000/ac.	40,000/ac. 80,000/ac. 120,000/ac.	80,000/ac. 120,000/ac.
Planting Date	5/16/2021	5/10/2021	5/13/2021	4/21/2021	5/14/2021	5/14/2021
Harvest Date	10/8/2021	10/10/2021	10/13/2021	10/18/2021	10/8/2021	10/8/2021
Experimental Type	On-Farm Demo	On-Farm Demo	On-Farm Demo	On-Farm Demo	On-Farm Demo	On-Farm Demo
Replications	4	3	3	3	4	4

Results

Variety	Planting Date	Maturity	Fungicide	Yield (bu./ac.) ^a
210302	70,000	72.9 bc	<0.01	\$762.72/ac.
	90,000	71.7 c		\$742.73/ac.
	110,000	77.2 a		\$795.09/ac.
	140,000	75.0 ab		\$760.80/ac.
210303	80,000	65.0 b	<0.01	\$673.88/ac.
	100,000	67.0 ab		\$688.44/ac.
	120,000	70.6 a		\$720.31/ac.
210304	80,000	64.5 a	0.75	\$668.48/ac.
	100,000	67.0 a		\$688.44/ac.
	120,000	65.2 a		\$661.99/ac.
210007	80,000	71.0 b	0.10	\$738.68/ac.
	110,000	73.1 ab		\$750.81/ac.
	140,000	78.0 a		\$793.20/ac.
	170,000	76.0 ab		\$761.05/ac.
210507	40,000	56.6 a	0.17	\$597.22/ac.
	80,000	60.5 a		\$625.28/ac.
	120,000	61.9 a		\$626.35/ac.
210508	80,000	53.3 a	0.23	\$547.52/ac
	120,000	55.7 a		\$559.39/ac

^aValues denoted with the same letter within a trial are not statistically different at the significance level of 0.10.

^bP-value = the calculated probability that the difference in yields can be attributed to the treatments and no other factors. For example, if a trial has a P-value of 0.10, there is 90% confidence the yield differences are in response to treatments. This is consistent for demonstration trials.

^cReturn on Treatment based on Seed prices at \$49.20 per 140,000 seeds. Cost from ISU Ag Decision Maker cost of production 2021. \$10.80 soybean commodity prices. ((Yield x Price)-Costs). Commodity price is the 2020 national average cash price for corn.

Key Takeaways

- Three trials displayed a significant difference in yields based on planted populations.
- Return on treatment calculations are variable per experiment with different populations being more profitable.
- There is no plant population that will consistently be the best yielding for soybean, as there are many other variables.
- NOTE: The results presented are from replicated demonstration trials. Statistics are used to detect differences at a location and should not be interpreted beyond the single location.