Effect of Planting Date on Soybean Yield

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Objective

To evaluate the effect of planting date on soybean yield.

Background

Crop Year: 2022	Tillage: None
Location: ACRE Farm	Soil Test (M3):OM 2.8%, P 66ppm, K 112ppm
County/Town: Defiance/Defiance, Ohio	Planting Date: 4/29, 5/20, 6/6, 6/21
Soil Type: Del Rey Silt Loam, Mermill Loam	Seeding Rate: 180K 1st - 3rd PD; 200K 4th PD
Drainage: Random	Harvest Date: 10/11 PD 1-3; 10/30 PD 4
Previous Crop: Soybean	Variety: Wellman 6131 E

Methods

This study was designed as a randomized complete block with four treatments with four replications each. Treatments consisted of four planting dates (PD). Each plot was 30 feet wide with varying lengths. All plots were treated equally with fertilizer and herbicide applications. Soybeans were no-till drilled with a row spacing of 7.5 inches. Target seeding rate for PD 1, 2, and 3 was 180,000 seeds per acre, while the PD 4 was 200,000 seeds per acre. The seeding rate was increased for PD 4 as a standard practice when planting soybean mid to late June. Seed depth was adjusted for each PD to reach adequate soil moisture resulted in approximately 1.0 inch for PD 1, 1.25 inch for PD 2 and 3, and 1.5 inch for PD 4. Plant population data was collected on June 30 during soybean growth stage V2-V3 by randomly placing a hoop ring, calibrated to 1/10,000 of an acre, at three locations within each plot and counting the number of plants. The three plant population data points were averaged for each plot. The entirety of each plot was harvested with a 30-foot grain head for the length of the plot. Grain samples from each plot were collected and combined by treatment then tested for moisture and test weight at the local grain elevator. PD 4 was harvested 19 days after PD 1-3 due to green stems and non-ripe soybeans. Harvested grain was weighted with a calibrated weigh wagon and weights adjusted to 13% moisture to determine final plot yield.

Results

Table 1. Soybean Plant Population by Planting Date (PD)		
	Plants/acre	Population as % of Target Seeding Rate
PD 1 – April 29, 2022	117,500 A	65.3%
PD 2 – May 20, 2022	128,333 AB	71.3%
PD 3 – June 6, 2022	148,333 BC	82.4%
PD 4 – June 21, 2022	154,166 C	77.1%
	LSD (0.10) 22,135	

Note: results with different letters are statistically significant.

Table 2. Soybean Yield Response to Planting Date (PD)	
	Yield (bushels/acre)
PD 1 – April 29, 2022	62.0 C
PD 2 – May 20, 2022	61.3 C
PD 3 – June 6, 2022	55.8 B
PD 4 – June 21, 2022	48.8 A
	LSD (0.10) 3.4

Note: results with different letters are statistically significant.

Summary

Early season Bean Leaf Beetle was observed feeding on PD 1 plots but not at a defoliation level requiring insecticide treatment. Comparing all planting date soil conditions, PD 1 was the ideal, followed by PD 2. PD 3 had some wetter conditions in spots, while PD 4 was the driest requiring the deepest planting depth. All plant populations were lower than the target seeding rate due to cool, wet soil conditions for PD 1-3, and dry soil conditions for PD 4. The plant populations as a percentage of target seeding rate increased from PD 1 through PD 3 due to trending from cool, wet soil conditions to relatively warmer and dryer soil conditions. The plant population as a percentage of target seeding rate (200,000 seeds per acre) for PD 4 was impacted by further drying soil conditions. Grain yields in this study were highest for PD 1 and PD 2. The yield difference between PD 1 and 2 were not statistically significant but was significantly higher compared to PD 3 and PD 4. The yield difference between PD 3 and PD 4 is statistically significant, with PD 4 having the lowest grain yield in this study. Yield results followed the expectation of declining yields with later/delayed planting date. Generally, each 10-day delay of planting in May delays maturity three to four days in the fall (Linsey, et al, 2017). Seed cost per acre in this study was $77.26 at 180,000 seeds per acre and $85.84 at 200,000 seeds per acre. At harvest, soybean price was $13.88 per bushel. The gross revenue per acre minus seed cost per acre in this study for each planting date was PD 1 $783.30, PD 2 $772.89, PD 3 $696.55, and PD 4 $590.81.

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Reference:

Lindsey, L, Tilmon, K., Michel, A., Dorrance, A. (2017). Ohio Agronomy Guide 15th Edition, Chapter 5. Soybean Production. Ohio State University, 2120 Fyffe Road, Columbus, OH, United States.

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