

Effect of Early Planting on Soybean Yield: 2023 Growing Season

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Summary

In an effort to increase soybean yield potential, early planting dates have been promoted as a management practice that can increase yield of soybeans. Early planting of soybeans can be a relative term, meaning late April/early May for some soybean producers in Kansas, but this study's definition of early planted soybeans is late March/early April. Theoretically, the earlier planting date could allow for more vegetative growth and interception of more light before blooming, increasing the yield potential. With the improvement of soybean seed treatments to protect seed when emergence is slowed due to cool and wet conditions, the early planting may be a viable option. The planting dates in the three years of the study have shown soybean yields as either stable or increased when planting in late March/early April compared to planting in mid-to-late April and early-to-mid May.

Procedures

Early soybean planting studies were conducted in 2023 at two Kansas State University experiment fields, Kansas River Valley (Topeka), and North Central (Scandia). The experiment at Topeka was irrigated, receiving 5.2 inches of water from August 17 to September 17. The experiment at Scandia was irrigated, receiving 11.25 inches from June 29 to September 13. Two varieties were planted at two seeding rates (100,000 and 150,000 seeds/a) at each of three planting dates in both studies. The varieties at Topeka were Pioneer 37A18E (Maturity Group 3.7) and Pioneer 42A84E (MG 4.2), and at Scandia were Golden Harvest GH3442XF (MG 3.4) and GH4392XF (MG 4.3). The M.G. 3.7 seed at Topeka was treated with ILeVO and the M.G. 4.2 seed was not, and both varieties were treated with Lumigen. The seed at Scandia was treated with Cruiser-Maxx + Vibrance + Saltro. The planting dates at Topeka were March 29, April 13, and May 1. The planting dates at Scandia were April 6, April 24, and May 17. Soybeans were planted in four 30-inch row plots at 10 ft wide × 40 to 50 feet long. The experimental design utilized at Topeka and Scandia was a randomized complete block design with four replications. Yields were determined from the middle two rows of each plot to avoid influence from neighboring plots. Yields were corrected to 13% grain moisture. Weed control was managed to have no effect on yields.

Results

The first planting date at Topeka had emerged by April 20, at 22 days after planting. In spite of taking three weeks to emerge, there were no large gaps in the stand. The second planting date emerged 15 days after planting, and the third took 10 days. The first planting date emerged 67 growing degree days (GDD) before the second planting date

and 256 GDD before the third date. The emergence data was similar to data in 2022. The soil temperatures near planting time at the 2-inch depths were 33, 62, and 50°F, respectively for the first through third planting dates.

The plant biomass measurements were less with in the third planting date in June, but no differences were measured when sampling in the following months. The plant number was highest with the second planting (110,201) compared to 92,277 and 75,680 for the first and third dates, respectively. The pod number was lowest with the third planting date (622 for 19.7 inches of row) compared to 791 and 797 for the first and second planting dates.

Canopy closure with the March 29 planting date was 1.75 days behind and 4 days earlier than closure dates for the April 13 and May 1 planting dates at Topeka, somewhat similar to the 2022 timeline. Maturity dates of the first two planting dates at Topeka were 2.6 days earlier than the May 1 planting date. The MG 3.7 soybean matured 6.7 days before the MG 4.2 variety. There was a higher level (14%) of sudden death syndrome (SDS) foliar symptom visible at R6 on August 28 with the MG 4.2 variety without ILeVO compared to results for the MG 3.7 with ILeVO (0.5%). The severity of SDS was not greater in the MG 4.2 variety with the earlier planting dates.

The highest yields were just over 77 bu/a with both varieties planted April 13 at Topeka (Figure 1). There was no significant difference between yields of any of the variety/ seeding rate/ planting date combination yielding between the high and low yielding treatments.

At Scandia, the 2-inch soil temperatures near the planting dates were 42, 45, and 67°F, respectively for the first through third planting dates. The biomass weight was less with the third sampling date for the June, July and August sampling dates, but weight had caught up with the first two planting dates by September. There were fewer plants with the lower seeding rate (84,090 plants/a) compared to the higher rate (108,431), but those plants compensated by having a higher number of pods, resulting in no difference in number of pod per sampling area. The only significant yield response was to variety, with the MG 4.3 yielding 9 bu/a (56 bu/a) more than the MG 3.4 variety.

This is the third year that this study has been conducted at Topeka and Scandia. The first years' data were reported in the 2022 and 2023 Kansas Field Research Reports (Adee and Dooley, 2022) (Adee, Dooley, and Pedriera, 2023). While caution should be used in making conclusions from this limited data set, the results showed that there were very positive yield responses to planting soybeans in late March/early April for certain variety/seeding rate combinations for three of the six site/years. For most variety/seeding rate treatments, there was no major yield loss due to early planting. However, there has not been a "killing" freeze after the first planted soybeans have emerged, which can happen in Kansas. Further research is needed to determine if these trends for yield response are consistent. An additional research objective could be to identify varieties that consistently respond with increased yield due to the early planting date compared to other varieties.

Acknowledgments

Funding was provided in part by the Kansas Soybean Commission.

References

- Adee, E. and Dooley, S. (2022) “Effect of Early Planting on Soybean Yield,” *Kansas Agricultural Experiment Station Research Reports*: Vol. 8: Iss. 4. <https://doi.org/10.4148/2378-5977.8299>
- Adee, E.; Dooley, S.; and Pedreira, B. (2023) “Effect of Early Planting on Soybean Yield: 2022 Growing Season,” *Kansas Agricultural Experiment Station Research Reports*: Vol. 9: Iss. 4. <https://doi.org/10.4148/2378-5977.8468>

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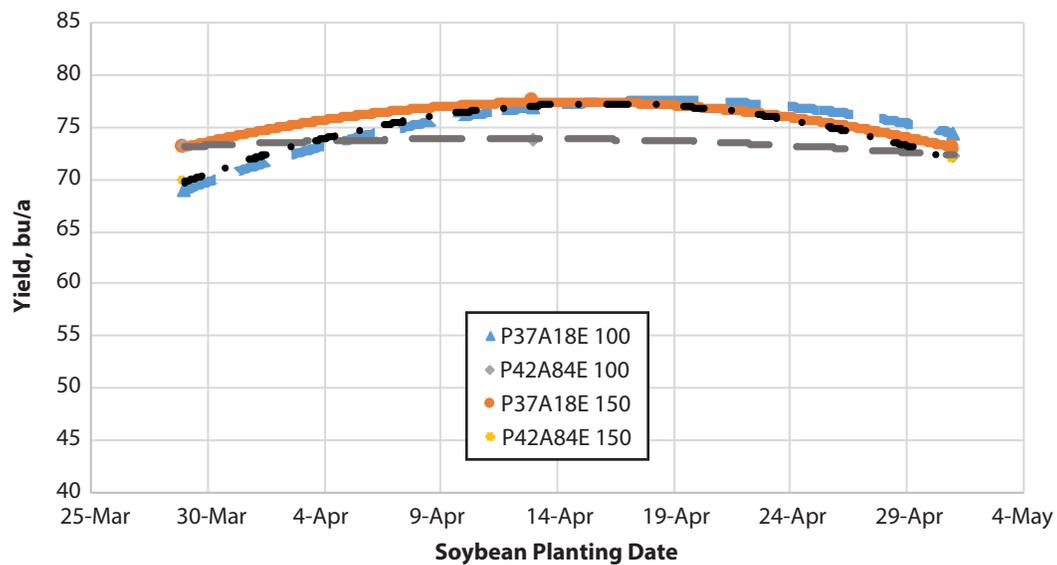


Figure 1. Effect of soybean planting date with soybean varieties of different maturity groups, planted at two seeding rates on yield at Kansas River Valley Experiment Field, Topeka, 2023.

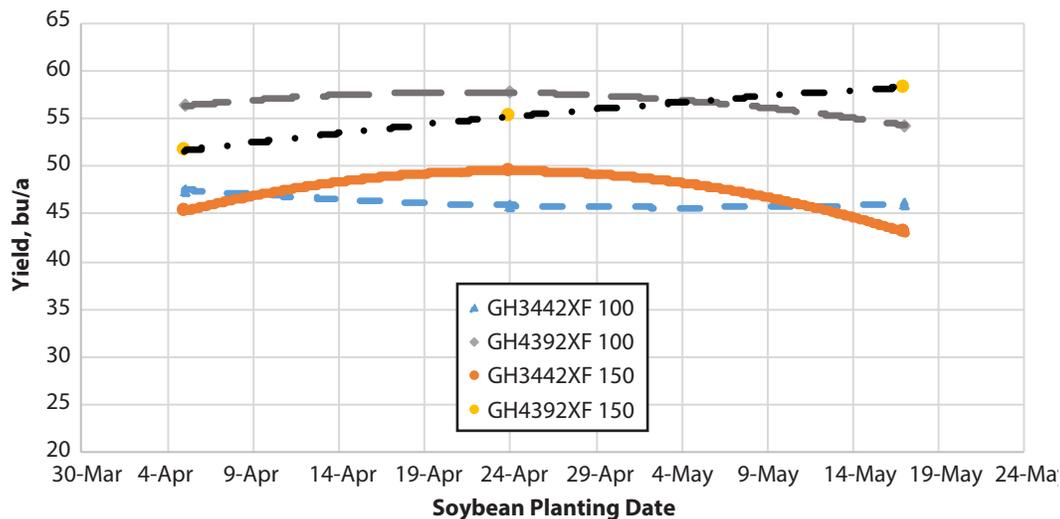


Figure 2. Effect of soybean planting date with soybean varieties of different maturity groups, planted at two seeding rates on yield at North Central Experiment Field, Scandia, 2023.