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Soybean Planting Date and Growth and Development

Abstract

Soybean planted either the last week of April or the first week of May typically produces yields greater than later planted soybean. This project will determine if initiation and duration of particular growth stages, along with main stem node accumulation explain why early planted soybeans (late April/early May) yield greater than late planted soybeans (mid May). Six planting dates with a one week interval were planted at seven Iowa State University (ISU) research farms and growth stages of the plants from the different planting dates were determined twice weekly.

Keywords

Agronomy

Disciplines

Agricultural Science | Agriculture | Agronomy and Crop Sciences

Soybean Planting Date and Growth and Development

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Introduction

Soybean planted either the last week of April or the first week of May typically produces yields greater than later planted soybean. This project will determine if initiation and duration of particular growth stages, along with main stem node accumulation explain why early planted soybeans (late April/early May) yield greater than late planted soybeans (mid May). Six planting dates with a one week interval were planted at seven Iowa State University (ISU) research farms and growth stages of the plants from the different planting dates were determined twice weekly.

Materials and Methods

The experiment was a randomized complete block design with three replications. Main plots were six planting dates (April 18, April 23, May 2, May 12, May 17, and May 23). Plot size was 10 ft × 50 ft, with 25 ft used for biomass sampling and developmental notes and 25 ft used for harvest. The soybean variety was K283RR/SCN. Seed was treated with an insecticide/fungicide seed treatment, Cruiser Maxx. Each plot was planted in four rows at 30-in. row spacing at a rate of 160,000 seeds/acre and a seeding depth of 1.5-in. Four plants were evaluated to determine growth stage two times a week for 20 weeks until plants reached harvest maturity. Plots were sprayed June 8 and July 5 with Roundup WeatherMAX to control weeds. They were also sprayed July 11 with Eraser to control bean leaf beetles and on August 28 with Warrior to control soybean aphids. Plots were harvested with an Almaco small-plot combine on October 25. Grain yields were adjusted to 13% moisture. Reported yields

and other harvest measurements are shown in Table 1. Dates at which plants reached a particular growth stage and the maximum number of main stem nodes are shown in Table 2.

Results and Discussion

Greatest yields were attained with May 2, 12, and 17 planting dates. Yields of both April planting dates and May 23 planting dates were lower. Soybeans planted on April 18, 23, and May 2 produced one more main stem node than the May 12 planting date and two more main stem nodes than the final two planting dates. Time between planting and emergence was 16 and 15 days for the April 18 and April 23 planting dates, respectively, 13 days for the May 2 planting dates, and less than 8 days for other planting dates. Plant establishment was very poor at the May 2 planting date but did not influence yield. Plants began to flower on June 5 for the early planting date but were delayed until June 29 for the late date. Time between the R1 and R5 growth stages (seed number determination period) was 13 days longer for the April 18 planting date compared with the May 22 planting date. Plants reached harvest maturity 3 to 7 days earlier for planting dates that occurred prior to May 2. Data collected from this experiment was not expected based on other data that supports early planting for achieving maximum soybean yield. Growth changes such as earlier flowering, longer seed determination period, and more main stem nodes did not explain the planting date response. This project will continue in 2008 and 2009.

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We would like to thank Jeff Butler and the rest of the farm staff for their assistance with this study. This study was funded by the checkoff and the Iowa Soybean Association.

Table 1. Effect of planting date on soybean plant density, height, lodging, moisture, and yield.

Planting date	Plant density × 1000	Height (in.)	Lodging 1-5†	Moisture (%)	Yield (bu/acre)
April 18	106.8	28.7	1.0	7.7	60.8
April 23	103.3	29.3	1.0	7.6	57.2
May 2	82.1	30.3	1.0	7.7	67.1
May 12	124.5	32.3	1.0	7.8	72.4
May 17	128.0	32.0	1.0	7.8	69.7
May 23	113.9	33.0	1.0	7.8	62.4
LSD (0.10)	15.7	2.0	NS¶	NS	6.5

†Lodging score: the range extended from 1 = erect to 5 = flat.

¶NS, not significant at $P \leq 0.10$.

Table 2. Effect of planting date on day of emergence, timing of reproductive stage, and maximum main stem node accrual.

Planting date	Emergence	Reproductive stage								Maximum main stem nodes
		1	2	3	4	5	6	7	8	
Apr 18	May 4	Jun 5	Jun 15	Jun 29	Jul 10	Jul 20	Aug 7	Sep 7	Sep 18	18
Apr 23	May 8	Jun 8	Jun 15	Jul 2	Jul 13	Jul 20	Aug 21	Sep 7	Sep 18	18
May 2	May 15	Jun 12	Jun 26	Jul 13	Jul 17	Jul 23	Aug 24	Sep 11	Sep 18	18
May 12	May 18	Jun 19	Jun 26	Jul 13	Jul 17	Jul 27	Aug 24	Sep 18	Sep 21	17
May 17	May 22	Jun 26	Jul 2	Jul 17	Jul 20	Jul 31	Aug 28	Sep 18	Sep 25	16
May 23	Jun 1	Jun 29	Jul 6	Jul 20	Jul 27	Jul 31	Sep 4	Sep 21	Sep 25	16