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Soybean Planting Date and Growth and Development Study

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 soybean (late April/early May) yield greater than late planted soybean (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 a week.

Keywords
Agronomy

Disciplines
Agricultural Science | Agriculture | Agronomy and Crop Sciences

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Soybean Planting Date and Growth and Development Study

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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 soybean (late April/early May) yield greater than late planted soybean (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 a week.

Materials and Methods

The experiment was a randomized complete block design with three replications. Main plots were six planting dates (April 23, April 30, May 6, May 14, May 21, and June 2). Plot size was 5 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, CruiserMaxx. Each plot was planted in four rows of 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 25 with Roundup WeatherMAX to control weeds. They were also sprayed June 29 with Warrior and on August 19 with Chloropyriphos and Lambdastar to control soybean aphids. Plots were harvested with an Almaco small-plot combine on October 21. 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 from planting dates between April 23 and May 21 as yields ranged from 57.7 bushels/acre and 58.0 bushels/acre. There was a non-significant 2.7 bushels/acre difference between May 21 and June 2 planting. Plant height and lodging were unchanged by planting date. Soybeans planted on April 23, 30, May 6, and May 14 produced 0.7 to 1.0 more main stem node than the May 21 and June 2 planting date. Time between planting and emergence was 13 to 16 days for planting dates earlier than May 6 and less than 9 days for later planting dates. Plant establishment was slightly reduced by April 23 planting, but stands were equivalent to the May 21 planting date. Plants began to flower on June 17 for the early planting date but were delayed until July 11 for the late date. Time between the R1 and R5 growth stages (seed number determination period) was 10 days longer for the April 23 planting date compared with the June 2 planting date. Plants reached harvest maturity 4 to 7 days earlier for planting dates that occurred prior to June 2. Growth changes such as earlier flowering, longer seed determination period, and more main stem nodes did not explain the planting date response. Studies will be conducted again in 2009.

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

Planting date	Plant density x 1000	Height (in.)	Lodging 1-5†	Moisture (%)	Yield (bu/acre)
April 23	106.2	34.7	1.0	11.8	57.7
April 30	115.1	33.0	1.0	11.8	57.7
May 6	123.9	35.0	1.0	11.8	59.7
May 14	123.0	35.0	1.0	11.8	58.4
May 21	108.0	35.3	1.0	11.8	58.0
June 2	118.6	34.0	1.0	11.8	55.3
LSD (0.10)	11.4	NS‡	NS	NS	NS

†Lodging score: the range extends 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	
April 23	May 9	June 17	July 1	July 18	July 22	Aug 5	Aug 22	Sep 16	Sep 19	20.6
April 30	May 14	June 20	July 1	July 22	July 25	Aug 5	Aug 26	Sep 16	Sep 23	20.3
May 6	May 19	June 24	July 4	July 22	July 29	Aug 8	Aug 26	Sep 19	Sep 23	20.3
May 14	May 23	June 24	July 8	July 25	July 29	Aug 12	Aug 29	Sep 19	Sep 23	19.9
May 21	May 29	July 1	July 11	July 25	Aug 1	Aug 12	Sept 2	Sep 23	Sep 26	19.2
June 2	June 9	July 11	July 22	Aug 1	Aug 8	Aug 19	Sept 5	Sep 26	Sep 30	18.1