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Soybean Planting Date and Growth and Development Study

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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 stations and growth stages of the plants from the different planting dates were determined twice weekly.

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Introduction

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Materials and Methods

The experiment was a randomized complete block design with three replications. Main plots were five planting dates (Apr 18, May 2, May 11, May 16, and May 22). The April 24 planting date was skipped due to wet conditions. 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 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 on June 5 and July 1 with Roundup WeatherMAX to control weeds. They were also sprayed at the end of July and end of August with Warrior to control soybean aphids. Plots were harvested with an Almaco small-plot combine on October 4. 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

No statistically significant yield differences were detected among any of the planting dates, but yield trends were as expected. Yield at the April 18 planting date was 5 bushels/acre more than the May 11 planting date. Lowest yields were attained at the May 16 and 22 planting dates. Plant height continued to increase as planting was delayed but did not contribute to greater plant lodging. Soybean planted on April 18 produced one more main stem node compared with all other planting dates. Delayed emergence did not influence plant establishment and final stands were all greater than 100,000 plants/acre. Plants began to flower on June 5 for the April 18 planting date, but were delayed until June 29 for the May 22 planting date. Time between the R1 and R5 growth stages (seed number determination period) was 17 days longer for the April 18 planting date compared with the May 22 planting date. Plants reached harvest maturity 3 to 5 days earlier for planting dates that occurred prior to May 11. Data collected from this experiment support early planting for achieving maximum soybean yield. Growth changes such as earlier flowering, longer seed determination period, and more main stem nodes may all contribute to greater yields at early planting dates. Studies will be conducted again in 2008.

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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)
Apr 18	115.6	34.7	1.0	12.0	75.7
May 2	110.4	38.0	1.0	12.1	72.2
May 11	120.9	39.3	1.0	12.0	70.8
May 16	125.4	42.0	1.0	12.2	69.0
May 22	120.1	42.3	1.0	12.2	66.2
LSD (0.10)	NS¶	3.4	NS	NS	NS

†Lodging score: the range extend 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 8	Jun 5	Jun 19	Jul 10	20-Jul	Jul 31	Aug 14	Sep 14	Sep 18	20
May 2	May 11	Jun 15	Jun 29	Jul 17	23-Jul	Jul 31	Aug 14	Sep 14	Sep 18	19
May 11	May 18	Jun 19	Jun 29	Jul 17	23-Jul	Aug 3	Aug 17	Sep 14	Sep 18	19
May 16	May 22	Jun 22	Jul 2	17-Jul	Jul 27	Aug 7	Aug 21	Sep 18	Sep 21	19
May 22	Jun 1	Jun 29	Jul 10	17-Jul	Aug 3	Aug 7	Aug 21	Sep 18	Sep 25	19