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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 farms and growth stages of the plants from the different planting dates were determined twice a week.

Keywords
Agronomy

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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 (April 17, April 30, May 9, May 19, and May 29). Plot size was 5 ft by 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 June 17 and July 16 with Roundup WeatherMAX to control weeds. They were also sprayed August 14 with Warrior to control soybean aphids. Plots were harvested with an Almaco small-plot combine on October 2. 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

Yields for the April 17 and 30 planting dates were 54.7 and 55.5 bushels/acre and were not statistically different from the 60.2 bushels/acre for the May 9 planting date. Lower yields for earlier dates may have been caused by 2,4-D drift on the first planting date from a neighboring field followed by hail on the first three planting dates. Plant height and lodging were influenced by planting date and plants were shorter and lodged more at the early planting date. The highest yielding planting date (May 9) produced an additional node compared with the May 29 planting date but similar node number to the two early dates. Time between planting and emergence ranged between 11 and 15 days for all planting dates except when planting occurred on May 29. Plants began to flower on June 24 for the April 17 and 30 planting dates but were delayed until July 8 for the May 29 planting dates. Time between the R1 and R5 growth stages (seed number determination period) was identical for the April 20 and May 29 planting date. Plants reached harvest maturity 4 to 7 days earlier for planting dates that occurred prior to May 13. Growth changes such as earlier flowering and production of additional mainstem nodes seem to be associated with greater yield but do not fully explain the yield response to planting date. 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 17	119.5	25.3	2.3	13.7	54.7
April 30	121.7	28.5	1.3	13.5	55.5
May 9	131.0	30.7	1.3	13.5	60.2
May 19	122.1	31.0	1.0	13.2	55.2
May 29	113.3	31.0	1.0	13.2	52.9
LSD (0.10)	NS‡	1.8	0.4	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 17	May 2	June 24	Jul 3	Jul 18	Jul 25	Aug 5	Aug 20	Sep 2	Sep 16	18.7
April 30	May 12	June 27	Jul 3	Jul 18	Jul 29	Aug 8	Aug 22	Sep 9	Sep 19	18.3
May 9	May 23	June 27	Jul 8	Jul 22	Aug 1	Aug 12	Aug 26	Sep 12	Sep 23	19.3
May 19	May 30	July 3	Jul 11	Jul 25	Aug 5	Aug 15	Aug 29	Sep 16	Sep 23	18.2
May 29	June 5	July 8	Jul 18	Jul 29	Aug 8	Aug 20	Sep 2	Sep 19	Sep 26	17.8