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Soybean Planting Date and Growth and Development

Palle Pedersen
Iowa State University

Jason De Bruin
Iowa State University

Jodee Stuart
Iowa State University

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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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Soybean Planting Date and Growth and Development

Palle Pedersen, assistant professor
Jason De Bruin, assistant scientist
Jodee Stuart, agricultural specialist
Department of Agronomy

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 20, May 2, May 10, May 16, and May 22). The April 24 date was skipped due to wet conditions. Plot size was 10 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, 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 9 and July 3 with Roundup WeatherMAX to control weeds. They were also sprayed July 6 with Warrior to control soybean aphids. Plots were harvested with an Almaco small-plot combine on September 27. 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

No statistically significant yield differences were detected among any of the planting dates. Yield for the April 20 planting date was 57.5 bushels/acre and was still 56.6 bushels/acre for May 22 planting dates. Plant height and lodging were not influenced by planting date. Planting date did not influence the number of main stem nodes produced. Time between planting and emergence did increase for the early planting date and was 18 days for the April 20 planting date, but dropped to less than 10 days for 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 20 planting date, but were delayed until June 26 for the May 22 planting date. Time between the R1 and R5 growth stages (seed number determination period) was 7 days longer for the April 20 planting date compared with the May 22 planting date. Plants reached harvest maturity 7 to 9 days earlier for planting dates that occurred prior to May 10. Data collected from this experiment indicated that in this environment a wide range of planting dates could be used to achieve the same yield. Growth changes such as earlier flowering and longer seed determination period did not explain the yield response to planting date. This project will continue in 2008 and 2009.

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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 20	148.3	35.7	1.0	10.7	57.5
May 2	138.6	36.3	1.0	10.8	51.7
May 10	148.3	36.3	1.0	10.8	55.5
May 16	138.6	36.7	1.0	10.9	56.9
May 22	147.4	38.7	1.0	10.7	56.6
LSD (0.10)	NS¶	NS	NS	NS	NS

†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 20	May 8	Jun 5	Jun 15	Jun 26	Jul 13	Jul 27	Aug 14	Aug 28	Sep 4	19
May 2	May 11	Jun 15	Jun 22	Jul 2	Jul 23	Jul 31	Aug 17	Aug 31	Sep 7	19
May 10	May 18	Jun 19	Jun 26	Jul 6	Jul 23	Jul 31	Aug 17	Sep 4	Sep 7	19
May 16	May 25	Jun 26	Jun 29	Jul 17	Jul 27	Aug 3	Aug 17	Sep 7	Sep 14	19
May 22	May 29	Jun 26	Jul 2	Jul 17	Jul 31	Aug 10	Aug 24	Sep 7	Sep 18	19