

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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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 |