

Soybean Response to Early Planting and Seed-applied Fungicide

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Introduction

Modern, elite soybean varieties respond well to early planting. Multiyear results from ISU research farms suggest that mid-April to early May planting dates most often produce top yields. Research farm and on-farm strip trials also suggest that elite varieties yield similarly over a wide range of seeding rates and resulting harvest populations. Based on these results, producers are advised to plant soybeans as soon as spring field conditions allow, with a seeding rate of 150,000–175,000 seeds/acre.

Modern varieties' yield response to early planting leads to speculation about planting some soybean acres very early (late March or early April) when weather conditions allow; therefore, in 2000, a soybean "planting date × seed treatment" test was started to evaluate yield response of two adapted, high-yield varieties to very early planting.

Two research objectives were identified: (1) to determine whether planting soybeans before corn could be a viable management option for Iowa producers, and (2) to evaluate the need for fungicide seed treatments to make this practice profitable. Establishing similar studies at four other university research farms statewide allowed us to compare soybean yield response to fungicide seed treatments in five environments.

Materials and Methods

In 2000 and 2001, adapted, high yield conventional varieties from LG/Callahan Seed Company (C-9288 variety; relative maturity 2.8) and Merschman Seed Company ("Mohave V" variety; relative maturity 2.8) were tested. LG/Callahan and Merschman offer fungicide-treated soybean seed. Fungicide seed treatments fight seedling diseases that can weaken or kill early-planted soybeans.

Each company was asked to furnish their varieties with and without respective fungicide treatments; therefore, a total of four treatments were compared on each of four planting dates. Experimental plots were planted directly into standing corn stalks at a rate of 175,000 seeds/acre, using a John Deere 7000 planter with 30-inch row spacing. Planting dates were: March 30, April 14, May 10, and May 30, 2000; and April 20, April 27, May 16, and June 3, 2001. (The 2001 planting dates were selected to match approximate "March 1 to planting date" growing degree-day (GDD) accumulations on corresponding 2000 planting dates.)

Planting dates and treatments were included in a split-plot design with four replications. Main plot treatments were planting dates; subplot treatments were variety/seed treatment combinations. Isolated severe hail damage on May 13, 2001 destroyed many seedlings planted March 30 and April 14. Plots were machine harvested September 29, 2000, and October 11, 2001. Grain yields (adjusted to 13% moisture) and plant population estimates are summarized in Tables 1–3.

Results and Discussion

Averaged across varieties and years, fungicide-treated and untreated soybean yields were statistically similar ($P>0.05$) on all planting dates. This yield response was consistent across four southern Iowa test environments (Table 1) and at the Armstrong farm (Table 2). Varieties responded similarly to seed fungicide treatment.

As in previous studies, soybeans yielded best when planted by mid-May. Producers considering very early soybean planting recognize the risk of stand losses caused by seedling diseases in cooler soils. Other factors contributing to reduced plant stand levels (summarized in Table 3) included poor germination of very early-planted LG/Callahan control plots in 2000, poor seed germination of both varieties in 2001, and the hail damage of mid-May 2001 that significantly reduced yield potential of early-planted soybeans.

Yield results from northern Iowa university research farms suggest that fungicide seed treatments are a valuable risk management

tool for very early-planted soybeans in Iowa, particularly in fields with a history of severe seedling disease pressure. However, fungicide seed treatments did not consistently improve soybean yields at southern Iowa test sites.

Multiyear testing suggests that yield potential is maximized when soybean planting is completed before mid-May. Depending on total soybean acres, producers might consider taking advantage of favorable spring weather and soil conditions to plant a portion of their soybean acres ahead of their corn; however, producers must consider stand establishment risks associated with planting before mid-April. Results of this two-year study suggest the need for further testing of seed fungicide treatments for very early-planted soybeans in Iowa.

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Table 1. Planting date and seed treatment effects on soybean yield in 4 southern Iowa environments 2000–2001.

Experimental treatment	Yield performance by average planting date				
	April 9	April 24	May 16	June 3	All planting dates
	------(Bushels/acre)-----				
Untreated seed (control)	43.5	45.4	47.9	46.1	45.7
Fungicide-treated seed	<u>44.3</u>	<u>44.7</u>	<u>48.0</u>	<u>45.1</u>	<u>45.6</u>
Mean	43.9 B ¹	45.0 B	47.9 A	45.6 B	45.6
LSD (P=0.05)	NS ²	NS	NS	NS	NS

¹ Planting date mean yields followed by different letters are statistically different (P<0.05).

² “NS” indicates no statistically significant (P>0.05) seed treatment effect on soybean yield.

Table 2. Planting date and seed treatment effects on soybean yield at Lewis, IA, 2000–2001.

Experimental treatment	Yield performance by average planting date				
	April 9	April 21	May 13	June 1	All planting dates
	------(Bushels/acre)-----				
Untreated seed (control)	38.9	39.4	45.0	42.4	41.4
Fungicide-treated seed	<u>40.0</u>	<u>38.3</u>	<u>44.4</u>	<u>41.7</u>	<u>41.1</u>
Mean	39.5 B ¹	38.8 B	44.7 A	42.0 AB	41.3
LSD (P=0.05)	NS ²	NS	NS	NS	NS

¹ Planting date mean yields followed by different letters are statistically different (P<0.05).

² “NS” indicates no statistically significant (P>0.05) seed treatment effect on soybean yield.

Table 3. Estimated established plant stand levels Lewis, IA, 2000–2001.

Experimental treatment	Date 1		Date 2		Date 3		Date 4	
	'00	'01	'00	'01	'00	'01	'00	'01
	------(Plants/acre × 1000)-----							
LG/Callahan with no seed treatment (control)	114	73	139	72	142	135	143	120
LG/Callahan with fungicide seed treatment	142	74	141	71	146	126	143	110
Merschman with no seed treatment (control)	144	74	138	61	144	120	143	111
Merschman with fungicide seed treatment	145	66	141	61	148	124	142	116