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Abstract
Today's high-yielding soybean varieties respond favorably to early planting. Multiyear results from statewide university research farms suggest that mid-April to early May planting dates produce top yields in most comparisons. 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 to 175,000 seeds/acre.

Disciplines
Agricultural Science | Agriculture

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Seed Fungicide Treatments for Very Early Soybean Planting

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Introduction

Today's high-yielding soybean varieties respond favorably to early planting. Multiyear results from statewide university research farms suggest that mid-April to early May planting dates produce top yields in most comparisons. 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 to 175,000 seeds/acre.

The yield response of modern varieties to early planting raises questions about expanding the soybean-planting season when weather conditions allow (very early planting of some soybean acres in late March or early April). In 2000, a soybean "planting date × seed treatment" study was initiated to evaluate yield response of two adapted, high-yield varieties to very early planting. Research objectives are to determine (a) whether planting soybeans earlier than corn could be a viable management option for Iowa producers and (b) if fungicide seed treatments are needed to make this practice profitable. Establishment of similar studies at four other university research farms statewide afforded yield response comparisons of fungicide seed treatment effects in five environments.

Materials and Methods

Adapted, high yield conventional varieties from LG/Callahan (C-2200 variety, relative maturity 2.2) and Merschman ("Comanche V" variety, relative maturity 2.2) seed companies were tested in 2000 and 2001. LG/Callahan and Merschman offer fungicide-treated soybean seed. Fungicide seed treatments fight soybean seedling diseases that can weaken or kill early-planted soybeans, causing profit-robbing stand reductions.

Each company was asked to furnish its varieties with and without respective fungicide treatments, thereby providing a total of four treatments to compare on each of four planting dates. Experimental plots were planted at 175,000 seeds/acre into a seedbed of lightly disked corn stalks, using a John Deere 7000 planter with 30-inch row spacing.

Planting dates were: (for 2000) March 31, April 18, May 10, and June 2; (for 2001) April 19, April 30, May 18, and June 11. Planting dates in 2001 were selected to match approximate "March 1 to planting date" growing degree-day (GDD) accumulations of corresponding 2000 planting dates.

Planting dates and treatments were included in a split-plot design with four replications. Main plot treatments were planting dates, and variety/seed treatment combinations were subplot treatments. Plots were machine harvested on October 11,2000, and October 17, 2001. Tables 1–3 summarize grain yields (adjusted to 13% moisture) and established plant population estimates.

Results and Discussion

Averaged across varieties and years, average soybean yield response to fungicide seed treatment was statistically significant ($P<0.05$) on only the earliest of four planting dates. This yield response was consistent across four northern Iowa test environments (Table 1) and at the Northwest Research Farm (Table 2). In all

of this study's test environments, soybeans yielded best when planted in 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 seed germination and severe bean leaf beetle feeding with subsequent seedling death in 2000, and a period of extended cool, wet weather that hampered establishment of all late April-planted 2001 plots.

Results and Discussion

Yield results 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. 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 soybean acres ahead of corn; however, producers must consider stand establishment risks associated with planting before mid-April. Results of this study strongly suggest use 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 northern Iowa environments (2000–2001).

	Yield performance by average planting date				
Experimental treatment	April 9	April 23	May 14	June 7	All planting dates
	(bushels/acre)				
Untreated seed (control)	38.4 b[1]	39.6 a	45.4 a	39.7 a	40.8 b
Fungicide-treated seed	43.1 a	41.4 a	45.8 a	39.8 a	42.5 a
Mean	40.8 B[2]	40.5 B	45.6 A	39.7 B	41.6
LSD (P=0.05)	3.3	NS[3]	NS	NS	1.7

[1] Within columns, experimental treatment mean yields followed by different letters are statistically different (P<0.05).
[2] Planting date mean yields followed by different letters are statistically different (P<0.05).
[3] "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 in 2000 and 2001 at Sutherland, IA.

	Yield performance by average planting date				
Experimental treatment	April 9	April 24	May 14	June 7	All planting dates
	(bushels/acre)				
Untreated seed (control)	33.6 b[1]	32.8 a	39.8 a	33.2 a	34.8 b
Fungicide-treated seed	37.9 a	34.5 a	40.0 a	32.8 a	36.3 a
Mean	35.7 B[2]	33.6 C	39.9 A	33.0 C	35.6
LSD (P=0.05)	3.1	NS[3]	NS	NS	0.4

[1] Within columns, experimental treatment mean yields followed by different letters are statistically different (P<0.05).
[2] Planting date mean yields followed by different letters are statistically different (P<0.05).
[3] "NS" indicates no statistically significant (P=0.05) seed treatment effect on soybean yield.

Table 3. Estimated established plant stand levels in 2000 and 2001 at Sutherland, IA.

	Date 1		Date 2		Date 3		Date 4	
Experimental treatment	'00	'01	'00	'01	'00	'01	'00	'01
	(Plants/acre × 1000)							
LG/Callahan with no seed treatment (control)	28	109	77	69	109	130	86	108
LG/Callahan with fungicide seed treatment	89	121	92	82	111	136	83	115
Merschman with no seed treatment (control)	130	122	142	67	163	132	118	109
Merschman with fungicide seed treatment	137	128	133	70	150	135	117	110