Influence of Polymer-coated Seed and Planting Dates on Corn

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Introduction

This three-year study was designed to study the effects polymer-coated corn seed on emergence and yield. The coating technology used was the Intellicoat® Early Plant™ seed coating technology. Intellicoat is derived from natural, biodegradable fatty acids, which act as temperature-sensitive switches. Thus, when soil temperatures warm above 55°F for several days, the polymer allows water to permeate the seed and germination to proceed.

Producers are interested in this technology. Because of larger farms and the desire to maximize yield, they are planting earlier each year, often in cold, wet soils that slow germination and emergence. The optimum planting period for maximum corn yield can be brief. Timing is critical in the northern cornbelt due to a shorter growing season. Planting corn as early as possible ensures the advantage of the entire growing season, therefore allowing the use of full-season hybrids to optimize corn yield. Delayed planting of full-season hybrids usually results in corn pollination occurring in August, which may cause yield reduction due to insufficient time for the corn to maximize starch accumulation. Also, there can be increased drying costs due to high-moisture grain at harvest. Previous studies have shown that the optimum time to plant corn is late April to early May. Delayed corn planting (mid- to late May) due to cold soils and rain delays is a common occurrence in northern Iowa. Periodically, dry topsoil conditions can occur in late March/early April in northern Iowa, but producers usually wait because the soil is too cold. This three-year study will determine if there is an advantage of using polymer-coated seed corn, regardless of soil temperature conditions.

Materials and Methods

These studies were planted in the spring of 2003, 2004, and 2005 into field cultivated soybean residue. Planting populations were 33,674, 36,068, and 36,480 plants/acre in 30 in. rows for 2003, 2004, and 2005, respectively. Anhydrous ammonia (150 lb of N) was applied in the spring of 2003 and manure was injected in the fall of 2003 and 2004 at a rate of manure to equal 196 and l83 lb N/acre, respectively, for the 2004 and 2005 studies. Soil samples suggested that no additional fertilization (P_2O_5, K_2O) was necessary.

The study was randomized and replicated three times in 2003 and four times in 2004 and 2005. Both polymer-coated and noncoated seed from the same hybrid were planted, and both seed types had the same fungicide treatment applied to them. Each seed type was planted at approximately two-week intervals throughout the spring. In 2003 there were four planting dates, and in 2004 and 2005 there were five.

Results and Discussion

Noncoated seed and earlier planting dates had lower stands; however, a yield increase due to coating was only noted in 2004 (Table 1). In 2003 and 2004, the seed coating only slowed emergence by one day; however, in 2005, emergence for the April and May plantings were delayed for two to seven days. The coated seed in later plantings emerged somewhat more unevenly compared with the early plantings. Soil temperatures did not rise above 55°F until April 26, 2003, April 16, 2004, and April 6, 2005. In 2004 and 2005, early May frost killed the top growth of the first planting, delaying regrowth and reducing final stands.

Yields were similar for both the coated and noncoated seed treatments, when averaging all three years; however, because there was considerable variability for each year regardless of planting date, the coating did not show an advantage to yield. Yield generally decreased as planting was delayed, although the majority of the decline occurred for the mid-May planting dates.

The Intellicoat technology performed satisfactorily in this study with greater final stands than uncoated seed; however, final stand didn't affect yield. Noncoated seed emerged within one day of the coated seed in very early planting dates, which showed that soil temperature may not play a major role in the breakdown of the polymer coating. There is also some question about the uneven emergence in the later plantings of the coated seed, as compared with very early planting dates. Nevertheless, more research is needed to see how this technology performs under less than ideal conditions.

Acknowledgments

Intellicoat® and Early Plant™ seed coating technology are trademarks of Landec Ag, Inc. No endorsement is intended of the seed coat polymer used in this study, nor is any criticism implied of polymers not used.

Table 1. Corn emergence and population as influenced by planting date and polymer coating.

2003 Planting date	Date emerged/population (no coating) 29,500- b	Date emerged/population (coated seed) 30,100- a	Grain yield (bu/acre) No coat- ns	Coat-ns
April 3	May 1/27,200 ppa-e	May 1/27,700 ppa-e	184-ns	187-ns
April 15	May 3/29,300 ppa-d	May 3/30,500 ppa-c	195-ns	186-ns
April 28	May 15/29,500 ppa-d	May 16/29,100 ppa-d	187-ns	185-ns
May 13	May 22/30,600 ppa-c	May 23/31,700 ppa-ab	188-ns	180-ns
May 19	May 29/30,700 ppa-bc	May 30/31,900 ppa-a	173-ns	173-ns

2004 Planting date	Date emerged/population (no coating) 30,500-b	Date emerged/population (coated seed) 32,300- b	Grain yield (bu/acre) No coat-a	Coat-b
March 23	April 16/27,900 ppa-c	April 15/28,000 ppa-c	194-ns	191-ns
April 6	April 25/30,700 ppa-b	April 26/34,000 ppa-a	202-ns	199-ns
April 17	May 6/31,100 ppa-b	May 7/33,800 ppa-a	202-ns	223-ns
May 4	May 13/32,300 ppa-ab	May 14/33,400 ppa-a	211-ns	219-ns

2005 Planting date	Date emerged/population (no coating) 30,200-b	Date emerged/population (coated seed) 33,000- a	Grain yield (bu/acre) No coat-ns	Coat-ns
March 29	April 15/25,300 ppa-ns	April 16/30,300 ppa-ns	183-ns	179-ns
April 10	April 27/30,500 ppa-ns	May 2/33,400 ppa-ns	194-ns	203-ns
April 21	May 10/31,400 ppa-ns	May 12/34,900 ppa-ns	193-ns	189-ns
May 4	May 17/32,100 ppa-ns	May 20/33,700 ppa-ns	198-ns	168-ns
May 17	May 27/31,600 ppa-ns	May 30/32,900 ppa-ns	182-ns	171-ns

Means with the same letter do not differ (P>.05).
ns=no significant difference.