

On-Farm Corn and Soybean Seed Treatment Trials

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Introduction

Seed treatments offer protection to germinating seeds and developing seedlings from fungi, insects, and nematodes. All legumes require the appropriate rhizobium bacteria in the soil in order for nitrogen fixation to occur. Inoculating the seed with an inoculum can insure the crop will take advantage of this nitrogen fixation.

Materials and Methods

In 2016, seven trials (Table 1) examined the use of corn and soybean seed treatments to increase yield. All trials were conducted on-farm by farmer cooperators using the farmer's equipment. Seed treatments were applied with the planter and arranged in a randomized complete block design with at least three replications per treatment. Plot size varied from field to field depending on equipment size and the size of the field. All plots were machine harvested for grain yield.

In Trial 1, soybean planted with soybean seed treated with the insecticide Incumbus was compared with soybean planted with untreated seed (Table 2). In Trials 2 and 3, corn treated with the biological seed treatment Tri-Core PGP was compared with untreated corn seed. In Trial 4, soybean seed treated with Innovate™ plus Bioboost® was compared

with untreated soybean planted with seed. Innovate is an insecticide/fungicide combination and Bioboost® is an inoculant. In Trial 5, soybean seed treated with Quickroots® seed treatment was compared with untreated soybean seed. In Trial 6, soybean seed treated with Cruiser Maxx® was compared with soybean seed treated with Clariva®. Cruiser Maxx® contains an insecticide and two fungicides. Clariva® is a nematicide. In Trial 7, soybean seed treated with Acceleron® fungicide seed treatment was compared with untreated soybean seed. Acceleron® and Quickroots® are marketed by Monsanto.

Results and Discussion

There was a small but significant soybean yield increase with the Incumbus insecticide seed treatment in Trial 1 ($P = 0.10$), and a small but significant soybean yield decrease with the Acceleron® fungicide seed treatment in Trial 7 ($P = 0.06$). The yield increase with the Incumbus may have been due to reduced insect feeding. It is not known why the Acceleron® may have resulted in a yield decrease. The Tri-Core PGP biological seed treatment did not have any affect on corn yield in Trials 2 and 3. It is marketed by Direct Biologicals as a blend of bacteria and fungi that create biofilms around root systems, which allows nutrient release and prevents plant pathogens.

In Trial 4, soybean seed treated with Innovate plus Bioboost® yielded two bushels/acre more than the untreated soybeans. It is not known whether the yield increase was due to the insecticide and/or fungicide in the Innovate, and/or the inoculant in the Bioboost®. Most research has indicated grain yield increases are seldom seen when soybean seed is treated with an inoculant, unless the field has not been planted to soybean for at least five years. Because this field had a corn-soybean rotation

history, it is unlikely the yield increase was due to the inoculant.

In Trial 5, there was no effect on soybean yield with the soybean seed treated with Quickroots®. Quickroots® is marketed as a microbial seed inoculant that improves availability of nutrients. In Trial 6, there was

no difference in yield between soybean treated with CruiserMax® and soybean treated with Clariva®. Because there was not an untreated seed treatment in this trial, it is not known whether either resulted in a yield increase.

Table 1. Variety, row spacing, planting date, planting population, and previous crop in on-farm seed treatment trials in corn and soybean in 2016.

Exp. no.	Trial	County	Variety	Row spacing (in.)	Planting date	Planting population (seeds/ac)	Previous crop
160804	1	Bremer	Pioneer P0937AM	30	5/12/16	130,000	Corn
160116	2	Lyon	Dekalb DK5063	30	5/6/16	34,500	Corn
160117	3	Lyon	Croplan 2450	15	5/18/16	150,000	Corn
160124	4	Lyon	Stine 23LF32	20	5/20/16	134,000	Corn
160411	5	Kossuth	LG 2259LL	30	5/22/16	150,000	Corn
160403	6	Franklin	Syngenta S26-P3	30	5/15/16	145,000	Corn
160704	7	Washington	Stine 31RF02	30	5/24/16	140,000	Corn

Table 2. Yield from on-farm seed treatment trials in corn and soybean in 2016.

Exp. no.	Trial	Treatment	Yield (bu/ac) ^a	P-value ^b
160804	1	Incumbus seed treatment	50 a	0.10
		Control	49 a	
160116	2	Tri-Core PGP biological seed treatment at 1.375 g/ac	215 a	0.33
		Control	208 a	
160117	3	Tri-Core PGP biological seed treatment at 1.375 g/ac	235 a	0.67
		Control	234 a	
160124	4	Innovate at 3qt/40 units plus BioBoost at 1.2 oz/bag	74 a	0.04
		Control	72 b	
160411	5	Control	62 a	0.44
		Quickroots biological seed treatment	61 a	
160403	6	Cruiser Max	58 a	0.68
		Clariva	59 a	
160704	7	Control	68 a	0.06
		Acceleron seed treatment	67 a	

^aValues denoted with the same letter within a trial are not statistically different at the significance level of 0.05.

^bP-value = the calculated probability that the difference in yields can be attributed to the treatments and not other factors. For example, if a trial has a P-value of 0.10, then we are 90 percent confident the yield differences are in response to treatments. For P = 0.05, we would be 95 percent confident.