1-1-2015

On-Farm Soybean Seed Treatment Trials

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Abstract
Seed treatments offer protection from fungi, insects, and nematodes to germinating seeds and developing seedlings. 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 can take advantage of this nitrogen fixation.

Keywords
Agronomy

Disciplines
Agricultural Science | Agriculture | Agronomy and Crop Sciences | Natural Resources and Conservation

On-Farm Soybean Seed Treatment Trials

RFR-A1436

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Introduction

Seed treatments offer protection from fungi, insects, and nematodes to germinating seeds and developing seedlings. 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 can take advantage of this nitrogen fixation.

Materials and Methods

In 2014, seven trials (Table 1) examined the use of soybean seed treatments to increase soybean yield. All trials were conducted on-farm by farmer cooperators using the farmers' equipment. Soybean seed treatments were applied with the planter and were arranged in a randomized complete block design with at least three replications per treatment. Strip size varied from field to field depending on equipment size and the size of the field. All strips were machine harvested for grain yield.

In Trials 1–4, soybeans planted with soybean seed treated with an inoculant was compared with soybeans planted with untreated seed (Table 2). The inoculant was Optimize® from Novozymes in Trial 1, PPST730 from Pioneer Hybrid for Trials 2-3, and First up ST from Helena Chemical Company for Trial 4.

In Trial 5, soybeans with seed treated with Clariva® nematicide were compared with soybeans planted with untreated seed. In Trial 6, soybeans with seed treated with Cruiser Maxx® were compared with soybeans planted with untreated seed. In Trial 7, the seed treatments Clariva Complete® and Cruiser Maxx Advanced® were compared with soybeans planted with untreated seed. Cruiser Maxx® and Cruiser Maxx Advanced® contain an insecticide and two fungicides. Clariva Complete® contains a nematicide, an insecticide, and two fungicides.

Results and Discussion

None of the soybean inoculants resulted in an increase in soybean yield (Table 2). Most research has indicated that grain yield increases are seldom seen when soybean seed is treated with an inoculant unless the field has not been planted to soybeans for at least five years. Fields in Trials 1–3 had a corn-soybean rotation history for several years, so would be less likely to show a benefit to the soybean inoculant. However, Trial 4 was in a field that had been in sod for 20 years, so a yield increase would have been more likely. It has been speculated there is often enough soil blowing from nearby soybean fields into fields without a recent soybean history resulting in the field being "inoculated" with the soybean rhizobium bacteria. This may have been the case in this field.

In Trial 5, there was not a soybean yield increase with the use of Clariva® nematicide, which may indicate there are low levels of nematodes that feed on soybeans in the field. In Trial 6, there was a yield increase of three bushels/acre with the use of the Cruiser Maxx® seed treatment. This yield increase may have been due either to the insecticide or fungicides in the treatment. The soybeans were planted in early May and the cool, wet weather in May would have increased the likelihood of problems with soil-borne fungal diseases, so most or all of the yield benefit

may have been due to protecting the soybeans from seedling diseases. No yield increase was seen with either of the seed treatments in Trial 7 (Table 3). These soybeans were not planted until June, which would have decreased the likelihood of problems with soybean seedling diseases. Although soybean seed treatments can result in yield increases, significant yield increases were only seen in one of the seven trials in 2014 (P = 0.05).

Table 1. Variety, row spacing, planting date, planting population, and previous crop in on-farm seed treatment trials in soybeans in 2014.

Exp. no.	Trial	County	Variety	Row spacing (in.)	Planting date	Planting population (seeds/A)	Previous crop
140706	1	Henry	Mycogen 5N342R2	30	5/23/14	155,000	Corn
140710	2	Washington	Pioneer P34T07R2	30	5/22/14	140,000	Corn
140716	3	Washington	Pioneer P34T07R2	30	5/23/14	VR 110-130,000	Corn
140637	4	Cass	4-star 2Y283	15	6/15/14	150,000	Sod
140130	5	Sioux	NKS2251	30	5/15/14	150,000	Corn
140323	6	Monona	Renze 2889RR	30	5/6/14	139,000	Corn
140507	7	Story	Asgrow 2433	30	6/6/14	150,000	Corn

Table 2. Yields from on-farm soybean seed treatment with multiple comparison trials in 2014.

			Yield (bu/A)			
Exp. no.	Trial	Treatment	Treatment	Control	Response	P-value[x]
140706	1	Inoculant	71	72	-1	0.29
140710	2	Inoculant	71	69	3	0.29
140716	3	Inoculant	65	65	0	0.82
140637	4	Inoculant	59	57	2	0.21
140130	5	Clariva	60	59	1	0.29
140323	6	Cruiser Maxx	60	57	3	0.03

[x]P-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.

Table 3. Yields from on-farm soybean seed treatment trials in 2014.

Exp. no.	Trial	Treatment	Yield (bu/A)[x]	P-value[y]
140507	7	Clariva Complete	52 a	0.62
		Cruiser Maxx Advanced	52 a	
		Control	53 a	

[x]Values denoted with the same letter are not significantly different at the significance level 0.05.

[y]P-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.