On-Farm Corn and Soybean Management Demonstration Trials

RFR-A1760

Jim Fawcett, extension field agronomist (retired)
Andrew Weaver, Northwest Farm, ag specialist
Matthew Schnabel, Northern Farm, superintendent
Zack Koopman, Ag Engineering/Agronomy Farm, ag specialist
Cody Schneider, Southeast Farm, ag specialist
Tyler Mitchell, Northeast Farm, ag specialist

Introduction

Farmers are faced with many decisions in managing corn and soybean as new technologies are introduced, such as Bt corn hybrids, new pesticides, and new seed treatments. As problems with corn rootworm resistance to Bt corn continue to be found in Iowa, it is important to research methods to manage this pest. It is also important for farmers to adopt tillage practices that not only maximize profits, but also conserve the soil. The objective of these trials was to investigate what affect various corn and soybean management practices would have on grain yield.

Materials and Methods

In 2017, 15 trials on various management practices in corn and soybean were investigated (Table 1). All trials were conducted on-farm by farmer cooperators using the farmer's equipment. Strips were arranged in a randomized complete block design with at least three replications per treatment. Strip width and length varied from field-to-field depending on field and equipment size. All strips were machine harvested for grain yield.

Trials 1, 7, and 13 investigated planting a corn hybrid with and without a rootworm insecticide at planting (Table 2). In Trial 1, Pioneer P0589AMXT was planted with and without Aztec® insecticide. In Trial 7, Agrigold 5361 was planted with and without Aztec® insecticide, and in Trial 13, Pioneer PO157 was planted with and without Aztec® insecticide. Pioneer P0589AMXT and Agrigold 5361 are transgenic hybrids that include the Bt rootworm trait. Pioneer PO589AMXT contains the Herculex trait and Agrigold 5361 contains the VT3 trait. Pioneer PO157 is a conventional hybrid.

In Trials 2 and 3, corn planted no-till on alfalfa ground was compared with corn planted following a disk and field cultivator on alfalfa ground.

In Trial 4, corn planted with seed treated with talcum powder and with Nutriplant® SD was compared with corn planted without a seed treatment. In Trial 5, corn seed treated with talcum powder was compared with corn planted without talcum powder. In Trial 6, soybean planted with seed treated with talcum powder and with Nutriplant® SD was compared with soybean planted without a seed treatment. Nutriplant® SD is marketed as a nutritional supplement to enhance seedling emergence and growth. Talcum powder is promoted to enhance seed flowability.

In Trials 8, 9, 10, and 12, a weed management system using Roundup® (glyphosate) plus Realm Q® (rimsulfuron plus mesotrione) was compared with a weed management system using Impact® (topramezone).

In Trials 11 and 15, soybean planted with an inoculant seed treatment was compared with soybean planted with untreated seed.
In Trial 14, soybean planted with seed treated with Acceleron® B-200, Acceleron® Standard and Acceleron®E007 and ILeVO was compared with soybean planted with untreated seed. The Acceleron® products are marketed by Monsanto. Acceleron® B-200 is promoted to attract beneficial microbes to the roots. Acceleron® Standard is an insecticide and fungicide. Acceleron®E007 is promoted to improve seed flowability. ILeVO is a fungicide promoted to control sudden death syndrome, which is marketed by Bayer.

Results and Discussion

In Trial 1, there was a six bushel/acre yield increase with the corn planted with a rootworm insecticide compared with the corn without the insecticide (Table 2). This may indicate the Pioneer PO589AMXT hybrid is not providing complete control of the rootworms and other soilborne insects in this field. There was no yield difference between the corn planted with an insecticide and corn planted without an insecticide in Trials 7 and 13. There was likely little rootworm pressure in Trial 13, and the transgenic hybrid in Trial 7 provided sufficient control of any rootworms in Trial 7. In Trials 2 and 3, there was no difference in corn yield between the corn planted no-till into alfalfa ground compared with the corn planted with tillage.

In Trial 4, there was no yield difference between the corn planted with Nutriplant® SD and with talcum powder seed treatments compared with the corn planted without a seed treatment. In Trial 5, there was a significant yield increase of 15 bushels/acre with the corn planted with the talcum powder seed treatment compared with no talcum powder seed treatment (P = 0.03). It is not known what might have caused this yield increase. In Trial 6, there was no difference in yield between soybean planted with Nutriplant® SD and with talcum powder compared with soybean planted without a seed treatment.

In Trials 8, 9, 10, and 12, there was no difference in corn yield with corn planted using a weed management system utilizing the Roundup® and Realm Q® compared with a system utilizing Impact®. There was not a difference in weed control between the two systems in any of the trials.

In Trial 11, there was not a significant yield increase with soybean planted with inoculated seed compared with soybean planted with untreated seed, but in Trial 15, the soybean planted with inoculated seed yielded one bushel/acre more than soybean planted with untreated seed (P = 0.02). Both trials were in fields with a long-term history of a corn-soybean rotation, which would reduce the likelihood of a yield increase with the inoculated seed. In Trial 14, the soybean planted with the seed treatment of the Acceleron® products and ILeVO® did not yield significantly different from the soybean planted without a seed treatment. There was no sudden death in the soybean in the trial, which would have reduced the chances of a yield response to the ILeVO®.

NOTE: The results presented are from replicated demonstration trials. Statistics are used to detect differences at a location and should not be interpreted beyond the single location.

Table 1. Variety, planting date, planting population, previous crop, and tillage practices in on-farm trials investigating various management practices in corn and soybean in 2017.

Exp. no.	Trial	Management practice	County	Variety	Row spacing	Planting date	Planting population (seeds/ac)	Previous crop	Tillage
170103	1	Rootworm insecticide	Lyon	Pioneer PO589 AMXT	22	5/4/17	36,000	Corn	Conventional
170504	2	Tillage after alfalfa	Dallas	Wyffels 7888 RIB	30	4/25/17	34,785	Alfalfa	No-till vs. disk and field cultivate
170507	3	Tillage after alfalfa	Dallas	Wyffels 7696 RIB	30	4/25/17	34,785	Alfalfa	No-till vs. disk and field cultivate
170816	4	Seed treatment	Bremer	Dekalb DK 5356	30	4/28/17	34,000	Corn	No-till
170817	5	Seed treatment	Mitchell	Winfield 419 955RIB	30	5/9/17	36,000	Soybean	No-till
170824	6	Seed treatment	Bremer	CB Seeds CB2108	30	5/27/17	130,000	Corn	No-till
170144	7	Rootworm insecticide	Lyon	Agrigold 5361	22	5/4/17	36,000	Corn	Conventional
170146	8	Impact vs. Roundup	Lyon	Pioneer P0589A MT	22	5/5/17	35,000	Corn	Conventional
170147	9	Impact vs. Roundup	Lyon	Pioneer P0339A MXT	22	5/5/17	35,000	Corn	Conventional
170145	10	Impact vs. Roundup	Lyon	Pioneer P9929	22	5/5/17	35,000	Corn	Conventional
170143	11	Seed inoculation	Osceola	Syngenta NK 520-T6	30	5/16/17	135,000	Corn	No-till
170111	12	Impact vs. Roundup	Lyon	Dekalb DK53-56	22	5/5/17	35,000	Corn	Conventional
170404	13	Rootworm insecticide	Kossuth	Pioneer PO157	30	5/6/17	34,500	Soybean	Conventional
170822	14	Seed treatment	Bremer	CB Seeds CB2108	30	5/27/17	130,000	Corn	No-till
170123	15	Seed inoculation	Osceola	Syngenta NK520-T6	30	5/16/17	135,000	Corn	No-till

Table 2. Yields for on-farm corn and soybean trials investigating various management practices in 2017.

Exp. no.	Trial	Treatment	Yield (bu/ac)[a]	P-value[b]
170103	1	Aztec HC at 0.6 oz/ac at planting	237 a	0.04
		No rootworm insecticide	231 b	
170504	2	No-till following alfalfa	184 a	0.47
		Disk and field cultivate following alfalfa	203 a	
170507	3	No-till following alfalfa	219 a	0.41
		Disk and field cultivate following alfalfa	205 a	
170816	4	Talcum powder planter box seed treatment at 8 oz/100 lb	218 a	0.56
		Nutriplant SD planter box seed treatment at 8 oz/100 lb	217 a	
		Control	215 a	
170817	5	Talcum powder planter box seed treatment at 12 oz/100 lb	228 a	0.03
		Control	213 b	
170824	6	Talcum powder planter box seed treatment at 8 oz/100 lb	53 a	0.17
		Nutriplant SD planter box seed treatment at 8 oz/100 lb	52 a	
		Control	52 a	
170144	7	Aztec HC at 0.6 oz/ac at planting	217 a	0.21
		No rootworm insecticide	215 a	
170146	8	Impact	254 a	0.44
		Roundup + Realm Q	253 a	
170147	9	Impact	232 a	0.24
		Roundup + Realm Q	233 a	
170145	10	Impact	230 a	0.19
		Roundup + Realm Q	232 a	
170143	11	Soybean seed inoculated	68 a	0.16
		Soybean seed not inoculated	67 a	
170111	12	Impact	233 a	0.86
		Roundup + Realm Q	233 a	
170404	13	Aztec 4.67G at 3.27 lb/ac at planting	224 a	0.98
		No rootworm insecticide	224 a	
170822	14	Acceleron B-200 at 2.1 oz/100 lb plus Acceleron Standard at 2.1 oz/100 lb plus Acceleron E007 at 2.1 oz/100 lb plus Illevo at 2.36 oz/100 lb	39 a	0.92
		Control	38 a	
170123	15	Soybean seed inoculated	69 a	0.02
		Soybean seed not inoculated	68 b	

[a]Values denoted with the same letter within a trial are not statistically different at the significance level of 0.05.
[b]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.