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On-Farm Corn and Soybean Management Trials

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Introduction

Farmers are faced with many decisions in managing corn and soybeans as new technologies are introduced, such as Bt corn hybrids, new pesticides, and land rolling equipment. Land rolling is the practice of pulling a large, heavy roller across soybean fields to push down rocks, smooth the surface of the field, and help break up residue. The purpose is to protect harvest equipment that could be vulnerable to rocks and corn roots. Yields are expected to improve by creating a more uniform harvest. 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 also is 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 2016, 11 trials on various management practices in corn and soybean were conducted (Table 1). All trials were conducted on-farm by farmer cooperators. 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, 2, and 3 investigated planting a transgenic corn hybrid with insect control traits with and without a rootworm insecticide. In Trial 1, Pioneer P0193AMX was planted with and without Aztec insecticide. In Trials 2 and 3, Dekalb DK53-56STX was planted with and without Aztec insecticide. Trial 1 was planted on soybean ground and Trials 2 and 3 were planted on corn ground.

In Trials 4, 5, and 6, a weed management system using Roundup® (glyphosate) was compared with a weed management system using Impact® (topramezone).

In Trials 7 and 8, soybean yields from strips land-rolled two to three days after planting were compared with soybean yields from strips not land-rolled. In Trials 9, 10, and 11, soybean planted no-till was compared with soybean planted with spring tillage. In Trial 9, mulch tillage was compared with no-till; in Trial 10, strip tillage was compared with no-till; and in Trial 11, a spring disking and field cultivation was compared with no-till.

Results and Discussion

In Trials 1, 2, and 3, there was no yield difference between the corn planted with an insecticide and corn planted without an insecticide (Table 2). This indicates the transgenic traits in the corn hybrids were providing sufficient control of any corn rootworms and other soilborne insects. In Trials 4 and 6, there was no difference in corn yield between the corn with a weed management system utilizing the Roundup® and the system utilizing Impact®. However, in Trial 5, the corn planted with the Impact® system yielded significantly more than the Roundup® system at $P = 0.10$. There was no difference in weed control between the two systems, so the reason for the yield difference is unknown.

In Trial 7, the land-rolled soybean yielded two bushels/acre more than the soybean not land-rolled. But in Trial 8, the land-rolled soybean yielded five bushels/acre less than the soybean not land-rolled. This would indicate positive yield responses to land rolling will likely be inconsistent.

In Trials 9, 10, and 11, no difference in soybean yield was seen between the no-till soybean and soybean where spring tillage was used. This agrees with most research that has shown no yield advantage to doing any tillage prior to soybean planting.

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 2016.

Exp. no.	Trial	Management practice	County	Variety	Row spacing	Planting date	Planting population (seeds/ac)	Previous crop	Tillage
160111	1	Rootworm insecticide	Sioux	Pioneer P0193AMX	30	5/6/16	34,000	Soybean	Conventional
160115	2	Rootworm insecticide	Lyon	DeKalb DK53-56 STX	22	5/5/16	VR 36,000	Corn	Conventional
160140	3	Rootworm insecticide	Lyon	DeKalb DK53-56 STX	22	5/5/16	VR 36,000	Corn	Conventional
160141	4	Roundup vs. Impact	Lyon	DeKalb DK53-56 STX	30	5/5/16	VR 36,000	Corn	Conventional
160142	5	Roundup vs. Impact	Lyon	DeKalb DK53-56 STX	30	5/5/16	VR 36,000	Corn	Conventional
160143	6	Roundup vs. Impact	Lyon	Pioneer P9929	30	5/5/16	VR 36,000	Corn	Conventional
160814	7	Rolling beans	Howard	NK19-BZ	30	4/24/16	160,000	Corn	No-till
160815	8	Rolling beans	Floyd	Pioneer P22T73R	30	5/5/16	160,000	Corn	Chisel plow
160107	9	Tillage	Sioux	Pioneer P22T73R	30	5/20/16	140,000	Corn	Mulch finish vs. no-till
160828	10	Tillage	Howard	NK 19-BZ	30	4/24/16	163,000	Corn	Strip till vs. no-till
160412	11	Tillage	Kossuth	LG 2259LL	30	5/22/16	150,000	Corn	Spring disc and field cultivate vs. no-till

Table 2. Yields for on-farm corn and soybean trials investigating various management practices in 2016.

Exp. no.	Trial	Treatment	Yield (bu/ac) ^a	P-value ^b
160111	1	Pioneer P0636 with Aztec 4.67 at 3.37 lb/ac at planting	106 a	0.53
		Pioneer P0636 without insecticide	107 a	
160115	2	DeKalb 53-56 STX without insecticide	201 a	0.10
		Dekalb 53-56 STX with Aztec 4.67 at 0.6 oz/1,000 ft at planting	197 a	
160140	3	DeKalb 53-56 STX without insecticide	229 a	0.57
		Dekalb 53-56 STX with Aztec 4.67 at 0.6 oz/1,000 ft at planting	228 a	
160141	4	Prequel followed by Realm Q plus Roundup	222 a	0.45
		Prequel followed by Realm Q plus Impact	227 a	
160142	5	Prequel followed by Realm Q plus Roundup	224 a	0.10
		Prequel followed by Realm Q plus Impact	241 a	
160143	6	Prequel followed by Realm Q plus Roundup	217 a	0.26
		Prequel followed by Realm Q plus Impact	221 a	
160814	7	Ground land rolled two days after soybean planting	63 a	0.02
		Ground not land rolled	61 b	
160815	8	Ground land rolled three days after soybean planting	59 a	0.02
		Ground not land rolled	64 b	
160107	9	Spring tilled with JD mulch finisher	80 a	0.11
		No-till	82 a	
160828	10	Strip till	61 a	0.57
		No-till	62 a	
160412	11	No-till	57 a	0.89
		Spring disked and field cultivated	58 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.