On-Farm Corn and Soybean Management Demonstration Trials

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Introduction

Farmers are faced with many decisions in managing corn and soybean as new technologies are introduced, such as new corn and soybean varieties, new pesticides, and new seed treatments. It also is important for farmers to harvest crops in a timely fashion to maximize yields. Corn rootworm is a persistent and economically important pest in Iowa. Rotating corn with soybean usually manages the pest, although rotation-resistant populations have occurred in some locations. 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. The objective of these trials was to investigate what effect various corn and soybean management practices would have on grain yield.

Materials and Methods

In 2019, seven trials investigating various management practices in corn and soybean were investigated (Table 1). Some trials were conducted on-farm by farmer cooperators using the farmer's equipment and some trials were conducted on research farms. 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.

In Trial 1, corn was harvested October 15, October 25, November 1, and November 6 (Table 2). In Trial 2, Holganix® was applied at 3 qt/acre to V5 corn and compared with a control. Holganix® is marketed as a plant-based compost tea extract. In Trial 3, two soybean varieties were compared that were planted mid-April. Trials 4, 5, 6, and 7 investigated corn rootworm management. In Trial 4, a planter application of Aztec in a T-band was compared with a control on corn ground. In Trial 5 a Smartstax, Bt3, and conventional hybrid were planted with and without Force 3G in a T-band on corn ground. Root ratings were made in Trial 5 mid-August using the Iowa State Node Injury (0-3) scale (Table 3). In Trials 6 and 7, a Smartstax, VT2P, and conventional hybrids were planted with and without an in-furrow application of Aztec. Trial 6 was on soybean ground and Trial 7 was on corn ground.

Results and Discussion

In Trial 1, corn yields decreased as harvest timing was delayed. The corn harvested October 15 yielded 29 bushels/acre more than the corn harvested November 6. There appeared to be no difference in ear droppage among the different harvest times so the reason for the yield difference is unknown. The yields reported are corrected to 15.5% moisture. It does show the importance of a timely harvest. In Trial 2, the Hoganix® had no effect on corn yield. In Trial 3, there was no difference in yield between the two soybean varieties planted April 15. In Trial 4, there was no difference in yield between the corn that received the Aztec at planting and the corn without the insecticide. This indicates the corn rootworm population likely was low in this field. In Trial 5, the conventional hybrid with the Force insecticide yielded more

than the conventional hybrid without insecticide and also yielded more than the Smartstax hybrid without insecticide. The Smartstax and Bt3 hybrids with the Force insecticide had lower root ratings than the conventional hybrid without insecticide. The yields and root ratings indicate an insecticide was not necessary on either the Smartstax or Bt3 hybrid, suggesting the Bt trait still is controlling rootworms in this field. In Trials 6 and 7, there was no difference in yield among the various hybrids and insecticide treatments. This indicates the rootworm populations likely were low in these fields.

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 (SB) in 2019.

Exp. no.	Trial	Management practice	County	Variety	Row spacing (in.)	Planting date	Planting pop. (seeds/ac)	Previous crop	Tillage
190407	1	Harvest timing	Hancock	Wyffels 4196SS	30	5/7/19	35,000	SB	Conven-tional
190622	2	Growth stimulant	Pottawattamie	Pioneer P1197AMXT	30	6/10/19	34,000	SB	No-till
190604	3	Variety	Adair	Bayer CZ3601LL Bayer CZ3233LL	30	4/15/19	143,000	Sorghum	Disked
190102	4	Corn rootworm	Lyon	Golden Harvest 96V99	22	5/11/19	36,000	Corn	Conven-tional
190115	5	Corn rootworm	Sioux	Syngenta NK1284-5222, NK1284-3000, NK1284-GT	30	6/4/19	34,000	Corn	Field cultivate
190408	6	Corn rootworm	Hancock	Wyffels 4968, Wyffels 4966, Wyffels 4960	30	5/6/19	35,000	SB	Conven-tional
190409	7	Corn rootworm	Hancock	Wyffels 4968, Wyffels 4966, Wyffels 4960	30	5/6/19	35,000	Corn	Conven-tional

Table 2. Yields for on-farm corn and soybean trials investigating various management practices in 2019.

Exp. no.	Trial	Treatment	Yield (bu/ac)	P-value
190407	1	Harvesed 10/15/19 at 21.0% moisture	235 a	<0.01
		Harvested 10/25/19 at 18.8% moisture	224 ab	
		Harvested 11/1/19 at 16.5% moisture	213 bc	
		Harvested 11/6/19 at 16.4% moisture	206 c	
190622	2	Holganix at 3 qt/ac at V5	130 a	0.98
		Control	131 a	
190604	3	Bayer CZ3601 LL planted 4/15/19	74 a	0.12
		Bayer CZ3233 LL planted 4/15/19	70 a	
190102	4	Aztec HC at 1.6 oz/1,000 ft of row	177 a	0.64
		Control	172 a	
190115	5	NK1284-5222 (Smartstax) with Force 3G at 4 oz/1,000 feet of row	181 ab	<0.01
		NK1284-5222 (Smartstax) without insecticide	172 b	
		NK1284-3000 (Bt3) with Force 3G at 4 oz/1,000 feet of row	184 a	
		NK1284-3000 (Bt3) without insecticide	177 ab	
		NK1284-GT (Conventional) with Force 3G at 4 oz/1,000 feet of row	185 a	
		NK1284-GT (Conventional) without insecticide	170 b	
190408	6	Wyffel 4968SS (Smartstax)	207 a	1.0
		Wyffel 4968SS (Smartstax) with Aztec 2.1 at 8 lb/ac	206 a	
		Wyffel 4966 (VT2P)	206 a	
		Wyffel 4966 (VT2P) with Aztec 2.1 at 8 lb/ac	207 a	
		Wyffel 4960 (Conventional)	208 a	
		Wyffel 4960 (Conventional) with Aztec 2.1 at 8 lb/ac	206 a	
190409	7	Wyffel 4968SS (Smartstax)	172 a	0.29
		Wyffel 4968SS (Smartstax) with Aztec 2.1 at 8 lb/ac	181 a	
		Wyffel 4966 (VT2P)	176 a	
		Wyffel 4966 (VT2P) with Aztec 2.1 at 8 lb/ac	181 a	
		Wyffel 4960 (Conventional)	185 a	
		Wyffel 4960 (Conventional) with Aztec 2.1 at 8 lb/ac	181 a	

[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.

Table 3. Corn root ratings for Trial 5.

Exp. no.	Trial	Treatment	Root rating [ab]	P-value[c]
190115	5	NK1284-5222 (Smartstax) with Force 3G at 4 oz/1,000 feet of row	0.10 b	<0.01
		NK1284-5222 (Smartstax) without insecticide	0.37 ab	
		NK1284-3000 (Bt3) with Force 3G at 4 oz/1,000 feet of row	0.12 b	
		NK1284-3000 (Bt3) without insecticide	0.52 ab	
		NK1284-GT (Conventional) with Force 3G at 4 oz/1,000 feet of row	0.26 ab	
		NK1284-GT (Conventional) without insecticide	0.84 a	

[a]Iowa State Node-Injury scale (0–3). Number of full or partial nodes completely eaten.

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

[c]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.