On-Farm Corn and Soybean Disease and Insect Management Demonstration Trials

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Introduction

Farmers are faced with many decisions for pest management options as new technologies are introduced. Pests, such as corn rootworm and nematodes, are persistent and economically important pests in Iowa. Rotating corn with soybean usually reduces corn rootworm pressure, although rotation-resistant populations can occur in limited areas of Iowa. New insects, such as the soybean gall midge, also are proving difficult to manage. Diseases supressed with seed treatments and foliar applications continues to be important to Iowa farmers. As resistance issues arise with insects and diseases in Iowa, it is important to investigate alternative methods of suppression. The objective of these trials was to investigate what effect various corn and soybean management practices would have on yield.

Materials and Methods

In 2020, nine trials investigating various management practices in corn and soybean were conducted (Table 1). Trial 200106, the effects of transgenic traits and ground-applied insecticide were evaluated for corn rootworms in corn. Two different hybrid trait packages were investigated for yield with the addition of Force® 3G insecticide as the treatment factors. This trial was conducted on a long-term continuous corn site with known corn rootworm issues. Trials 200408 and 200409 were companion studies both looking at the same three corn hybrid trait packages with and without Aztec 2.1 insecticide (8 lb/ac). Trial 200408 was conducted on corn following corn ground while 200409 was on corn following soybean ground. In Trial 200105, the soybean gall midge was the pest issue. The trial evaluated yield differences between using Thimet® insecticide at 9 oz/acre and an untreated control at planting time in soybean. Trials 200114, 200115, and 200116 looked at the differences in yield using Cobra® herbicide to combat white mold disease issues in 15-in. soybean rows. Trial 200402 investigated Nemasect™ seed treatment in corn and the effect on yield. Trial 200704 investigated yield differences in three soybean seed treatments. Ilevo®, Saltro®, and Tripidity®ST bio stimulant soybean seed treatments were compared for yield differences. 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.

Results and Discussion

Trial 200106 did have significant yield differences (Table 2) at the $P \leq 0.10$ level. Dekalb 54-38 RIB SmartStax with and without 4 oz/1,000ft Force 3G insecticide out yielded the Dekalb 54-40 RIB VT DoublePro with and without 4 oz/1,000ft Force 3G insecticide. There also was a significant yield difference in the Dekalb 54-40 RIB VT DoublePro as the treatment with insecticide out yielded the no insecticide treatment by 49 bu/acre. Trial 200106 also showed significant

differences in root feeding ratings between treatments and hybrids (Table 3). All four of the treatment combinations were significantly different than each other. The two hybrids with Force® 3G insecticide added had better root scores than no insecticide treatments. The yields and root ratings indicate an insecticide was necessary to increase yields with both the Smartstax and VT DoublePro hybrid, suggesting the Bt traits alone may not be controlling rootworms well in this field. Companion trials 200408 and 200409 did not show any significant yield differences between treatments. This indicates the rootworm populations likely were low in these fields. However, the corn-on-corn field and corn following soybean fields created approximately 40 bushels/acre average yield difference between trials, which was to be expected. Trial 200105 did not have a signifigant difference in yields among treatments. Trial 200114 showed a significant two bushels/acre yield decrease when using Cobra® herbicide as a white mold control. Trials 200115 and 200116, however, did not show any significant yield differences at the $P \leq 0.10$ level. Trial 200402 had no differences in yield between the seed treatment and the control. Trial 200702 displayed highly significant yield differences between the seed treatments in soybean. The Saltro® out yielded the Ilevo® seed treatment by the largest margin of six bushels/acre.

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. Pest issue, variety, planting date, planting population, previous crop, and tillage practices in on-farm trials investigating various management practices in corn and soybean in 2020.

Trial	Pest issue	County	Variety	Row spacing (in.)	Planting date	Planting pop. (seeds/ac)	Previous crop	Tillage
Corn								
200106	Corn rootworm	Sioux	Dekalb 54-38RIB SmartStax Dekalb 54-40RIB CB Only	30	5/1/20	34,000	Corn	Conventional
200408	Corn rootworm	Hancock	Wyffels-5510 Wyffels-5516 Wyffels-5518	30	4/21/20	35,000	Corn	Conventional
200409	Corn rootworm	Hancock	Wyffels-5510 Wyffels-5516 Wyffels-5518	30	4/21/20	35,000	Soybean	Conventional
Soybean								
200105	Gall midge	Sioux	Pioneer P19A14X	30	4/27/20	140,000	Soybean	No-till
200114	White mold	O'Brien	Syngenta NK S21-W8X	15	4/29/20	125,000	Corn	Fall disc/ spring cultivate
200115	White mold	O'Brien	Pioneer 21A28X	15	4/30/20	125,000	Corn	Fall disc/ spring cultivate
200116	White mold	Hancock	Stine 19GB62 GT27	15	5/3/20	125,000	Corn	Fall disc/ spring cultivate
200402	Seed treatment	Hancock	Becks 2442FP	30	4/22/20	145,000	Corn	Strip till
200704	Seed treatment	Louisa	Merschman Mohawk 1928E	30	4/21/20	140,000	Corn	No-till

Table 2. Yields for on-farm corn and soybean trials investigating various disease and insect in 2020.

Trial	Treatment	Application timing	Yield (bu/ac)[a]	P-value[b]
Corn				
200106	Dekalb 54-38 RIB SmartStax with 4 oz/1,000ft Force 3G insect	Planting	174 a	<0.01
	Dekalb 54-38 RIB SmartStax with no insecticide		168 a	
	Dekalb 54-40 RIB VT DoublePro with 4 oz/,1000ft Force 3G insect		143 b	
	Dekalb 54-40 RIB VT DoublePro with no insecticide		94 c	
200408	Wyffels-5510 Conventional with Aztec 2.1 at 8 lb/ac	Planting	115 a	0.75
	Wyffels-5510 Conventional with no insecticide		116 a	
	Wyffels-5516 RIB VT Double Pro with Aztec 2.1 at 8 lb/ac		112 a	
	Wyffels-5516 RIB VT Double Pro with no insecticide		109 a	
	Wyffels-5518 RIM SmartStax with Aztec 2.1 at 8 lb/ac		114 a	
	Wyffels-5518 RIM SmartStax with no insecticide		111 a	
200409	Wyffels-5510 Conventional with Aztec 2.1 at 8 lb/ac	Planting	155 a	0.16
	Wyffels-5510 Conventional with no insecticide		153 a	
	Wyffels-5516 RIB VT Double Pro with Aztec 2.1 at 8 lb/ac		150 ab	
	Wyffels-5516 RIB VT Double Pro with no insecticide		148 ab	
	Wyffels-5518 RIM SmartStax with Aztec 2.1 at 8 lb/ac		146 b	
	Wyffels-5518 RIM SmartStax with no insecticide		146 b	
Soybean				
200105	Thimet at 9 oz/ac	Planting	63 a	0.13
	Control		59 a	
200114	Cobra at 6 oz/ac	6/25/20	62 a	0.05
	Untreated		64 b	
200115	Cobra at 6 oz/ac	6/25/20	69 a	0.22
	Untreated		71 a	
200116	Cobra at 6 oz/ac	6/25/20	61 a	0.18
	Untreated		66 a	
200402	Nemasect seed treatment	Planting	55 a	0.59
	Control		56 a	
200704	Saltro seed treatment	Planting	59 a	<0.01
	Tripidity seed treatment		56 b	
	Ilevo seed treatment		53 c	
	Control		56 b	

[a]Values denoted with the same letter within a trial are not statistically different at the significance level of 0.10.
[b]P-Value = the calculated probability that the difference in yields can be attributed to the treatments and no 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. This is consistent with demonstration trials.

Table 3. Corn root ratings for Trial 200106.

Trial	Treatment	Root rating[ab]	P-value[c]
200106	Dekalb 54-38 RIB SmartStax with 4 oz/1,000ft Force 3G insect	0.28 a	<0.01
	Dekalb 54-38 RIB SmartStax with no insecticide	1.23 c	
	Dekalb 54-40 RIB VT DoublePro with 4 oz/1,000ft Force 3G insect	0.81 b	
	Dekalb 54-40 RIB VT DoublePro with no insecticide	2.43 d	

[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 0.10.
[c]P-value = the calculated probability that the difference in yields can be attributed to the treatments and no 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. This is consistent with demonstration trials.