On-Farm Corn and Soybean Fungicide Demonstration Trials

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Introduction

An application of foliar fungicide to corn and soybean has become a common practice for many farmers in Iowa. The effect of fungicide on corn and soybean yield, however, can vary from year to year. Environmental conditions, such as rainfall and temperature, influence disease development, which will determine whether a fungicide affects yield. Because environmental conditions vary from one year to the next, it is difficult to predict how and when to use a fungicide. The objective of these trials was to evaluate whether the application of a foliar fungicide would result in a yield increase in corn and soybean.

Materials and Methods

In 2019, there were five trials in Iowa that evaluated the effect of fungicide on corn yield (Table 1), and 17 trials investigated the effect of fungicide on soybean yield (Table 2). Most trials were conducted on cooperators' farms. Some trials were conducted on research farms. Fungicide treatments were applied by ground equipment and were arranged in a randomized complete block design with at least three replications per treatment. Plot size varied from field-to-field depending on the field equipment. All plots were machine harvested for grain yield.

In corn Trial 1, Quilt Excel® at 10.5 oz/acre was applied at R2 and Lucento™ at 5 oz/acre was applied at VT (Table 3). In corn Trial 2, Aproach Prima® at 6 oz/acre was applied to corn at V11 in the morning and in the afternoon. In Trial 3, Miravis® Neo at 13.7 oz/acre was applied to corn at V11. In Trials 4 and 5, Tigris™ Axozyprop was applied at 10.5 oz/acre to corn at VT. In all corn trials, the strips treated with a fungicide application were compared with untreated strips.

In soybean Trial 1, Aproach Prima® at 6 oz/acre was applied to soybean at R2 in the morning and in the afternoon (Table 4). In Trial 2, Miravis® Neo at 13.7 oz/acre was applied to soybean at R2. In Trials 3 and 4, Lucento™ at 5 oz/acre was applied to soybean at R3. In Trials 5, 6, and 7, Delaro® at 11 oz/acre was applied to soybean at R3. In Trial 8, Aproach Prima® at 6 oz/acre was applied to soybean at R1. In Trial 9, Delaro® at 10 oz/acre was applied to soybean at R2. In Trials 10 and 11, Revytek™ at 8 oz/acre plus Fastac® insecticide at 3 oz/acre was applied to soybean at R3 and compared with Revytek™ at 8 oz/acre at R3. In Trials 12 and 13, Delaro® at 8 oz/acre plus Warrior® insecticide at 3 oz/acre was applied to soybean at R3 and compared with Delaro® at 8 oz/acre at R3. In Trial 14, Priaxor® at 4 oz/acre was applied to soybean at R3. In Trials 15 and 16, Lucento™ at 5.5 oz/acre was applied to soybean at R3. In Trial 17, Headline® at 12 oz/acre was applied to soybean at R5. In all soybean trials, except Trial 13, strips treated with a fungicide application were compared with untreated strips.

Results and Discussion

In corn Trial 1, the corn treated with Quilt Excel® yielded 8 bushels/acre more than the untreated corn, but there was no effect of the Lucento™ on corn yield. In Trial 2, there was

no effect of the Aproach Prima® on corn yield with either the morning or afternoon application. In Trial 3, there was an 8 bushel/acre increase in yield with the corn treated with Miravis® Neo (P = 0.07). In Trial 4, there was no effect of the Tigris™ Axozyprop on corn yield, but in Trial 5 there was a 14 bushel/acre decrease in corn yield with the application of Tigris™ Axozyprop. It is possible the yield decrease was due to the surfactant in the spray solution affecting the ear development. The fields were not fully tasseled at the time of application. This problem has occurred in other fields with fungicide applications prior to tasseling.

In soybean Trial 1, there was no effect of the Aproach Prima® on soybean yield with either the morning or afternoon applications. In Trial 2, there was a 2 bushel/acre increase in soybean yield with the application of Miravis® Neo (P = 0.03). In Trials 3 and 4, there was no effect of the Lucento™ on soybean yield. In Trials 5 and 6, there was no effect of the Delaro® on soybean yield, but in Trial 7 there was a 10 bushel/acre increase in yield with the Delaro®. In Trial 8, there was no effect of the Aproach Prima® on soybean yield. In Trial 9, there was a 3 bushel/acre decrease in soybean yield with the application of Delaro® (P = 0.01). It is not known what might account for the yield decrease. In Trial 10, there was a 3 bushel/acre increase in yield with the application of Revytek™ and an additional 2 bushels/acre with the addition of Fastac® insecticide.

In Trial 11, there was a 1 bushel/acre increase in yield with the application of Revytek™ and an additional 3 bushels/acre with the addition of Fastac® insecticide. In Trial 12, there was a 6 bushel/acre increase in yield with the application of Delaro® and an additional 5 bushels/acre with the addition of Warrior® insecticide. In Trial 13, there was no difference in yield between the soybeans that received an application of Delaro® and the soybeans that received an application of Delaro® plus Warrior®. In Trial 14, there was no effect of the Priaxor® on soybean yield. In Trials 15 and 16, there was no effect of the Lucento™ on soybean yield. In Trial 17, there was an increase of 1 bushel/acre with the application of Headline® (P = 0.05).

Although plant disease evaluations were not made in these trials, it is likely there was not much disease present in the corn and soybean trials where there was not an economic response to the fungicide. This indicates the importance of evaluating plant disease incidence and the likelihood of disease problems with current weather conditions and varieties selected to make decisions on the use of foliar fungicides in protecting corn and soybean yield.

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, row spacing, planting date, planting population, previous crop, and tillage practices in the 2019 fungicide trials on corn.

Exp. no.	Trial	County	Variety	Row spacing (in.)	Planting date	Planting population (seeds/ac)	Previous crop	Tillage
190105	1	Lyon	Pioneer PO306AM	30	5/7/19	36,000	Soybean	Strip till
190108	2	Sioux	Pioneer PO306AM	30	6/14/19	34,000	Oats	Disk
190110	3	Sioux	Pioneer P0075AM	30	6/3/19	34,000	Soybean	Disk
190313	4	Monona	LG5525 VT2	30	5/20/19	32,500	Soybean	Disk
190314	5	Monona	LG5548 STX7	30	5/20/19	32,500	Soybean	Disk

Table 2. Variety, row spacing, planting date, planting population, previous crop, and tillage practices in the 2019 fungicide trials on soybean.

Exp. no.	Trial	County	Variety	Row spacing (in.)	Planting date	Planting population (seeds/ac)	Previous crop	Tillage
190107	1	Sioux	Pioneer P19A14X	30	6/6/19	140,000	Corn	Disk
190109	2	Sioux	Pioneer P16A49X	30	6/3/19	140,000	Corn	No-till
190315	3	Monona	Rob See Co RSC2615LL	30	6/2/19	135,000	Corn	No-till
190316	4	Monona	Rob See Co RSC2615 LL	30	6/2/19	135,000	Corn	No-till
190317	5	Monroe	Rob See Co RSC2386 LL	30	6/2/19	135,000	Corn	No-till
190318	6	Monona	Rob See Co RSC2386 LL	30	6/2/19	135,000	Corn	No-till
190320	7	Monona	Rob See Co RSC2615 LL	30	6/14/19	135,000	Alfalfa	Disk
190412	8	Wright	Nutech 20N23E	30	6/3/19	155,000	Corn	Conventional
190506	9	Boone	Miller 2653 LL	30	6/12/19	140,000	Corn	Fall disk rip spring field cultivate
190616	10	Cass	Credenz CZ2889GT LL	15	5/4/19	135,000	Corn	No-till
190617	11	Cass	Credenz 3309GT LL	15	5/4/19	135,000	Corn	No-till
190618	12	Adair	Credenz CZ2601 LL	30	4/22/19	140,000	Corn	No-till
190621	13	Cass	Asgrow 28X9	30	5/16/19	150,000	Corn	Vertical till
190705	14	Washington	Cornelius CB2908RXN	15	6/4/19	148,000	Corn	No-till
190711	15	Louisa	Pioneer P31A22X	30	6/10/19	150,000	Corn	No-till
190712	16	Washington	Pioneer P29A85L	30	6/12/19	150,000	Corn	Fall chisel spring soil finisher
190713	17	Washington	Pioneer P37A56L	30	6/13/19	160,000	Corn	Soil finisher

Table 3. Yields for on-farm fungicide trials in corn in 2019.

Exp. no.	Trial	Treatment	Yield (bu/ac)[a]	P-value[b]
190105	1	Quilt Xcel at 10.5 oz/ac at R2	225 a	0.02
		Lucento at 5 oz/ac at VT	221 ab	
		Control	217 b	
190108	2	Aproach prima at 6 oz/ac at V11 in the morning (76°F)	192 a	0.10
		Aproach prima at 6 oz/ac at V11 in the afternoon (86°F)	194 a	
		Control	188 a	
190110	3	Miravis Neo at 13.7 oz/ac at V11	224 a	0.07
		Control	216 a	
190313	4	Tigris Axozyprop at 10.5 oz/ac at VT	182 a	0.23
		Control	198 a	
190314	5	Tigris Axozyprop at 10.5 oz/ac at VT	175 a	<0.01
		Control	189 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.

Table 4. Yields for on-farm fungicide trials in soybean in 2019.

Exp. no.	Trial	Treatment	Yield (bu/ac)[a]	P-value[b]
190107	1	Aproach prima at 6 oz/ac at R2 in the morning (76°F)	63 a	0.60
		Aproach prima at 6 oz/ac at R2 in the afternoon (86°F)	64 a	
		Control	63 a	
190109	2	Miravis Neo at 13.7 oz/ac at R2	69 a	0.03
		Control	67 b	
190315	3	Lucento at 5 oz/ac at R3	66 a	0.36
		Control	65 a	
190316	4	Lucento at 5 oz/ac at R3	59 a	0.17
		Control	55 a	
190317	5	Delaro at 11 oz/ac at R3	56 a	0.54
		Control	55 a	
190318	6	Delaro at 11 oz/ac at R3	44 a	0.28
		Control	42 a	
190320	7	Delaro at 11 oz/ac at R3	55 a	<0.01
		Control	45 b	
190412	8	Aproach prima at 6 oz/ac at R1	71 a	0.43
		Control	69 a	
190506	9	Delaro at 10 oz/ac at R2	58 a	0.01
		Control	61 b	
190616	10	Revytek at 8 oz/ac plus Fastac at 3 oz/ac at R3	87 a	0.01
		Revytek at 8 oz/ac at R3	85 b	
		Control	82 c	
190617	11	Revytek at 8 oz/ac plus Fastac at 3 oz/ac at R3	90 a	<0.01
		Revytek at 8 oz/ac at R3	87 b	
		Control	86 c	
190618	12	Delaro at 8 oz/ac plus Warrior at 3 oz/ac at R3	72 a	<0.01
		Delaro at 8 oz/ac at R3	67 b	
		Control	61 c	

Table 4 (continued). Yields for on-farm fungicide trials in soybean in 2019.

190621	13	Delaro at 8 oz/ac plus Warrior at 3 oz/ac at R3	87 a	0.22
		Delaro at 8 oz/ac at R3	84 a	
190705	14	Priaxor at 4 oz/ac at R3	69 a	0.28
		Control	67 a	
190711	15	Lucento at 5.5 oz/ac at R3	64 a	0.19
		Control	62 a	
190712	16	Lucento at 5.5 oz/ac at R3	62 a	0.47
		Control	61 a	
190713	17	Headline at 12 oz/ac at R5	66 a	0.05
		Control	65 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.