On-Farm Corn and Soybean Fungicide Demonstration Trials

RFR-A2053

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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 or the timing of application in each day would result in a yield increase in corn and soybean.

Materials and Methods

In 2020, there were three trials in Iowa that evaluated the effect of fungicide on soybean yield, three trials investigated the effect of fungicide on corn yield and two trials evaluated time of day application on corn and soybean yields (Table 2). In soybean trial 200110 two fungicides applied at the R3 growth stage were investigated against a control of no fungicide: Aproach Prima® at 9 oz/acre and Priaxor® at 8 oz/acre. Trials 200411, 200412, and 200707 had Miravis® Neo at 13.7 oz/acre applied to soybean at R3 against a control of no fungicide. In corn trial 200111, Aproach Prima® at 9 oz/acre applied at the R2 growth stage was investigated for yield differences against a control of no fungicide. Trials 200118 and 200119 both compared applications of Quilt Excel® at 10.5 oz/acre at the R2 growth stage in corn against a control of no fungicide. Trial 200112 and 200113 both compared Aproach Prima® at 9 oz/acre on R3 soybean (200112) and R2 corn (200113) at two timings during the day. On July 16, 2020, the first application was done between 8:25 and 8:40 a.m. on both trials with a temperature of 61°F, 100 percent humidity, and winds of 5-7 mph. The second application on July 16, 2020, was done between 1:35 and 1:50 p.m. with a temperature of 82°F, approx. 90 percent humidity, and winds of 10 mph. Most trials were conducted on cooperator's farms, with some trials 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

Results and Discussion

In 8 of 9 trials, no effect of fungicide on yield was detected ($P \leq 0.10$). An application of a fungicide to either corn or soybean did not result in greater or lower yields. Similarly, no yield differences occurred when a fungicide was applied early morning or early afternoon. Trial 400411 had a 5 bushel/acre yield advantage with the use of Miravis® Neo at 13.7 oz/acre that was significant at $P \leq 0.10$. Although trial 200113 did show a large variance in yield averages, this was due to one rep of data that skewed results but was deemed not significant to $P \leq 0.10$. In all fungicide trials, no difference in grain moisture levels occurred at $P \leq 0.10$. Although plant disease evaluations were not made in these trials, the 2020 growing season was warmer and drier than normal and not favorable for disease development. It is likely there was little disease present in the corn and

soybean trials and consequently there was not an economic response to the fungicide. This indicates the importance of evaluating plant disease incidence, 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 2020 fungicide trials on corn and soybean.

Trial	County	Variety	Row spacing (in.)	Planting date	Planting population (seeds/ac)	Previous crop	Tillage
Soybean							
200110	Sioux	Pioneer 19A14X	30	4/27/20	140,000	Corn	No-till
200411	Webster	Stine 25EA12	30	5/1/20	175,000	Corn	No-till
200412	Webster	Pioneer 25A96	30	5/1/20	175,000	Corn	No-till
200707	Louisa	Merschman Osage 2025E	30	4/27/20	130,000	Corn	Fall chisel springsSoil finish
Corn							
200111	Sioux	Pioneer P0075AM	30	4/24/20	34,000	Soy	No-till
200118	Cherokee	Pioneer P0421Q	30	4/21/20	34,000	Soy	Conventional
200119	O'Brien	Pioneer P0421Q	30	4/23/20	34,000	Soy	Conventional
Timing							
200112	Sioux	Pioneer 18A98X	30	4/27/20	140,000	Corn	No-till
200113	Sioux	Pioneer P0075AM	30	4/30/20	34,000	Soy	No-till

Table 2. Yields and economics for on-farm corn and soybean fungicide trials in 2020.

Trial	Treatment	Yield (bu/ac)[a]	P-value[b]	Cost per acre[c] (fungicide + app fee)
Soybean				
200110	Aproach Prima at 9 oz/ac at R3	63 a	0.91	$26
	Priaxor at 8 oz/ac at R3	64 a		$22
	Control	63 a		0
200411	Miravis Neo at 13.7 oz/ac at R3	64 a	0.02	$21
	Control	59 b		0
200412	Miravis Neo at 13.7 oz/ac at R3	61 a	0.27	$21
	Control	59 a		$0
200707	Miravis Neo at 13.7 oz/ac at R3	64 a	0.86	$21
	Control	63 a		$0
Corn				
200111	Aproach Prima at 9 oz/ac at R2	225 a	0.38	$26
	Control	228 a		$0
200118	Quilt Excel at 10.5 oz/ac at R2	189 a	0.94	$19
	Control	189 a		$0
200119	Quilt Excel at 10.5 oz/ac at R2	214 a	0.81	$19
	Control	212 a		$0
Timing				
200112	Aproach Prima at 9 oz/ac at R3 (8:25 am 61°F)	64 a	0.23	$26
	Aproach Prima at 9 oz/ac at R3 (1:35 pm 82°F)	67 a		$26
	Control	67 a		$0
200113	Aproach Prima at 9 oz/ac at R2 (8:40 am 61°F)	228 a	0.38	$26
	Aproach Prima at 9 oz/ac at R2 (1:50 pm 82°F)	218 a		$26
	Control	231 a		$0

[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 for demonstration trials.
[c]Cost per acre is based on current cost estimates of products used. $10 application fee added to each fungicide cost. Local costs structures and discounts will vary. The baseline formula is population x cost per unit seed/acre.