

Historical Corn Yield Parameters from Foliar Fungicide Applications on Multiple Hybrids and Growth Stages

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Introduction

Fungicide use on hybrid corn continues to be of interest to many farmers in Iowa. The number of fungicides registered for use on corn continues to increase, especially with the introduction of various generic products. Fungicide use has been promoted at various timings including multiple application timings.

The objectives of these two long-term studies were to evaluate the yield response on multiple corn hybrids to a foliar fungicide application at R1 (silk) stage, and to assess the effects of fungicide applications at different timings of corn growth stages on an individual hybrid for yield, harvest moisture, and lodging.

Materials and Methods

In the variety x fungicide comparison, yearly corn variety trials were planted from 2008 to 2019, planted following soybean in conventional tillage systems. The experimental design was a randomized complete block design with three blocks and each plot was six rows wide (30-in. row spacing) by 75 ft long. Fungicides were all applied at R1, randomized within the 3 blocks (Table 1).

In the fungicide application timing studies conducted from 2007–2019, foliar fungicides were compared at timings of V6, V12, R1, R2,

R3, and V6+R1. One corn variety was used with multiple foliar fungicide products. The data presented in Table 2 are an average of the fungicide products used for each application timing. All fungicide application timings were not compared each year.

Fungicide applications were applied using a CO₂ pressurized 10-ft hand boom treating the center four rows of each 6-row plot. The boom was fitted with Tee Jet flat fan nozzles (XR11003VS), spaced 20 in. apart and delivering 20 gallons/acre at 24 psi. Disease severity was not documented all years and no data are presented. The four center rows of each plot were harvested with a John Deere 9450 combine fitted with an Avery Weigh-Tronix weigh scale and Shivvers 5010 moisture meter.

Results and Discussion

Precipitation, temperature, and relative humidity vary year by year, which can promote or restrict the type and amount of disease present and timing of inoculation, which can affect the severity of disease on grain yield. Gray leaf spot (GLS) and northern corn leaf blight (NCLB) were prevalent most years, but usually below economic thresholds. Severity of NCLB was highest in 2015 and had the highest return on investment in 2015 when averaged across all varieties (Table 1).

In general, fungicide applications at V6, R2, or R3 were less effective in providing a yield response than for application at V12 or R1 (Table 2). Applications of fungicides at R1 or V6 plus R1 typically yielded the same (Table 2). Use of fungicide and fungicide application timings have occasionally had an effect on lowering percent lodging at harvest due to healthier stalk tissue, but data is inconsistent

over the years, mainly due to amount of disease present, timing of wind events, and timing of corn harvest (Table 2).

Economic return for fungicide applications may vary, depending on disease level, application timing, cost of fungicides used, and aerial or ground application costs.

Table 1. Effect of yield, percent lodging, and grain harvest moisture to R1 timed foliar fungicide applications on 12 years of corn variety trials at the ISU Northeast Research Farm, Nashua, Iowa, from 2008-2019.

Year-variety	Avg yield with fungicide treatment bu/ac	Avg yield of untreated control bu/ac	Avg increased	Avg	Avg reduced	Avg yield
			grain moisture at harvest with fungicide treatment %	increased yield with fungicide treatment bu/ac	lodging with fungicide treatment %	range with fungicide application
2019 – 32 var	239.3	233.2	+ 0.26	+ 6.1	0.00	-3.9 to +15.7
2018 – 32 var	213.4	207.7	+ 0.53	+ 5.7	-0.38	-12.2 to +23.8
2017 – 32 var	241.2	239.7	+ 0.11	+ 1.6	0.00	-6.6 to +11.0
2016 – 24 var	219.5	215.0	+ 0.23	+ 4.4	- 0.15	-6.7 to +21.5
2015 – 26 var	224.6	212.8	+ 1.10	+11.8	- 6.22	+0.1 to +29.9
2014 – 25 var	188.0	183.0	+ 0.57	+ 5.0	0.00	-11.7 to +23.9
2013 – 24 var	194.8	188.7	- 0.20	+ 6.1	- 0.20	-5.1 to +16.8
2012 – 27 var	184.1	181.2	0.00	+ 2.9	- 1.00	-14.3 to +21.5
2011 – 24 var	218.2	212.2	+ 0.02	+ 6.0	- 0.04	-2.2 to +17.5
2010 – 22 var	207.1	203.1	+ 0.37	+ 4.0	0.00	-5.1 to +17.5
2009 – 24 var	213.1	208.1	+ 0.71	+ 5.0	0.00	-5.5 to +15.4
2008 – 24 var	220.6	216.6	+ 0.11	+ 4.0	- 9.40	-9.0 to +21.6
12-yr avg	213.7	208.4	+ 0.32	+ 5.3	- 1.4	-6.9 to +19.7

Table 2. Effect of yield and percent lodging on 13 years of timing of foliar fungicide applications on corn at the ISU Northeast Research Farm, Nashua from 2007 to 2019.

Fungicide timing treatments	Number of trial years treatments were included	Average yield of untreated for number of trial years	Average yield response to treatments for number of trial years	Average yield increase to treatments	Average harvest moisture for number of trial years	Average % lodging to treatments for number of trial years
		----- bu/ac -----			----- % -----	
Untreated	13	212.3	212.3	0.0	20.6	5.7
V6	9	214.1	217.2	3.1	20.5	5.8
V12	4	220.7	227.2	6.5	20.9	7.3
R1	13	212.3	219.3	7.0	20.7	6.5
R2	7	204.9	208.1	3.2	21.0	6.2
R3	4	208.3	211.9	3.6	20.9	5.7
V6+R1	7	213.8	219.2	5.4	20.7	6.7