

Assessing the Effects of Fungicide on Various Corn Hybrids

Thames Valley Regional Partner Grant Project

Purpose:

Previous fungicide trials have shown extreme variability in effectiveness, with very high (30-40 bu/ac) to no yield advantages. There appears to be a hybrid interaction with this variability of response. The purpose of this project was to assess the effects of fungicide applications on various corn hybrids and to examine the predictability of hybrid response to a fungicide application.

Methods:

1) Site Establishment

Cooperators were contacted and chose a field for planting. Sites were established with 4 different hybrids:

- 2 sites had later season hybrids (A7646, A8168G3, MZ 535 HX, N45-A6)
- 4 sites had earlier season hybrids (38M58, DCK 46-60, DKC 50-48, MZ 424)

Hybrids were selected based on previous 2008 research on Headline® fungicide influence on hybrid yields. The 38M58, DKC 50-48, A7646, and A8168G3 hybrids did not have a yield advantage when compared to the control when sprayed with Headline®, while the DCK 46-60, MZ 424, MZ 535 HX, and N45-A6 had a clear yield advantage over the control when sprayed with Headline®.

Each site had 2 replications of treated and untreated hybrids. Buffer strips were added between reps or after every 4 plots and each plot was 4, 6, or 8 rows of corn wide and ran the length of the field.

2. Treatment Application

Headline® fungicide was applied at 4 sites and Quadris® was applied at 2 sites at the full rate with the University of Guelph Ridgetown Campus sprayer in most cases or with the cooperator sprayer. Untreated plots did not have fungicide sprayed. The target application timing was crop stage VT (tasseling) and occurred in early to mid August.

3. Disease Ratings

Each site had 2 ratings for disease during the course of the growing season. Each section was marked in order to ensure that the same section of field was rated each time. The first rating was conducted during late July-early August and the second rating was conducted in early September. Plots were divided into 3 sections and 10 plants from each section were scouted for Northern Leaf Blight, Common Rust, Eye Spot, and Grey Leaf Spot. Disease presence was measured as a percentage of the plant leaf and final values were attained by averaging the 3 field sections together for each hybrid. In early to mid October stay-green ratings were taken from 5 plants from each section of each plot. Averages were generated for each hybrid.

4. Harvest

Plots were harvested and wet weights were measured with a weigh wagon and recoded. Grain moistures and test weights were also recorded and yields were calculated. In addition, plant lodging scores were recorded.

Results:

Differences in disease ratings were generally not significant across the trials. There was an increase in disease pressure at the timing of the second rating compared to the earlier scores. Headline® did appear to cause significant disease reductions in the hybrid MZ 424 hybrid. Most obviously there was a reduction in Eye Spot pressure when Headline® was sprayed when compared to the control. Otherwise, there were no clear differences between the treated and untreated controls in terms of disease pressure.

The amount of green plant tissue was measured in early October and in general plots that were sprayed with fungicide had more green tissue

Tables 1 and 2 present the complete analyses of the influence of foliar fungicide on corn yield and harvest grain moisture content. The late maturing hybrids (Table 1) illustrated the yield advantages to spraying Headline® more clearly than did the early maturing hybrids. The treated A8168G3 hybrid had significantly higher yields ($p=0.001$) than the untreated check when all sites were averaged, these results are opposite to the 2008 findings. The treated N45-A6 hybrid also had significantly higher yields at $p=0.1$, these results are similar to the 2008 results. In general there was a tendency for a yield advantage when Headline® was sprayed on late maturing hybrids.

At the earlier sites (Table 2) there were several significant yield effects caused by the fungicide application. However, some yield responses were positive and some were negative. When averaged over all locations there were no yield differences between the untreated and fungicide treatment for the earlier maturing sites.

Broken stalk measurements (data not shown) were not influenced by fungicide application or hybrid in 2009.

In addition to these 6 intensive sites a number of producers conducted head to head comparisons of fungicide (Headline) treated corn versus untreated corn across a range of hybrids. This data is summarized in Table 3.

Table 1. The impact of foliar fungicides on grain corn yield and harvest moistures on 4 hybrids across 2 locations in 2009.

Location-Hybrid		Grain Yield bu/acre			Moisture Content %		
		Fungicide	Untreated		Fungicide	Untreated	
R009	A7646	175	167		22.6	22.6	
	A8168G3	181	163	*	24.6	25.4	
	MZ 535 HX	162	158		21.9	21.7	
	N45-A6	178	176		22.5	20.1	
	Average	174	167	*	22.9	22.4	
K009	A7646	170	179	+	27.6	26.6	
	A8168G3	196	175	**	28.7	30.7	*
	MZ 535 HX	160	159		27.1	26.6	
	N45-A6	199	189		24.6	23.9	
	Average	181	175	*	27.0	26.9	
Average Across Locations	A7646	173	173		25.1	24.6	
	A8168G3	188	169	***	26.7	28.1	***
	MZ 535 HX	161	158		24.5	24.1	
	N45-A6	189	182	+	23.5	22.0	
	Average	177	171	**	24.9	24.7	

+, **, ***, **** = difference between fungicide vs. untreated check significant at $p=0.10$, 0.05, 0.01, and 0.001, respectively.

Table 2. The impact of foliar fungicides on grain corn yield and harvest moistures on 4 hybrids across four locations in 2009.

Location-Hybrid		Grain Yield (bu/acre)			Moisture Content %		
		Fungicide	Untreated		Fungicide	Untreated	
J009	38M58	158	149	+	24.2	24.1	
	DKC 46-60	144	147		29.9	26.3	*
	DKC 50-48	158	158		31.8	29.3	+
	MZ 424	142	140		33.0	32.5	
	Average	150	149		29.7	28.0	*
M009	38M58	119	117		33.8	35.2	
	DKC 46-60	125	119		35.9	34.2	
	DKC 50-48	123	127		38.7	37.4	
	MZ 424	108	107		41.0	40.3	
	Average	119	117		37.3	36.8	
S009	38M58	189	181		20.4	20.3	

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	DKC 46-60	186	183		21.3	20.5	
	DKC 50-48	209	197	*	23.3	23.9	
	MZ 424	184	191		24.7	22.5	* *
	Average	192	188		22.4	21.8	+
M009	38M58	142	148		17.4	17.5	
	DKC 46-60	144	151		18.2	17.7	+
	DKC 50-48	140	148	+	21.5	21.1	
	MZ 424	127	139	*	22.2	21.9	
	Average	138	147	* *	19.8	19.5	*
Average Across Locations	38M58	152	149		23.9	24.3	
	DKC 46-60	150	150		26.3	24.7	
	DKC 50-48	157	157		28.8	27.9	
	MZ 424	140	144		30.2	29.3	
	Mean Fungicide	150	150		27.3	26.5	
+,*,** = difference between fungicide vs. untreated check significant at p=0.10, 0.05, and 0.01, respectively.							

Summary:

Key points from 2009.

1) Significant responses in corn yield due to fungicide applications were rare in 2009 in the earlier maturity set of trials. Where they did occur fungicides resulted in both positive and negative yield responses. In the two longer season trials there was a trend for hybrids to respond positively to the fungicide applications.

2) There was no trend for the hybrids identified from 2008 data, as either responsive or non-responsive to exhibit those same characteristics in 2009. In fact, the one hybrid that seemed to respond positively this year with some consistency was a non-responder in the plot work of 2008.

Next Steps:

In order to fully understand the hybrid interaction 2 more years of field trials will be conducted. These years of data will be added to the current data in order to reduce the variability and to improve the integrity of the current findings.

Table 3. The impact of foliar fungicides on grain corn yield and harvest moistures on various hybrids across various on-farm sites in 2009. Note: Since not all hybrids were at all sites comparisons should be made only between fungicide and untreated plots not between hybrids.

Hybrid	# of Paired Comparisons	Treatment	Average Yield	Difference	Average Moisture	Difference
DKC 50-44	25	Headline	202	+ 4	27.6	+0.3
		Untreated	198		27.3	
DKC 46-60	20	Headline	175	+ 3	24.7	+0.6
		Untreated	172		24.1	
DKC 50-20	5	Headline	176	+ 3	19.4	-0.4
		Untreated	173		19.8	
DKC 50-48	4	Headline	193	+ 3	23.5	-0.4
		Untreated	190		23.9	
MZ 424	4	Headline	152	- 4	22.8	+0.6
		Untreated	156		22.2	
P 38M58	4	Headline	164	0	19.0	+0.2
		Untreated	164		18.8	

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