

Assessing the Effects of Fungicide on Various Corn Hybrids

(Thamesvalley SCIA 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

Sites were established each with 4 different hybrids:

- 3 sites had long season hybrids (A7646, A8168G3, MZ 4244BR, N45-A6)
- 5 sites had short season hybrids (38M58, DKC 46-60, DKC 50-48, P0125HR)

2) Hybrid Selection

Hybrids were originally selected for this project based on University of Guelph (2008) research. From this 2008 work 4 hybrids were selected that had been shown to be non-responsive to Headline® fungicide and 4 hybrids were selected that had been responsive to Headline®. The non-responsive hybrids were: 38M58, DKC 50-48, A7646, and A8168G3 while the responsive hybrids were: DKC 46-60, MZ 424, MZ 535 HX, and N45-A6. In 2010 MZ 535 HX had to be replaced with MZ 4244BR and MZ424 was replaced with P0125HR.

Each site had 2 replications of treated and untreated hybrids, 2 hybrids were chosen for each site that were categorized as responsive and 2 hybrids were non-responsive. 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.

3) Treatment Application

Headline® fungicide was applied at all sites at the full rate with the University of Guelph Ridgetown Campus sprayer in most cases or with the co-operator sprayer. Untreated plots did not have fungicide sprayed. The target application timing was crop stage VT (tasseling) and occurred from the middle to the end of July.

4) 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 early to mid July and the second rating was conducted in mid to late August. 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. In late

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August to early September stay-green ratings were taken from 5 plants from each section of each plot.

5) Harvest

Plots were machine harvested and wet weights were measured with a weigh wagon and recorded. Grain moistures and test weights were also recorded and yields were calculated.

Results:

1) Longer season sites

One long season hybrid (N45-A6) clearly had a yield advantage when sprayed with Headline® at all (2) locations (see Table 1). N45-A6 was identified in the original work as being responsive to Headline® and also had a positive yield response in the field trials of 2009. MZ 4244BR was a replacement for MZ 535 and hence not part of the original screening work, so we were uncertain as to how it might respond to Headline®. It appeared to not have any consistent response to Headline® in 2010. Those long season hybrids that were previously identified as being non-responsive (A7646 and A8168G3) did not have any consistent positive yield response to Headline® in 2010. Interestingly, A8168G3 did show positive yield response in 2009. Harvest moistures did tend to be slightly higher for the fungicide treated plots; average increase was 0.4 % at harvest. Differences in disease ratings were generally not significant across the trials. The amount of green plant tissue was measured in September. For the long season sites there was a trend in the sprayed plots to have more green tissue than the unsprayed plots, potentially indicating that the fungicide did have some impact on late season plant health.

2) Shorter season sites

In terms of positive yield benefits of the fungicide application, the shorter season sites did have more response to Headline® than the longer season sites. DKC 46-60 was identified as a responsive hybrid and in 2010 responded positively to the fungicide application at 4 of the 5 sites (average yield increase over untreated plots was 10.2 bu/acre, see Table 2). In 2009 this same hybrid had no positive response at any of the 4 test sites. P0125HR was a new hybrid in the trials this year and so we had no indication as to its potential responsiveness to Headline®; it responded to the fungicide at 2 of the 5 sites. The hybrids indicated as non-responsive (38M58 and 50-48) did see a yield increase to Headline® application at 2 of 5 sites; this was about the same trend as 2009 when they showed positive yield response at 1 (38M58) and 2 (50-48) of 4 sites. The harvest moistures at the shorter season sites were, on average 0.5% higher for the fungicide treated plots compared to other untreated checks.

There was an increase in disease pressure at the timing of the second rating compared to the earlier rating. At a majority of the sites Headline® did appear to cause significant eye spot reductions. However, the hybrid that responded best to spray application (greatest reduction in eye spot pressure) was not similar from site to site. The sites with the greatest reduction in eyespot due to spraying (i.e. GO10 and MO10) also tended to experience larger increases in yield over the untreated control.

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The trend for treated hybrids to have more green tissue late in the growing season compared to untreated plots was not as evident in the shorter season sites as the long season

Table 1. The impact of foliar fungicides on grain corn yield and harvest moistures on 4 long season hybrids across 3 locations in 2010.

Location-Hybrid		Grain Yield bu/acre			Moisture Content %		
		Fungicide	Untreated	Diff	Fungicide	Untreated	Diff
D010	A7646	179.0	188.4	-9.4	16.6	15.8	+0.8
	A8168G3	155.5	171.4	-15.9	18.1	17.5	+0.6
	MZ 4244BR	153.8	167.7	-13.9	16.3	16.0	+0.3
	N45-A6	155.7	140.9	+14.8	17.3	16.6	+0.7
	Average	161.0	167.1	-6.1	17.1	16.5	+0.6
K010	A7646	179.9	175.2	+4.7	15.2	14.9	+0.3
	A8168G3	180.3	177.6	+2.7	17.2	17.1	+0.1
	MZ 4244BR	171.3	163.7	+7.6	15.3	14.8	+0.5
	N45-A6	182.4	171.2	+11.2	15.6	15	+0.6
	Average	178.5	171.9	+6.6	15.8	15.4	+0.4
V010	A7646	224.5	220.9	+3.6	20.5	20	+0.5
	MZ 4244BR	217.9	214.3	+3.6	19.1	19.6	-0.6
	Average	221.2	207.6	+3.6	19.6	19.3	+0.3
Average Across Locations	A7646	194.5	194.8	-0.4	17.4	16.9	+0.5
	A8168G3	167.9	174.5	-6.6	17.7	17.3	+0.4
	MZ 4244BR	181.0	181.9	-0.9	16.9	16.8	+0.1
	N45-A6	169.1	156.1	+13	16.5	15.8	+0.7
	Average	178.1	176.8	+1.3	17.1	16.7	+0.4

Summary:

Key points from 2010

1) Attempting to reliably characterize hybrids as being responsive or non-responsive to a fungicide has proven very difficult. Over the two years of this project most options have presented themselves. That is, at least one hybrid, identified as being responsive in the 2008 work has consistently responded to Headline with significant yield gains over the untreated plot. One hybrid, identified as non-responsive showed no advantage to Headline in either year. Other hybrids having been identified as either responsive or non-responsive have shown the opposite trait and have not been consistent from one year to the next.

2) The presence, or lack of corn leaf disease pressure had a fairly minor impact on the ability to indicate a yield improvement to the fungicide application.

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Table 2. The impact of foliar fungicides on grain corn yield and harvest moistures on 4 short season across 5 locations in 2010.

Location-Hybrid		Grain Yield (bu/acre)			Moisture Content %		
		Fungicide	Untreated	Diff	Fungicide	Untreated	Diff
G010	38M58	179.3	167.3	+12	19.5	18.7	+0.8
	DKC 46-60	184.5	163.8	+20.7	19.7	19.1	+0.6
	DKC 50-48	195.6	183.2	+12.4	22.3	20.5	+1.8
	P0125HR	191.2	176.9	+14.3	21.7	20.5	+1.2
	Average	187.7	172.8	+14.9	20.8	19.7	+1.1
M010	38M58	240.2	226.2	+14.0	23.4	22.1	+1.3
	DKC 46-60	239.0	224.1	+14.9	22.0	21.7	+0.3
	DKC 50-48	218.8	216.1	+2.7	19.2	18.3	+0.9
	P0125HR	222.0	233.2	-11.2	19.5	18.3	+1.2
	Average	230.0	224.9	+5.1	21.0	20.1	+0.9
J010	38M58	202.0	201.7	+0.3	16.6	16.1	+0.5
	DKC 46-60	206.6	200.2	+6.4	16.1	16.3	-0.2
	DKC 50-48	222.0	211.2	+10.8	17.9	17.7	+0.2
	P0125HR	197.6	200.2	-2.6	17.7	17.4	+0.3
	Average	207.0	203.3	+3.7	17.1	16.9	+0.2
S010	38M58	163.0	158.9	+4.1	15.6	15.6	0
	DKC 46-60	186.8	179.5	+7.3	16.7	16.3	+0.4
	DKC 50-48	165.4	161.2	+4.2	16.7	15.9	+0.8
	P0125HR	178.2	171.3	+6.9	16.4	15.9	+0.5
	Average	173.4	167.7	+5.7	16.4	15.9	+0.5
S010-2	38M58	163.1	163.1	0	15.6	15.4	+0.2
	DKC 46-60	157.9	156.1	+1.8	15.7	15.5	+0.2
	DKC 50-48	179.0	174.4	+4.6	16.4	16.3	+0.1
	P0125HR	168.4	167.9	+0.5	15.9	16.1	+0.2
	Average	167.1	165.4	+1.7	15.9	15.8	+0.1
Average Across Locations	38M58	189.5	183.4	+6.1	18.1	17.6	+0.6
	DKC 46-60	195.0	184.7	+10.2	18.0	17.8	+0.3
	DKC 50-48	196.2	189.2	+6.9	18.5	17.7	+0.8
	P0125HR	191.5	189.9	+1.6	18.2	17.6	+0.6
	Mean Fungicide	193.0	186.8	+6.2	18.2	17.7	+0.5

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3) Ongoing efforts to classify hybrids as to their responsiveness to fungicides may have little value to producers unless it can be done more reliably. Further investigations into responsiveness to Headline may need to be conducted at a more basic (cellular) level and/or begin early in a hybrids (pre-commercialization) testing.

Next Steps:

No next steps are planned currently for this project.

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