

## SUMMARY OF THE 2008 STRIP TRIALS FOR FOLIAR FUNGICIDE USE ON CORN

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### Introduction

Foliar fungicide use on corn has increased in recent years. Insufficient Midwest field data have encouraged a series of small- and large-scale research plots implemented by UW-Madison and Extension personnel in 2007 and 2008. Large-scale field plots have advantages and disadvantages when compared to small scale plots. Advantages of small-plot research include the ability to control variables such as soil type/texture, drainage, soil compaction and pest interactions. It also allows the researcher to evaluate several different treatments in a small area. However, the value of large-scale on-farm research is that the previously mentioned variables are not singled out and those results better represent “real world” scenarios. Both research methodologies should be considered vital and important steps in the research process.

The 2008 results of the large scale, on-farm plots will be reported in this paper, as will the combined results from 2007 and 2008.

### Methods

On-farm, large-scale field plots were initiated during the 2008 growing season in Chippewa, Dane, Green Lake (2), Jefferson, La Crosse (3 locations), Sheboygan and Waupaca counties using the host grower’s production practices (tillage, hybrids, etc.) and replicated a minimum of two times.

Foliar fungicides were applied according to labeled recommendations during the R1 stage of corn development. Foliar disease ratings were taken in most plots prior to application and again in early September by estimating the percent foliage affected. Stalk lodging was assessed in early October using a stalk nudge test by pushing 30 consecutive corn plants to a 45 degree angle and recording the number of lodged plants. A plant was considered lodged if it bent prior to reaching a 45-degree angle or if it was lodged prior to this test and anthracnose symptoms were present.

### 2008 Results of Individual Plots

Individual strip trial results (Table 1) indicated that 3 of the 8 field trials had a statistical difference in yield. There was no statistical difference in kernel moisture, test weight or lodged stalks in those fields where data was available.

### Combined 2007 and 2008 Results

**What Have We Learned?** On-farm foliar fungicide strip trials in corn have now been conducted at several locations over two years (Figure 1). In Figure 2, we also show the boxplots for yield and grain moisture for the 2008 on-farm trials across all observations. In order to determine how fungicides may be recommended, it is important to conduct analyses that help to identify if there are effects of fungicide treatment, as well as identify the largest source of variation (for example, year, location (e.g., county), farm). In both 2007 and 2008, disease pressure was low and variable, with 2007 dominated by late

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Table 1. Individual field results

County (# reps)	Hybrid	Previous crop	Treatment/ (rate fl. oz/a)	Yield <sup>a</sup>	Kernel moisture <sup>a</sup> (%)	Test Wt. <sup>a</sup>	# Lodged stalk/30 <sup>a</sup>	Ave. % diseased foliage pre- application	Ave. % diseased foliage- September	Diseases present
Chippewa (3)	Renk RK438 RRYGCB	Soybean	UTC	187.25 a	-	-	3.0 a	3 %	10 %	A, NCLS
			Headline (12)	185.65 a	-	-	3.67 a		10 %	
Dane (2)	N/A	N/A	UTC	204.8 a	N/A	N/A	N/A	N/A	N/A	N/A
			Headline (N/A)	208.9 <u>a</u>	N/A	N/A	N/A	N/A	N/A	N/A
Green Lake Field #1 (3)	DKC 52-43	soybean	UTC	166.5 a	17.0 a	54.7	0 a	< 1 %	15 %	R, ES, NCLB
			Headline (6)	190.5 b	18.1 a	54.5	0 a		15 %	
Green Lake Field #2 (3)	Croplan 388	soybean	UTC	206.9 a	20.2 a	53.7	0 a	< 1 %	8.0 %	R, ES, NCLB
			Headline (6)	212.5 b	21.0 a	53.0	0 a		3.7 %	
Jefferson (4)	Midwest 7645 VT3	wheat	UTC	163.9 a	24.0 a	N/A	N/A	N/A	N/A	N/A
			Headline (6)	160.3 a	24.5 a	N/A	N/A	N/A	N/A	N/A
La Crosse Field #1 (2)	Croplan 388	corn	UTC	146.3 a	16.0 a	-	11.0 a	1 %	10 %	N/A
			Headline (6)	160.2 a	16.4 a	-	9.0 a	1 %	5 %	N/A
La Crosse Field #2 (2)	Pioneer 37Y13	soybean	UTC	217.5 a	21.9 a	-	9.5 a	1 %	2 %	N/A
			Headline (6)	228.2 b	21.8 a	-	5.5 a	1 %	4.5 %	N/A
Sheboygan (3)	Golden Harvest 7148LL	soybean	UTC	154.0 a	23.1 a	51.3 a	10.5 a	< 1 %	2	A, R
			Headline (12)	157.8 a	22.9 a	52.3 a	10.2 a		1	
Waupaca (3)	Pioneer 35F37	corn	UTC	168.5 a	35.4 a	51.8 a	N/A	N/A	N/A	N/A
			Headline (6)	171.2 a	33.0 a	52.3 a	N/A	N/A	N/A	N/A

<sup>a</sup> For each location, means within a column followed by the same letter are not significantly different (P=0.10), Duncan's Multiple Range Test or direct estimate of difference (contrast) for the Green Lake field trials due to unbalanced replication.

- signifies data not taken at time of harvest

N/A=data not available at this time,

A=anthracnose, ES=eyespot, NCLB=northern corn leaf blight, NCLS=northern corn leaf spot, R=rust

season stalk rots, and 2008 having initial concern about a common rust epidemic. Therefore, a combined analysis was conducted for the on-farm strip plot data. A summary of means and standard deviations for yield in 2007 and 2008 are presented in Table 2, but note that means and analyses discussed will be based on the statistical model in subsequent questions. The hypothesis that was tested was that there would be no difference in yield, grain moisture, or stalk lodging, with the application of a foliar fungicide. The level of significance was set to 0.10 for all analyses.

**Yield:** The analysis indicated that there was no evidence that the mean yields were different from one another in 2007 and 2008 ( $P = 0.1058$ ). Yields were estimated based on the statistical model and were 183.8 (Headline), 184.5 (Quilt), and 180.4 (Untreated check). While there is a trend for higher yields when Headline and Quilt were applied, compared with the untreated check, the difference in these yields (3.4 and 4.1 bushels, respectively) may not justify the application of a foliar fungicide economically. For example, if we take the current estimated price for the application of a foliar fungicide (and including the application cost) in the \$25-30/acre range, this would require corn prices to be from \$6 to \$9 just to breakeven.

**Moisture:** To date, there is no evidence from the on-farm strip trials that grain moisture is increased when the application of a foliar fungicide ( $P = 0.5203$ ). Grain moisture, averaged across years, has ranged from 20.9% to 21.2%.

**Lodging:** Based on our combined analyses, there is evidence of reduced stalk lodging with application of a foliar fungicide ( $P = 0.0041$ ). Estimated percentage lodged plants (out of sample sizes of 30 per plot) were 19.8% (Headline), 20.7 (Quilt), and 29.4% (Untreated check). Further work is needed to quantify the economics of improved efficiency in terms of harvest time and missed plants.

**Sources of Variation:** Our analyses identified that that two primary sources of variation were at the farm scale and also the replication within the farm scale. Of those two sources of variation, the farm was the highest source of variation. Therefore, we continue to work on incorporating information about differences in hybrids, soil types, and other overall farm management practices to further quantify if and how they affect yield response with the application of a foliar fungicide.

Table 2. Mean yield and standard deviation of yield for on-farm strip plot fungicide trials conducted in 2007 and 2008 in Wisconsin. The number of observations varies because not all treatments were used in all trials.

Year	Treatment	Total number of observations	Mean yield (bu/acre)	Standard deviation of yield
2007	Headline	10	188.1	27.7
	Quilt*	17	172.5	18.6
	Untreated	19	176.4	29.5
2008	Headline	25	181.9	25.0
	Untreated	25	179.2	25.8

\* Quilt was used only in the 2007 on-farm strip trials.

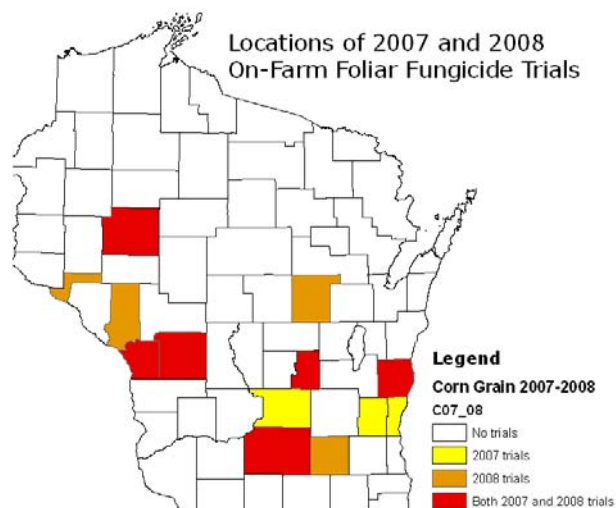


Figure 1. Locations of the on-farm foliar fungicide trials (includes both small plot and strip) in 2007 and 2008 in Wisconsin.

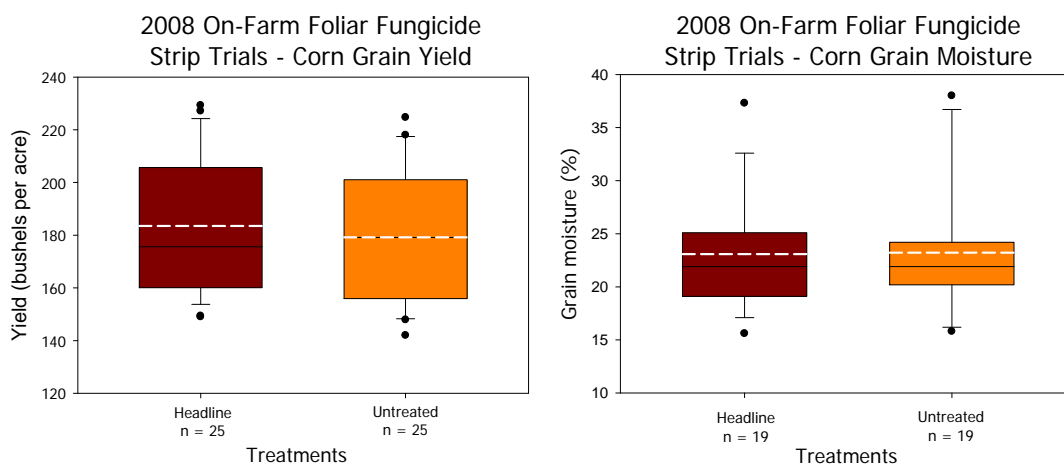


Figure 2. Boxplots of corn grain yield (bushels/acre) and corn grain moisture (%) for the 2008 on-farm large strip trials. The “n” under each treatment indicates the number of observations used to make the boxplot. The dashed white line represents mean values.