Effectiveness of Foliar Fungicides by Timing on Gray Leaf Spot on Hybrid Corn

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Introduction

Foliar fungicides remain an input on hybrid corn that many farmers consider. New fungicides for use on corn are registered annually. The goal of this project is to provide data to help farmers determine the need for foliar fungicides in their production. The objectives of this project were to 1) assess the effect of timing of application of fungicides on disease, 2) evaluate the yield response of hybrid corn to foliar fungicide application, 3) discern differences, if any, between fungicide products, and 4) detect and observe fungicide and application timing performance for tar spot disease control, if detected.

Materials and Methods

The corn hybrid Pioneer P0157AMXT, with a resistance rating of 4 for grey leaf spot (GLS) (1-9 scale, 9 = outstanding), was planted following soybean in a minimum tillage system May 15, 2019. A randomized complete block design with six replications was used. Each plot was four rows wide (30-in. row spacing) by 73 ft long. All plots were bordered by two rows on either side. Fungicides were applied at either V12 (June 12), R1 (July 31), R3 (August 15), or R5.5 (September 5), determined by Tarspotter app for conditions conducive for tar spot fungus to occur (Table 1). A CO^2 pressurized 10-ft hand boom was used to spray the plots, fitted with Tee Jet flat fan sprayer nozzles (XR11003VS), spaced 20 in. apart and delivering 20 gallons/acre at 24 psi. On September 4 (1/2 milk line), disease severity on the ear leaf and one leaf above ear leaf of each plot were assessed and only ear leaf disease data is presented. Disease severity was assessed on a plot basis as an estimate of percent leaf area diseased. On October 29, all four 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. All data were subjected to analysis of variance and means were compared at the 0.1 significance level using Fisher's protected least significant difference (LSD) test.

Results and Discussion

The most prevalent disease observed in the trial was gray leaf spot, with some northern corn leaf blight observed later in the upper canopy. Common rust, southern rust, and bacterial leaf streak also were found but at very low levels. Gray leaf spot severity was low, and untreated check disease severity on ear leaves progressed 0.06 percent, 2.22 percent, and 6.0 percent June 30, August 19 and September 4, respectively. No tar spot was observed on this trial through September 4. On September 4, tar spot was observed in other fungicide trials on the farm. Some late season tar spot was observed after mid-September. Disease severity was significantly reduced by applications at V12 and R1. Applications of fungicide at V12 were more effective at reducing disease than applications at R1, R3, or R5.5, however, that did not always translate into higher grain yields depending on fungicide product tested. Fungicide treatments applied at R5.5 did not reduce disease severity, and disease severity of R3 fungicide applications generally were three times higher than treatments applied at R1. In general, yields did not correlate with treatments that reduced disease the most due to low disease pressure.

Table 1. Effect of fungicide and timing of fungicide applications on foliar disea se severity and yield of corn at ISU Northeast Research Farm, Nashua, Iowa, in 2019.

Treatment, rate/ac, application timing[z]	Disease severity (%)[y]	Yield (bu/ac)[x]
Non-treated control	6.0 bc	221.3 cde
Trivapro, 13.7 fl oz, V12	0.4 fgh	227.4 a-d
Miravis Neo, 13.7 fl oz, V12	0.3 gh	228.4 a-d
Veltyma, 8 fl oz, V12	0.1 h	223.1 cd
Lucento, 5 fl oz, V12	0.4 gh	222.1 cd
Topguard EQ, 5 fl oz, R1	1.2 e-h	227.0 a-d
Lucento, 5 fl. oz, R1	2.0 e	220.1 de
Trivapro, 13.7 fl oz, R1	1.4 e-h	225.9 bcd
Miravis Neo, 13.7 fl oz, R1	1.6 efg	226.0 a-d
USF 0411, 8 fl oz, R1	1.8 ef	234.5 a
Veltyma, 8 fl oz, R1	1.6 efg	231.8 ab
Quilt Xcel, 10.5 fl oz, R1	1.1 e-h	226.4 a-d
Headline AMP, 10 fl oz, R1	1.3 e-h	227.4 a-d
Miravis Neo, 13.7 fl oz, R3	5.3 c	229.0 abc
Quilt Xcel, 10.5 fl oz, R3	3.9 d	222.2 cd
Veltyma, 8 fl oz, R3	3.7 d	231.9 ab
Trivapro, 13.7 fl oz, R5.5 - Tarspotter app.	5.9 bc	219.9 de
Miravis Neo, 13.7 fl oz, R5.5 - Tarspotter app.	9.1 a	223.1 cd
P-value	<0.01	0.0483

[z]V12 = 12-leaf stage; R1 = silking; R3 = milk stage; R5.5 = 1/2 milkline and date that a high risk of tarspot was likely to occur based on the Tarspotter App, which looks at GPS coordinates, temperature, and relative humidity to predict tar spot fungus development and location.

[y]Percent canopy diseased at 1/2 milk line (September 4). Gray leaf spot was the most prevalent disease. Some Northern corn leaf blight also was present at lower levels.

[x]Corrected to 15.0% moisture content.

[w]Means followed by same letter do not significantly differ (P = 0.1, LSD).