Fungicidal Control of Leaf Diseases in High-Oil Hybrid Corn, 2000

Gary Munkvold, associate professor
Charlie Martinson, associate professor
John Shriver, research associate
Department of Plant Pathology

Introduction

Gray leaf spot, caused by the fungus *Cercospora zeae-maydis*, has developed since 1982 into one of the most important corn leaf diseases in Iowa. It is most common and severe in the southern half of the state. The pathogen survives well in corn residue on the soil surface. Because of the continuing and justifiable popularity of conservation tillage, it seems likely that this disease will be a chronic problem, and fungicides may be needed for its control. In 2000, we conducted a trial at the Southeast Research Farm (SERF) to evaluate fungicidal control of gray leaf spot on high-oil hybrids, which are more likely than standard hybrids to demonstrate an economical return from a fungicide application due to the higher value of the crop.

Materials and Methods

The experiment was located in Field 8 at the SERF. The previous crop was corn. Two hybrids were planted on 3 May 2000 in a split-plot design. The hybrids were Wyffels 7010 (a 111-day high-oil hybrid) and 7115 (a 112-day high-oil hybrid with some tolerance to gray leaf spot). Plot sizes were 4 rows (30 in. spacing) by 50 ft. There were four replicate blocks. The first fungicide application was made when both hybrids were near growth stage V-9 (6/28). The second fungicide application was made when both hybrids were near growth stage VT (7/12).

All fungicides were applied with a Hagie high-clearance sprayer with three TXVS-4 nozzles per row; one was directed over the row and two were on 24 in. drops between the rows. The sprayer traveled at 2.5 mph, and the nozzles delivered 15 gal/acre at 50 psi. The fungicides tested were propiconazole (Tilt®, Novartis, Inc), azoxystrobin (Quadris 2.08 Flowable®, Zeneca Ag. Products), and trifloxystrobin/ propiconazole (Stratego 250 EC® Novartis, Inc). Treatment details are described in Table 1.

Disease ratings (% of ear leaf and 1-9 whole-plot scale) were taken on 8/10 (stage R4). Three of the four rows of each plot were harvested on 9/27. Yields were corrected to 15.5% moisture. Grain samples were submitted to the ISU Grain Quality Testing Lab, where oil, protein, and starch content were measured by NIR analysis. Analysis of variance was conducted separately for each hybrid and mean separation was conducted by the Student-Newman-Keuls Test ($\alpha = 0.05$).

Results and Discussion

Disease levels on 8/10 were low, but significant differences were found for both hybrids (Table 1). The predominant disease was common rust with some gray leaf spot. The Quadris treatments applied at V-9 tended to have the lowest disease severity, but there was little difference among the fungicide treatments. Several of the treatments were not significantly different from the nonsprayed control. In early September, severe lodging occurred in some of the plots.

Our disease ratings of 8/10 did not reflect much disease pressure, but the fungicides still affected yield (Table 2), probably by retarding late season disease that we did not observe on 8/10. Yields were significantly different among treatments and hybrids. Hybrid 7010 had a greater response to fungicide application than 7115. Quadris applied at the high rate at V-9 had the highest yields in hybrid 7010, but for 7115, the highest yield occurred where Quadris was applied at the medium rate at VT. However, the fungicide applications did not significantly affect yield on hybrid 7115.

Fungicide treatment did not have significant effects on oil or starch content. Oil ranged from 5.7% to 6.2% for hybrid 7010, and from 5.9 to 6.5% for hybrid 7115. Starch ranged from 69.7% to 70.4% and from 68.4% to 69.4% for the two hybrids, respectively. Protein content was significantly affected in both hybrids, but it did not seem to be related to disease control or yield (Table 2). The highest protein content for hybrid 7115 was in the control; for 7010 the highest protein was in two of the Quadris treatments.

Acknowledgments

We would like to thank Kevin Van Dee and Matt Hunt for their valuable assistance with the fieldwork, and we thank Wyffels Hybrids for providing the seed used in the study.

Table 1. Disease severity on August 10.

Treatment	Rate (fl oz/acre)	Timing	Disease (% ear leaf) 7010	Disease (% ear leaf) 7115	Disease (1-9 scale) 7010	Disease (1-9 scale) 7115
Untreated			2.9 a	2.7 a	3.25 ns	3.50 a
Quadris	6.1	V-9	1.8 b	1.4 cd	2.75	2.25 bc
Quadris	9.3	V-9	1.6 b	1.3 cd	2.50	2.00 c
Quadris	12.3	V-9	1.7 b	1.2 d	2.75	2.00 c
Tilt	4.0	V-9	2.9 a	2.5 ab	3.75	3.75 a
Stratego	10.0	V-9	2.0 b	1.9 bc	3.00	3.00 ab
Quadris	6.1	VT	1.9 b	2.0 ab	3.00	3.00 ab
Quadris	9.3	VT	1.6 b	2.2 ab	2.50	3.25 a
Quadris	12.3	VT	1.9 b	2.1 ab	3.00	3.25 a
Tilt	4.0	VT	1.6 b	2.2 ab	2.75	3.00 ab
Stratego	10.0	VT	2.2 ab	2.4 ab	3.00	3.50 a
Tilt + Quadris	2.0 + 6.1	VT	1.8 b	2.3 ab	2.50	3.50 a

Table 2. Yield and protein content.

Treatment	Rate (fl oz/acre)	Timing	Protein (% dry basis) 7010	Protein (% dry basis) 7115	Yield (bu/A) 7010	Yield (bu/A) 7115
Untreated			8.5 de	9.7 a	128.7 b	142.0 ns
Quadris	6.1	V-9	8.8 abcd	9.3 c	130.9 ab	151.5
Quadris	9.3	V-9	8.9 abc	9.4 bc	135.6 ab	151.7
Quadris	12.3	V-9	9.0 a	9.5 abc	145.1 a	149.4
Tilt	4.0	V-9	8.9 abc	9.3 c	136.7 ab	143.1
Stratego	10.0	V-9	9.0 ab	9.3 c	136.8 ab	148.3
Quadris	6.1	VT	9.0 a	9.3 c	140.1 ab	150.4
Quadris	9.3	VT	8.7 bcd	9.5 abc	132.2 ab	153.6
Quadris	12.3	VT	8.3 e	9.6 ab	139.5 ab	150.6
Tilt	4.0	VT	8.6 cd	9.6 a	134.1 ab	143.4
Stratego	10.0	VT	8.5 de	9.6 a	127.9 b	145.6
Tilt + Quadris	2.0 + 6.1	VT	8.7 abcd	9.5 abc	139.2 ab	149.3