

Effectiveness of Foliar Fungicides on Hybrid Corn in Iowa

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Introduction

This project was designed to study 1) the effect of foliar fungicide application on gray leaf spot and common rust disease development on hybrid corn and 2) the yield response of hybrid corn to foliar fungicide application.

Materials and Methods

Nine fungicide treatments were applied to two hybrids, Dekalb DKC61-66 RR2, with good resistance to gray leaf spot (GLS) and common rust, and Dekalb DKC60-18 RR2, which is susceptible to GLS but has very good rust resistance. The experimental design was a randomized split plot design. Hybrid served as the main plot factor, and fungicide treatments as subplot factors. Each main plot was 4 rows wide (30-in. row spacing) by 385 ft long; sub plots were 35 ft long by 4, 30-in. spaced corn rows. Corn was planted with an Almaco 4-row planter calibrated to plant @ 35,000 seeds/acre in a corn following corn tilled field on May 1. Fungicides were applied with a modified Hagie high clearance sprayer at either tasseling (VT) July 17 or at VT and two weeks later at blister (R2). Spray solutions were applied in a volume of 20 gallons/acre with Tee Jet hollow cone spray nozzle TXVS-3 at 50 psi. Foliar disease assessments of GLS and common rust were done at VT and every two weeks thereafter for a total of four assessments. Disease severity was assessed as the number of lesions on the ear leaf

of five plants, except for the final assessment date when GLS severity was assessed as the % ear leaf diseased. At R6, stalk rot incidence was assessed by pinching the stalks of 10 plants. The inner two rows of each plot were harvested with a John Deere 4400 on October 12.

Results and Discussion

Common rust and GLS disease severity at this site was low; however, differences in the susceptibility of hybrids to GLS could be discerned. Lesions of common rust were first observed on the ear leaf at VT (mid-July). Gray leaf spot was not observed on the ear leaf until mid-August. The number of lesions of both diseases on the ear leaf increased as the season progressed. All fungicide treatments reduced foliar disease severity on both hybrids. Stalk rot incidence was lower in some treatments but the treatments were not consistent between hybrids. The yield response on DKC61-66 RR2 (Table 1) and DKC60-18 RR2 (Table 2) ranged from -9.2 bushels/acre to 16.8 bushels/acre and -7 bushels/acre to 10.1 bushels/acre, respectively. No statistical differences or trends were observed in the yield response due to one application of fungicide versus the yield response due to two applications of fungicide. No phytotoxicity was observed in any treatment.

Studies on the efficacy of foliar fungicides for GLS management, and yield response are expected to continue in 2008.

Acknowledgements

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Table 1. Hybrid DKC61-66 RR2.

Treatment, rate/acre, surfactant ^z , timing	Common rust ^y				Gray leaf spot ^x				Stalk rot ^w	Yield ^v
	Jul 17	Jul 31	Aug 14	Aug 28	Jul 17	Jul 31	Aug 14	Aug 28		
Untreated	1.3 ab ^u	5.3 a	12.0 a	20.3 a	0.0 a	0.0 a	2.5 a	20.5 a	58 a	234.2 a
Quilt, 14 fl oz, NIS, VT.	0.3 b	1.0 b	4.0 b	4.0 b	0.0 a	0.0 a	0.5 b	3.3 b	35 b	239.3 a
Quilt, 14 fl oz, NIS, VT, R3	1.3 ab	1.0 b	3.0 b	6.3 b	0.0 a	0.0 a	0.3 b	0.0 b	53 a	238.0 a
Quadris, 9.2 fl oz, COC, VT	2.0 a	1.5 b	4.8 b	8.8 b	0.0 a	0.0 a	0.8 b	3.5 b	50 a	250.8 b
Quadris, 9.2 fl oz, COC, VT + Tilt, 4 fl. Oz., NIS, R3	0.3 b	0.8 b	2.0 b	3.8 b	0.0 a	0.0 a	0.3 b	0.5 b	25 b	225.0 c
Quadris, 9.2 fl oz, COC, VT+ R3	0.5 ab	1.0 b	1.3 b	2.0 b	0.0 a	0.3 a	2.0 a	0.5 b	28 b	251.0 b
Headline, 6 fl oz, COC, VT	2.0 a	5.0 a	12.5 a	5.5 b	0.0 a	0.0 a	0.0 b	3.5 b	45 a	234.8 a
Headline, 6 fl oz, COC, VT + R3	0.3 b	0.3 b	3.3 b	4.0 b	0.0 a	0.0 a	0.5 b	1.0 b	35 ab	248.0 b
Stratego, 10 fl oz, NIS, VT	1.0 ab	1.8 b	5.8 b	9.3 b	0.0 a	0.0 a	0.8 b	1.0 b	55 a	241.9 a
Stratego, 10 fl oz, NIS, VT+ R3	1.0 ab	1.0 b	5.8 b	4.5 b	0.0 a	0.0 a	1.3 b	0.0 b	40 a	241.0 a
Quilt + Warrior, 14 fl oz, NIS, VT	0.8 ab	2.3	3.0	3.8	0.0 a	0.3	0.3 b	1.8 b	53 a	236.0 a

^zSurfactant “NIS” non ionic surfactant 0.25% v/v. Surfactant “COC” crop oil concentrate 1.0% v/v.

^yMean number of pustules (five ear leaves were assessed in each plot ; N=20/treatment).

^xMean number of lesions (five ear leaves were assessed in each plot ; N=20/treatment).

^wMean incidence (%) of stalk rot (10 plants in each plot were assessed using the “pinch test”; N=40/treatment).

^vBushels/acre @ 15.5% moisture.

^uColumn numbers followed by the same letter are not statistically different at P=0.05 as determined by Tukey’s multiple range test.

Table 2. Hybrid DKC60-18 RR2.

Treatment, fl oz/acre, surfactant ^z , timing	Common rust ^y				Gray leaf spot ^x				Stalk rot ^w	Yield ^d
	Jul 17	Jul 31	Aug 14	Aug 28	Jul 17	Jul 31	Aug 14	Aug 28		
Untreated	0.8 b ^u	2.8 a	12.8 a	6.5 a	0.3 a	0.5 a	41.3 a	172.5 a	60 a	227.9 a
Quilt, 14 fl oz, NIS, VT3	1.0 b	1.5 b	2.3 b	2.8 b	0.0 a	0.3 a	3.8 b	82.3 b	58 a	238.1 a
Quilt, 14 fl oz, NIS, VT, R.	0.3 b	0.0 b	1.5 b	5.0 a	0.3 a	0.3 a	1.8 b	8.8 c	35 b	231.3 a
Quadris, 9.2 fl oz, COC, VT	0.5 b	0.5 b	3.8 b	1.0 b	0.3 a	0.5 a	1.3 b	72.3 b	68 a	220.9 b
Quadris, 9.2 fl oz, COC, VT + Tilt, 4 fl. Oz., NIS, R3	2.0 a	1.3 b	3.8 b	2.5 b	0.0 a	0.3 a	0.3 b	16.5 c	63 a	221.5 b
Quadris, 9.2 fl oz, COC, VT+ R3	0.3 b	1.0 b	2.0 b	1.0 b	0.3 a	0.3 a	0.5 b	11.5 c	38 b	235.7 a
Headline, 6 fl oz, COC, VT	0.0 b	1.3 b	3.8 b	1.8 b	0.0 a	2.3 b	0.8 b	26.5 c	60 a	225.7 b
Headline, 6 fl oz, COC, VT + R3	0.5 b	1.3 b	1.3 b	1.3 b	0.0 a	0.8 a	0.8 b	2.5 d	43 bc	235.9 a
Stratego, 10 fl oz, NIS, VT	1.0 b	1.3 b	3.5 b	12.0 c	0.3 a	0.5 a	1.8 b	54.0 b	88 a	232.4 a
Stratego, 10 fl oz, NIS, VT+ R3	0.8 b	2.0 a	1.8 b	5.3 b	0.0 a	0.0 a	0.8 b	2.0 d	58 a	232.9 a
Quilt + Warrior, 14 fl oz, NIS, VT	1.3 b	1.0 b	3.5 b	6.0 b	0.0 a	0.5 a	1.3 b	21.3 c	48 bc	223.1 b

^zSurfactant “NIS” non ionic surfactant 0.25% v/v. Surfactant “COC” crop oil concentrate 1.0% v/v.

^yMean number of pustules (five ear leaves were assessed in each plot ; N=20/treatment).

^xMean number of lesions (five ear leaves were assessed in each plot ; N=20/treatment).

^wMean incidence (%) of stalk rot (10 plants in each plot were assessed using the “pinch test”; N=40/treatment).

^dBushels/acre @ 15.5% moisture.

^uColumn numbers followed by the same letter are not statistically different at P = 0.05 as determined by Tukey’s multiple range test.