Project Report for 2008
Wheat and Feed Grain Committee

Title: Efficacy of fungicide for the control of southern rust and other diseases of corn.

Principal Investigators: A. K. Hagan, L. Kykendall, and B. Dillard.

Objective: Evaluate the efficacy and economics of registered fungicides for the control of diseases on susceptible and resistant corn lines.

Production Methods for Small Plot Fungicide Trials

Brewton Agricultural Research Unit (BARU): Before planting, the study site, that was cropped to corn the previous two years was turned with a moldboard plot and the Benndale sandy loam soil (<1% organic matter) was worked to seed bed condition with a disk harrow. The experimental design was a split plot design with corn variety as the whole plot and a fungicide treatment as the split plot treatment. Individual fungicide split plots, which consisted of four 30 foot rows on 36 inch centers, were replicated four times. The corn varieties Pioneer 33M53 and Pioneer 31V16 were planted on March 28. A pre-emergent application of Dual Magnum II at 1.3 pt/A on 28 March was followed by a post-plant application of Atrazine at 2 qt/A on 20 May. A broadcast application of 176 lb per acre of ammonium nitrate (34-0-0) on 18 April was followed by a second application of the same fertilizer at 176 pounds per acre on 9 May. The study area was not irrigated. Fungicide treatments were applied on June 10 and June 24 with a high-boy sprayer in 10 gallons of spray volume per acre. Southern rust ratings on the ear leaf were recorded on July 9 on a scale of 0 to 10 where 0 = no disease, 1 = 1 to 10%, 2 = 11 to 20%, 3 = 21 to 30%, 4 = 31 to 40%, etc of leaf area diseased. Plots were combined on August 29 and yields are reported at 15.5% moisture. Significance of treatment effects were tested by analysis of variance and Fisher's protected least significant difference (LSD) test ($P \leq 0.05$). Since the corn cultivar x interaction was not significant, data presented in table for each variable was averaged across corn variety.

Gulf Coast Research and Extension Center (GCREC): The test site, which was cropped to corn the previous three years, was prepared for planting with a moldboard plow and disk harrow. On March 13, 211 lb/A of 11-19-19 fertilizer with 10 lb/A sulfur, 3 lb/A zinc, and 0.5 lb/A boron was broadcast and incorporated with a disk harrow. On March 17, the corn varieties 'Pioneer 33M53' and 'Pioneer 31G97' were sown at a rate of approximately 24,000 seed/A in a Malbis fine sandy loam (OM<1%) with 7 lb/A of Counter 15G insecticide in-furrow. An at-plant broadcast application of Roundup Weathermax at 22 fl oz/A + Prowl H_20 at 1.5 pt/A on March 17 was followed by a post-direct application of 22 fl oz/A of Roundup Weathermax plus 2 qt/A of Atrazine on April 25. On June 22, 400 lb/A of ammonium nitrate was broadcast. This test was not irrigated. The experimental design was a split plot with corn variety as the whole plot and fungicide treatments as the split-plot. Individual split plots consisted of eight 30-ft rows on 3.2 ft centers in four replications. While the center four rows were treated with a fungicide, the two outer rows on either site of the treated four-row block remained untreated. An untreated plot was also included. Fungicide treatments were broadcast with a 'high-boy' sprayer in 15 gal/A of spray volume on June 4 at growth stage R4 and on June 25. Northern corn leaf blight (NCLB) ratings on the ear leaf were recorded on June 25 on a scale of 0 to 10 where 0 = no disease, 1 = 1 to 10%, 2 = 11 to 20%, 3 = 21 to 30%, 4 = 31 to 40%, etc of leaf area diseased on 10 leaves in each plot. Plots were harvested on 20 Aug. Yields are reported at 15.5% moisture. Significance of treatment effects were tested by analysis of variance and Fisher's protected least significant difference (LSD) test ($P \leq 0.05$). Since the corn cultivar x interaction was not significant, data presented in table for each variable was averaged across corn variety.

Sand Mountain Research and Extension Center (SMREC): A small plot corn fungicide trial that was established at SMREC was abandoned due to severe drought.

Results

BARU: Dry weather at the time of silking and pollination reduced corn yield. While southern rust came in late and pressure was low, rust ratings for the non-treated control were higher compared with all of the fungicide-treated corn (Table 1). Yield for the non-treated control and each of the fungicide treatments did not significantly differ. However, Tilt 3.6E-treated corn yielded less than the Quilt and Stratego-treated corn. Average yield of Pioneer 33M53 was higher compared with Pioneer 31V16 (data not shown).

Table 1. Impact of fungicides on southern rust control and yield response of corn at BARU in 2008.

Fungicide and rate/A	Rust rating*	Yield bu/A
Tilt 3.6E 4 fl oz ……	0.0 b	75.6 b
Quilt 10.5 fl oz …….	0.0 b	87.1 a
Headline 2.09E 9 fl oz …….....	0.0 b	80.1 ab
Stratego 10 fl oz ……...	0.0 b	87.4 a
Untreated Control ……	0.2 a	82.5 ab

*Southern rust severity was rated on the ear leaf of 10 plants in each plot on a 0 to 10 scale.
**Means separation was according to Fisher's protected least significant difference (LSD) test (P=0.05).

GCREC: Despite three years in continuous corn as well as average to above average rainfall during the study period, only a low level of northern corn leaf blight was observed on both corn varieties. When compared with the untreated control, a significant yield gain was obtained only with Headline 2.09E. Yield response among the fungicide treatments did not significantly differ. Yield was significantly higher for Pioneer 33M53 compared with Pioneer 31G97 (data not shown).

Fungicide and rate/A	NCLB rating*	Yield bu/A
Tilt 3.6E 4 fl oz ……	0.1	144.2 ab
Quilt 10.5 fl oz …….	0.0	146.3 ab
Headline 2.09E 9 fl oz …….....	0.1	147.8 a
Stratego 10 fl oz ……...	0.0	142.6 ab
Untreated Control ……	0.1	140.5 b

*Northern corn leaf blight was rated on the ear leaf of 10 plants in each plot on a 0 to 10 scale.
**Means separation was according to Fisher's protected least significant difference (LSD) test (P=0.05).

On-Farm Corn Fungicide Demonstration – L. Kykendall and J. Clary

A corn fungicide demonstration was located in an irrigated field on the Segrest Farm in Macon Co. that has previously been cropped to corn. The experimental design was a randomized complete block with three replications. The corn variety Pioneer 31G97 was planted on April 18. The field was oversprayed with Headline 2.09EC at 6 fl oz/A at early silk on June 26. On July 10, Quilt at 10 fl oz/A was applied to strips laid out across the field. The study area was irrigated as needed and was combined on September 11. Average yield for the Headline 2.09EC + Quilt treated corn was 213 bu/A compared with 214.3 for the corn treated with Headline 2.09EC alone at silking. Test weights for the Headline 2.09E-treated and the Headline 2.09EC/Quilt-treated corn was the same.

Summary: Disease pressure in all 2008 fungicide screening trials was minimal due to relatively dry June weather patterns. Appreciable Southern rust damage was seen in later planted corn in 2008. Despite a lack of disease pressure, a significant yield increase at GCREC was obtained with Headline 2.09EC compared with the non-treated control. Fungicide treatments did not impact corn yields in the drought-damaged BARU study. Due to the study design, the yield response due to fungicide inputs could not be determined because a non-treated control was not included. Overall, fungicide use should be limited to irrigated situations where the corn yield potential is in excess of 150 bu/A or when corn planting is delayed into April or later during the production year.