

2007 Project Report
Wheat and Feed Grain Committee

Project Title: Impact of tillage and row spacing on the incidence of diseases of corn.

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Objective: 1) Compare the incidence of foliar diseases on corn in a conventional and conservation tillage system; 2) Determine row spacing influences on disease severity on conventional and conservation till corn production systems.

Materials and Methods: The site selected for this trial had been planted to corn for the previous three years. A rye cover crop was killed with Roundup Weathermax at 22 fl oz/A on February 15. On March 5, 206 lb/A of 9-19-19 analysis fertilizer with 10 lb/A sulfur + 3 lb/A zinc was broadcast. In the conservation tillage plots, rows were laid out using a KMC subsoiler + coulter + rolling basket rig, while the conventional tillage plots were turned with a moldboard plow and then worked to seed bed condition with a disk harrow. The corn hybrids DKC 69-72, Pioneer 31N26, and Pioneer 33M53 were planted on single 30-inch rows or on twin rows 7 inches apart on 30 inch centers. Plots were sown on April 3 with 7 lb/A of Counter insecticide placed in-furrow. The experimental design was a split-split plot with tillage as whole plots, corn varieties as the split-plot, and row spacing as the split-split plot. Individual split-split plots consisted of four 30-foot rows. Dual Magnum at 1.5 pt/A + 2 qt/A of Atrazine + 2 qt/A of Gramoxone was broadcast at-plant. An additional 382 lb/A of ammonium nitrate + ammonium sulfate (130 lb actual N/A) was broadcast on April 28. Southern rust and eyespot ratings on the ear leaf were recorded on 18 Jul 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 harvested with a combine on August 30. 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=0.05).

Weather Patterns: Rainfall totals were well below the 30-yr average in Mar and May but near normal to normal for Apr, Jun, Jul, and Aug. Afternoon temperatures were also above average for June and July. The combination of dry weather and high afternoon temperatures helped suppress the activity of fungal plant pathogens of corn into July. Wetter early summer weather patterns and a later planting date resulted in the rapid onset of southern rust in July.

Results: When data was pooled across corn varieties, row spacing did not influence the severity of southern rust and eyespot (Table 1). While overall eyespot levels were relatively low, severity of this disease was higher in the conservation than conventionally tilled corn. In contrast, tillage practices had no affect on the severity of southern rust. Yield for the conservation and conventionally tilled corn was similar as were single and twin row corn yields.

Table 1. Impact of tillage and row spacing on the average yield of three corn varieties in 2007.

Input	Corn disease rating*		Yield bu/A
	Southern rust	Eyespot	
Tillage			
Conventional	1.3	0.6	123.5
Conservation	1.4	1.1	118.9
Row Spacing			
Single (30 inch)	1.3	0.8	122.2
Twin	1.4	0.9	120.0

*Southern rust and eyespot on the ear leaf was rated on a 0 to 10 scale.

Overall, southern rust ratings for the three corn varieties were very similar (Table 2). Eyespot damage was heavier on Pioneer 31N26 and DKC 69-72 compared with Pioneer 33M53. While the yield of the three corn varieties did not significantly differ, the average yield for Pioneer 33M53 was higher by about 6 bu/A.

For Pioneer 33M53, row spacing and tillage had no noticeable impact on the severity of southern rust or eyespot as well as on the yield of this corn variety. With Pioneer 31N26 and DKC 69-72, southern rust ratings were similar regardless of the row spacing or tillage system. Eyespot incidence, however, was lower for both varieties when conventionally tilled. Yield response of Pioneer 31N26 was not influenced by tillage or row spacing. With DKC 69-72, a trend towards lower yields for this variety grown using conservation than conventional tillage practices was seen. Also, yields were higher for DKC 69-72 grown on single than twin row.

Table 2. Impact of tillage and row spacing on the yield of each corn hybrid, 2007.

Corn Hybrid	Corn disease rating		Yield bu/A
	Southern rust	Eyespot	
Pioneer 33M53	1.5	0.3	125.6
Tillage			
Conventional	1.4	0.2	126.9
Conservation	1.6	0.4	124.4
Row Spacing			
Single	1.5	0.2	126.7
Twin	1.5	0.4	124.5
Pioneer 31N26	1.2	1.2	118.0
Tillage			
Conventional	1.2	0.8	118.1
Conservation	1.1	1.5	118.1
Row Spacing			
Single	1.2	1.1	118.6
Twin	1.2	1.3	117.5
DKC 69-72	1.3	1.1	119.4
Tillage			
Conventional	1.2	0.7	121.1
Conservation	1.4	1.5	117.4
Row Spacing			
Single	1.3	1.0	125.4
Twin	1.4	1.2	114.2

*Southern rust and eyespot on the ear leaf was rated on a 0 to 10 scale.

Summary: Generally, tillage and row spacing had little influence on the occurrence of southern rust as well as on the yield response of two of three corn varieties. Eyespot ratings were higher on two of three corn varieties under conservation than conventional tillage. However, the low incidence of this disease probably limited its impact on corn yield. Overall, Pioneer 33M53 held a slight yield advantage over Pioneer 31N26 and DKC 69-72.