

## **HEAD SCAB IN TILLED AND NO-TILLED WHEAT**

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### **BACKGROUND:**

The severity of head scab disease was worse this year than it has been since 1991. Therefore, it gave us an opportunity to evaluate the effects of this disease in a side-by-side comparison of no-till and tilled wheat behind corn in a large acreage situation, a rare opportunity indeed.

Since head scab is a fusarium fungal organism that is common on decaying corn stalks, most plant pathologists and wheat experts in the U.S. feel that no-till wheat planted after corn would be a disaster when the conditions are right for the expression of the disease in wheat because of the large inoculum base. A few pathologists feel that this is not true because the spores are easily transported by the wind and there are enough corn stalks and other sources of fusarium available that both tilled and no-tilled wheat are about equally vulnerable when the conditions are right for infection. Previous results on small plots have indicated that the severity of the disease is not related to tillage. However, many have argued that since the data comes from small plots and the tillage treatments are close to each other, the data is not a true representation of what actually happens in the field.

### **RESEARCH APPROACH:**

Large on-farm trials had already been established for another experiment which evaluated tilled and no-tilled wheat side-by-side in large plots. The plots were approximately 20 acres and established on three farms in the fall of 2001. Each farm was a replication with treatments (till, no-till). The previous crops were tilled wheat

followed by no-till, double-cropped soybean in 2000 and no-till corn in 2001. The tilled and no-tilled wheat treatments were planted in 2001 following corn. The crops were planted and harvested by the farmer and data collected by researchers.

### **RESULTS AND DISCUSSION:**

The data indicates that head scab, during this susceptible year, is very similar in the two tillage treatments. There is a tendency for more fusarium in the head in no-tillage, but the differences are small and should have little effect on the economic welfare of the producer.

The data can be seen in the table below. The number of heads with scab are the same (Incidence). However, the heads with the scab disease have a slightly large percentage of the head infected in the no-till area (Severity). When the two factors are multiplied by each other to give an estimate of the percentage of seeds in the field infected (Field Severity), the results show slightly more of the seeds (about 1%) are infected by head scab. This is a small percentage for a favorable year.

The test weight supports the previous observation by showing little difference between the tillage treatments. The germination rate and the seeds with fusarium spores show that the severity of the disease is greater in the no-till conditions. It indicates that the seeds which were infected were probably more severely infected and a larger percentage of the seeds on each head had the fusarium disease.

**DATA SUMMARY:**

There were increased trends towards slightly lower yield and lower test weights in no-till.

Moderate head scab symptoms occurred on all farms in both treatments.

There was a trend towards slightly more severe head scab in no-till wheat; no significant difference in head scab incidence.

Elevated levels of head scab in seed harvested from no-till wheat significantly reduced seed germination (-10.5%).

**CONCLUSIONS:**

Slightly lower yield and test weight in no-till wheat was more than offset by reduced costs associated with producing no-till wheat.

There was a tendency towards slightly more severe head scab symptoms in no-till wheat, behind corn, but the differences compared with tilled wheat are not great.

Seed quality was significantly lower in no-till wheat (due to elevated infection of head scab), but overall seed quality was average to well below average, depending on location, regardless of tillage.

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<b>EFFECT OF TILLAGE ON THE INCIDENCE AND SEVERITY OF HEAD SCAB</b>							
<b>Field</b>	<b>Tillage</b>	<b>Incidence* (% of heads)</b>	<b>Severity* (% of head)</b>	<b>Field Severity* (% of seeds)</b>	<b>Test Wt**</b>	<b>Germin. Rate**</b>	<b>Seed with Fusarium**</b>
Chester	No-Till	21.5	35.3	7.64	56.7	41.5	77.6
	Tilled	22.3	33.5	8.11	57.0	50.5	77.0
Robertson	No-Till	20.5	45.9	9.45	55.6	62.0	48.0
	Tilled	18.5	33.2	6.18	57.4	68.5	34.0
Thompson	No-Till	13.5	20.4	2.76	61.5	41.5	63.0
	Tilled	17.5	15.9	2.79	60.9	50.5	41.0
Average	No-Till	18.5	33.9	6.6	57.9	48.3	62.7
	Tilled	19.4	27.5	5.7	58.4	56.5	50.7
*Incidence (% of head with visible head scab), Severity (Portion (%) of heads that were infected) and Field Severity (% of total seeds visibly infected) were all estimated for heads collected prior to harvest.							
**Test weight, Germination (quick estimate with crude method) and Seed with Fusarium (% of seeds show fusarium spores on seed) were all determined in laboratory from grab samples collected from the combine at harvest.							