

# KANSAS COOPERATIVE PLANT DISEASE SURVEY REPORT

## PRELIMINARY 2007 KANSAS WHEAT DISEASE LOSS ESTIMATES

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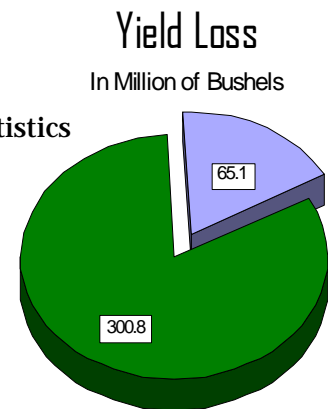
### **HIGHLIGHTS**

Cumulative disease losses for 2007 wheat crop were estimated at 17.8 per cent of the crop or 65.1 million bushels. This loss estimate compares to the 20 year average of 11.4 per cent loss and is the greatest cumulative loss since 1995 when foliar diseases and barley yellow dwarf virus were primarily responsible for a 20.4 per cent loss.

The KANSAS AGRICULTURAL STATISTICS SERVICE July 12 forecast of 300.8 million bushels represented an expected harvest of 9.4 million acres of wheat with an average yield of 32 bushels per acre. These estimates are similar to final 2006 statistics of 291.2 million bushels production and 32 bushels per acre. As compared to the June 1 estimate, the numbers represent a dramatic decline of 17 per cent. Significant factors contributing to this decline include poor harvest conditions from rains and flooding in the central and eastern regions of the state and disease pressure. Freeze injury in April was also an important factor in limiting this year's crop.

The most important disease to the 2007 crop was leaf rust which made up about 80 percent of the total disease loss estimate. A large per cent of the planted acreage was considered susceptible or intermediate in resistance to leaf rust and with favorable disease conditions the disease was epidemic statewide. Second in importance to the disease loss component was the *Septoria* leaf disease complex with an estimated disease loss of 1.8 per cent followed by tan spot at 1.3 per cent.

Figure 1. Yield Loss



Legend: Loss (light blue), Yield (green)

## DISEASES

**Leaf rust** was epidemic across Kansas in 2007. The disease was noted early in the state at scattered over wintering sites. Inoculum for the spring epidemic though originated primarily from southern production areas outside of Kansas. This southern source of inoculum appeared in the state at about the normal calendar date of mid April. What was different in 2007 was that much of the wheat in Kansas was delayed two to three weeks by the early April freeze that occurred over Easter weekend. The southern leaf rust inoculum infected the plant at an earlier than normal growth stage from boot to early heading. The rust fungus multiplied rapidly when wet conditions and moderate temperatures persisted. The result was an explosion of rust by early grain filling stages and the loss of much leaf tissue to the plant. Extreme western and northeast Kansas escaped some of the rust epidemic because of drier conditions.

Figure 2. Map showing areas of Kansas with rust disease pressure.

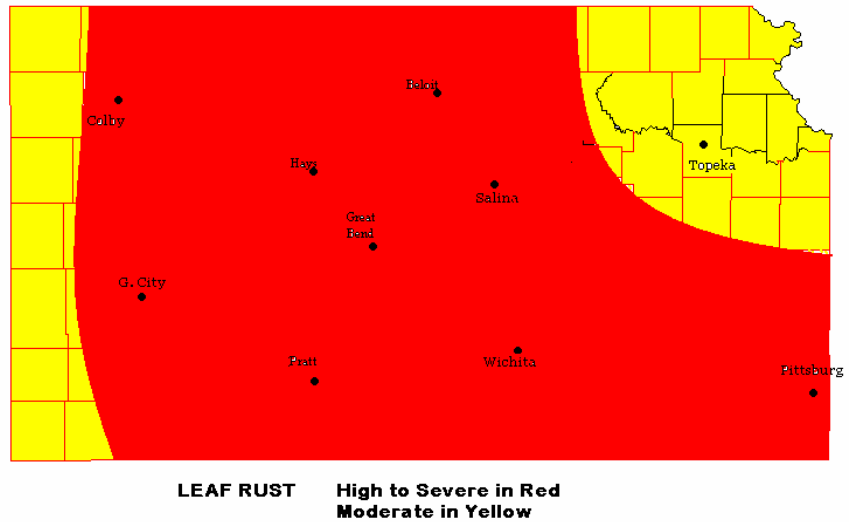


Figure 3. Leaf rust on May 17 in central Kansas, water stage.



In estimating the yield loss, a somewhat different approach was done this year because of significant fungicide use in some crop reporting districts. It was estimated based on area agronomists and extension agent discussions that in southwest Kansas that 2/3 of the acreage was treated while in neighboring districts about 1 in 10 acres were treated. The table below gives estimated losses from districts calculating the yield losses after fungicide treatment. Fungicide treatment was estimated to reduce the loss by 1/2 on the average.

Table 1. Loss from leaf rust with fungicide adjustments

	<b>% loss without fungicide</b>	<b>% acreage treated</b>	<b>Actual % loss with fungicide treated acreage</b>	<b>Lost bushels (1000)</b>
<b>NW</b>	17.6	10	16.7	-9443
<b>WC</b>	13.0	10	12.35	-7792
<b>SW</b>	16.0	67	10.72	-8717
<b>NC</b>	16.1	*	16.1	-8117
<b>C</b>	16.6	*	16.6	-5494
<b>SC</b>	16.9	15	15.6	-7116
<b>NE</b>	5.3	*	5.3	-341
<b>EC</b>	8.1	*	8.1	-458
<b>SE</b>	13.2	*	13.2	-928

\*Fungicides were applied but the acreage estimate was below 10% and not believed to be a significant factor for yield loss computation.

Varietal resistance to control leaf rust was not important to management of the disease. Less than 1.5 per cent of the acreage including all of central and western Kansas was planted to these resistant varieties. In western Kansas, about 80 per cent of the acreage was planted to susceptible rust varieties with the remaining in intermediate varieties. In central Kansas, acreage of intermediate and susceptible varieties were roughly equal. Overley, Jagalene, and Jagger were the three most common varieties planted in the fall of 2006. The lack of good resistance in varieties contributed significantly to the epidemic as leaf rust multiplied rapidly over million of acres.

Statewide, the total loss from leaf rust was estimated to be 13.9 per cent or roughly 50 million bushels. The percentage statistic of 13.9 was the highest for leaf rust or any disease component since 1976 when disease loss estimates were initiated.

***Septoria leaf disease*** complex was second in importance in the assessment of disease losses. It was reported statewide in occurrence. The disease was primarily associated with the central crop reporting districts and in southeast Kansas. The disease was common to about 1/3 of the fields in central Kansas. Speckled leaf blotch (c.a. *Septoria tritici*) like leaf rust was favored by the delay of the crop from the Easter freeze and a repeating precipitation pattern. High to severe levels (25 to 90 per cent leaf area) were reported in the early grain filling stages at some locations in these districts. Because overall 90 per cent plus of the varieties planted had fairly good resistance and intermediate tolerance, estimates were negated from potentially serious loss percentages. In south central and southeast Kansas disease loss exceeded 5 per cent of the crop.

A statewide loss estimate of 1.8 per cent was calculated or 5.4 million bushels in 2007. The estimate compares to the 20 year average loss of 1 per cent and the largest loss estimate since 1995 for the *Septoria* complex.

***Tan spot*** was third in ranking the diseases of importance to wheat production in 2007. North central Kansas had significant levels of disease. The disease associated with no or low till cropping systems was reported across the north central cropping district at milk stage. Loss in the north central district was estimated at 7.4 per cent followed by the northeastern district at 2.4 per cent. In other crop reporting districts because of the widespread leaf rust and speckled leaf blotch, estimates were much more difficult to determine. Field assessments found the different disease causing fungi competed for the leaf tissue and the tan spot ratings required some intuition to measure. Overall, the crop was estimated to have loss 1.3 per cent to this disease. The 2007 estimate was slightly higher than the 1 per cent 20 year average.

**Barley yellow dwarf, stripe rust, scab, and powdery mildew** make up the next rankings with estimates of 0.2 per cent. These four diseases were occasionally found at significant levels. They were not the dominate diseases this year as sometimes they have been in the past. Stripe rust was primarily in western Kansas while barley yellow dwarf and powdery mildew were reported more from central, south central, and southeastern crop reporting districts. Scab was noted in the southern third of the state from the Missouri border into south central Kansas. In comparison, powdery mildew and scab were near or the same as the long term averages while barley yellow dwarf and stripe rust were well below the long term respective average estimates.

In 2007, several diseases were not found to any extent. Wheat streak mosaic which was the dominate disease in 2006 was rarely reported during field assessments and in laboratory screenings. Take all and other root and crown rots were almost non existent. Soil borne mosaic was reported in a few situations in western Kansas. Common bunt received a couple of reports in north central Kansas and loose smut was reported infrequently during survey.

**Snow mold** in western Kansas was present this year following the long period of snow cover that some areas experienced. Some of the losses due to thinned stands from snow mold were overcome as healthy plants nearby compensated in growth for the missing plants.

**Table 2. Rankings for 2007 disease losses and comparisons**

<b>Disease</b>	<b>2006</b>	<b>2007</b>	<b>20 yr avg.</b>
1. Leaf rust	0.1	<b>13.9</b>	3.79
2. <i>Septoria</i> complex	0.001	<b>1.8</b>	0.97
3. Tan spot	0.2	<b>1.3</b>	0.96
4. Powdery mildew	0.1	<b>0.2</b>	0.22
5. Barley yellow dwarf	0.8	<b>0.2</b>	1.21
6. Scab	0.001	<b>0.2</b>	0.21
7. Stripe rust	0.001	<b>0.2</b>	1.31
8. Bunt and loose smut	0.05	<b>0.02</b>	0.01
9. Soil borne mosaic and Spindle streak complex	0.05	<b>0.01</b>	0.37
10. Wheat streak complex	7	<b>0.01</b>	1.94
11. Snow mold	0	<b>0.01</b>	0.00
12. Root and crown rots	0.1	<b>0.01</b>	0.13
13. Take all	0.1	<b>0.001</b>	0.24
14. Bacterial leaf blight	0.001	<b>0.001</b>	0.02
15. Stem rust	0	<b>0</b>	0.05
16. Strawbreaker	0	<b>0</b>	0.01
17. Ceph stripe	0	<b>0</b>	0.001
18. American wheat striate	0.001	<b>0</b>	0.001
<b>Total</b>	<b>8.5</b>	<b>17.8</b>	<b>11.43</b>

Estimates prepared by Kansas State University, Kansas Department of Agriculture and USDA-ARS personnel. Estimates are based on expert opinions, but are not statistically designed.

Estimates utilize a disease survey, variety resistance, variety acreages, crop district yield estimates, and loss functions or estimates for each disease. Information for variety acreages and crop district yield estimates were provided by the Kansas Agricultural Statistics.

Trace amounts are denoted by 0.001.

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