KANSAS COOPERATIVE PLANT DISEASE SURVEY REPORT

PRELIMINARY 2009 KANSAS WHEAT DISEASE LOSS ESTIMATES

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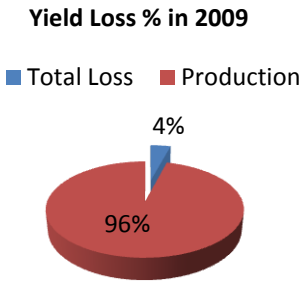
Jon A. Appel, Erick DeWolf, William W. Bockus, and Timothy Todd

Plant Pathologist, Plant Protection Program, Kansas Department of Agriculture, Topeka, 66619; Extension Specialist, Plant Pathology, Kansas State University, Manhattan 66506; Professor, Plant Pathology, Kansas State University, 66506; Instructor/nematologist, Plant Pathology, Kansas State University 66506.

This article was posted to the following website:
http://www.ksda.gov/includes/document_center/plant_protection/Plant%20Disease%20Reports/2009KSWheatDiseaseLossEstimates.pdf

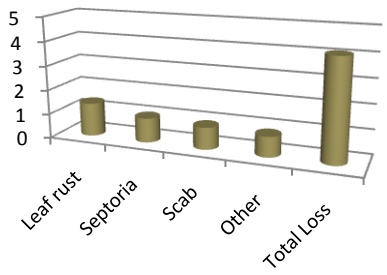
HIGHLIGHTS



The cumulative disease loss estimate for the 2009 wheat crop was 4.1 per cent or 15.4 million bushels. The 2009 estimate was the second smallest since 1976 when disease loss estimates began.

The KANSAS AGRICULTURAL STATISTICS SERVICE July forecast of 360.8 million bushels represented an expected harvest of 8.8 million acres of wheat with an average yield of 41 bushels per acre. This was an increase of 1 bushel per acre statewide from 2008 or 4.8 million bushels. The acreage harvested decreased in 2009 by 100,000 acres compared to 2008. The increase in statewide production was in spite of the reduction in harvested and planted acreage.

One factor that contributed to increased production in 2009 from 2008 was less disease pressure. This factor accounted for 15 million bushels or 3.6 per cent increase in yield. The 2009 estimate was the second year in a row that disease loss estimates were below the 20-year average.



Leaf rust remained the number one disease of importance to the Kansas wheat crop although the estimate was less than half the 20-year average. The *Septoria* complex was second in importance and near its 20-year average. Third was the head disease called scab that directly affects the developing heads. Scab was second last year in importance and was epidemic in southeast Kansas in 2009.

DISEASES

Leaf rust although well below disease levels normally associated with the spring growing season in Kansas, was the most important disease affecting wheat production. We commonly observed disease levels of moderate infection (about 10-25% leaf severity) in the southern tier counties of south central and southwest Kansas and north into some areas of central Kansas. We observed a few scattered fields with a high level of infection (greater than 25% leaf severity). Overley the leading variety of seeded acreage and susceptible to leaf rust had 30-40 % infection in some variety plots within the area described.

Average %Loss of all varieties	District
0.5	NW
0.8	WC
1.3	SW
0.5	NC
1.8	C
2.7	SC
1.0	NE
0.3	EC
0.4	SE

As observations moved northward, we reported ratings of low to moderate infection in west central, north central, some of northwest and northeast Kansas.

We estimated leaf rust to cause an overall reduction in yield of 1.4 per cent for the 2009 Kansas wheat crop. This estimate accounted for nearly 5 million bushels. The 2009 estimate compares to the 20-year average of 3.93 per cent and 4.7 and 13.9 per cent loss estimates of 2008 and 2007, respectively.

In summary, leaf rust observations were fewer and lower than observations of past years. We attributed the influence of weather in Oklahoma and Texas production as primary reasons for lower disease pressure. Drought and freeze affected Texas leaf rust populations and freeze reduced much of the early inoculum for Kansas when it killed plant tissue in Oklahoma wheat. Rust inoculum from the southern states of the *Puccinia* pathway was delayed and substantially reduced. The impact from leaf rust on Kansas production despite some ideal weather conditions was below average in Kansas.

***Septoria* complex** was second in importance to leaf rust in the 2009 wheat crop. We noted the complex of *Septoria tritici* and *Stagonospora nodorum* in Kansas fields particularly in south central and eastern Kansas. Frequent rains and high humidity in these areas of Kansas were associated growing conditions that elevated disease levels. South central Kansas had the greatest disease loss of all the crop-reporting districts of 3 per cent average for all varieties and 7 per cent on susceptible varieties. Reports were common to the district and severities ranged from five to 50 per cent of the flag leaf at soft dough stage.

The 20-year average for *Septoria* complex was 1.14 per cent loss. The loss estimate in 2009 was 1 per cent or 3.6 million bushels.

Scab was third in disease loss importance to Kansas production for 2009. The majority of the estimated loss was from the southeast crop-reporting district where scab was epidemic and caused some abandonment of acreage for harvest. The disease took almost 20 per cent of the crop from this district or over 3 million bushels. Scab was to a much lesser degree present in south central and east central Kansas. We combined the crop reporting districts for a 0.9 per cent for the loss estimate in 2009. This estimate compares to 2008's estimate of 1.9 per cent where scab was widespread in the eastern third and some areas of central Kansas. The 20-year average loss compares at 0.53 per cent.

Barley yellow dwarf incidence was higher when compared to the past two years but still lagged behind historical averages. The area of highest incidence was south central followed by southwest Kansas. For example, the incidence of BYD in Stafford County included 16 fields observed at early heading. Two fields had incidences of 50 to 70 per cent, four fields of 10 to 20 per cent, seven fields of 1 to 9 per cent, and three fields were without BYD symptoms. The virus is transmitted by aphids in the fall and the spring and historically has been epidemic (loss at greater than 3 per cent) in about one of 7 years.

We estimated a 1.6 million bushel loss or 0.4 per cent loss in 2009. This compares to a twenty-year average of 1.13 per cent loss.

Tan spot was lower in incidence and accounted for about 0.3 per cent loss in 2009. Much of the estimate was from the three western crop-reporting districts where wheat debris was common to fields because of tillage practices. Rainfall in the west was more frequent in 2009 than historical averages. The increased precipitation favored the fungus disease that is associated with inoculum in the debris. Tan spot reports were few in the central Kansas corridor compared to historical levels.

The incidence of relatively minor diseases was up in 2009 and included bacterial leaf streak/black chaff (*Xanthomonas translucens*), *Cephalosporium* stripe, take all, and loose smut. Weather conditions of frequent rains favored bacterial leaf streak. We observed numerous locations with bacterial disease in the eastern two thirds of the state. Bacterial leaf streak was the dominate disease in some fields with over 40 per cent severity. Take all was a noticeable problem to some fields in south central Kansas. Loose smut statewide was observed at incidences of 2 to 5 per cent occasionally. The significant infection was likely linked to infected seed.

A couple of significant diseases that had few reports included most notably the wheat streak mosaic complex and stripe rust. Both of these diseases can be significant problems but survey indicated very little disease pressure. The lack of these two diseases contributed greatly to the low overall disease loss estimate. Their combined long- term averages are above 2.5 per cent loss.

Nematodes: In an ongoing project funded by USDA-APHIS, KDA and KSU scientists conducted a soil and root sampling survey in Kansas wheat fields. Over 700 samples were collected from western and central Kansas fields. In the past two years, over 6.8 million acres have been sampled at the rate of one sample per 4,800 acres. In 2010, the remaining acreage in central and eastern Kansas is planned for the sampling. What we found in this year's survey was nearly identical to the 2008 survey of western Kansas. The primary nematode of concern was a lesion nematode, *Pratylenchus neglectus*. Populations in the root system varied a little more than western Kansas but overall were very similar. The average population was about 2500 individuals per gram of dry root weight slightly more than the previous year. One notable population in Pratt County was over 70,000 nematodes per gram of root tissue and was the highest level yet discovered in Kansas wheat. Some disease loss estimates associate a one per cent loss in yield with each 1,000 nematodes per gram of root. In Kansas, this estimate study has not been completed. We are somewhat hesitant therefore to associate a loss with an exact number of lesion nematodes per gram of dry root weight. This particular species of lesion nematode is regarded as one of the most important to Australian wheat production and associated with corn losses in the United States. Exotic nematodes such as the British root-knot nematode, cereal cyst nematode, and Mediterranean cereal cyst nematode were not observed in root sample extractions.

The image to the right is of wheat root systems that lack much secondary and tertiary rootlets because of a high lesion nematode population (70,000 + per gram of dry root weight) found in a sandy soil site in Pratt County, Kansas.

Table 1. Rankings for 2009 disease losses and comparisons

Disease	2008	*2009*	20 yr avg.
1. Leaf rust	4.72	*1.37*	3.93
2. *Septoria* complex	0.5	*1*	1.14
3. Scab	1.9	*0.9*	0.53
4. Barley yellow dwarf	0.01	*0.44*	1.13
5. Tan spot	0.45	*0.26*	0.95
6. Bunt and loose smut	0.01	*0.04*	0.02
Bacterial leaf complex	0.03	*0.04*	0.01
8. Powdery mildew	0.03	*0.02*	0.19
9. Stripe rust	0.01	*0.01*	1.54
Take all	0.001	*0.01*	0.21
11. Wheat streak mosaic	0.02	*0.001*	1.17
Soilborne and spindle streak virus complex	0.001	*0.001*	0.30
Root and crown rot	0.001	*0.001*	0.08
Stem rust	0.001	*0.001*	0.07
Cephalosporium stripe	0.0	*0.001*	0.00
15. Strawbreaker	0.001	*0.0*	0.02
American wheat striate	0.0	*0.0*	0.00
Snow mold	0.001	*0.0*	0.00
Lesion nematodes western and central Kansas (not included in total).	1.75	*2+*	
Total	7.7	*4.1*	11.28

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. The Kansas Agricultural Statistics provided information for variety acreages and crop district yield estimates.
0.001 denotes trace amounts.

Special thanks to the staff at the Great Plains Diagnostic Laboratory, Kansas State University and the Plant Protection & Weed Control Program, Kansas Department of Agriculture for their help in survey and diagnosis of wheat diseases. Without their contribution, this paper would not be possible.