

KANSAS COOPERATIVE PLANT DISEASE SURVEY REPORT

PRELIMINARY 2014 KANSAS WHEAT DISEASE LOSS ESTIMATES

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<http://agriculture.ks.gov/docs/default-source/PP-Disease-Reports-2014/2014-ks-wheat-disease-loss-estimates.pdf>

HIGHLIGHTS

The KANSAS AGRICULTURAL STATISTICS SERVICE July forecast of 235 million bushels represented an expected harvest of 8.4 million acres of wheat with an average yield of 28 bushels per acre. The harvested acreage was equal to 2013 and accounted for 90 per cent of the planted acreage. The three western crop reporting districts had substantially more harvested acreage than in 2013 while central and eastern CRP's had less acreage harvested than in 2013.

The cumulative disease loss estimate for the 2014 wheat crop was 1.2 per cent or 2.9 million bushels. The potential yield of the crop without diseases was calculated at 238 million bushels. The 2014 yield loss (excluding lesion nematodes for comparison reasons to years that did not include nematode estimates) is the lowest estimate ever since 1976 when loss estimates were began. The estimated loss caused by diseases other than lesion nematode was 0.2 per cent and included such common diseases as leaf rust and wheat streak mosaic virus. The 0.2 estimate compares to a 20 year average estimate of 8.41 per cent of the crop and the second lowest estimate in 1996 of 2.1 per cent.

In 2014, **Lesion nematodes** (LN) populations were sampled and the loss estimate ranked LN as the most important disease to wheat production followed by tan spot and wheat streak mosaic. This was the second year that lesion nematodes (the first was 2013) were ranked as the number one issue to growers although their damage and subsequent loss largely goes unnoticed. Tan spot rose to the second most important disease status largely because of the lack of disease pressure from any other diseases especially other fungal foliar diseases. Similarly, wheat streak mosaic reports were very low but because of the absence of other viral diseases and fungal foliar diseases WSM was ranked as the third most important disease. The significance of tan spot and wheat streak mosaic to grain production was mainly symbolic although the diseases ranked two and three respectively.

Peaks and valleys associated with epidemics and weather influences have marked the loss estimates that began in 1976 (Figure 2). The trend is a steady decline in losses. The loss in 2014 was the lowest year estimate of the survey and diseases were negatively influenced by drought conditions from summer of 2013 through May of 2014.

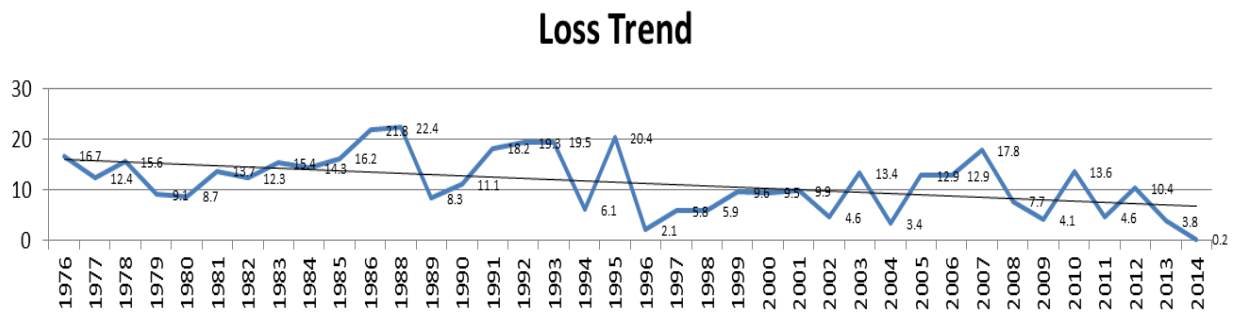


Figure 1. Loss trend graph with trend line of wheat disease loss estimates from 1976 to 2014 without lesion nematodes estimates: lesion nematode estimates were only made since 2010 and left out for presentation purposes.

DISEASES

Thirty two wheat fields in 22 counties across the state were sampled for **Lesion nematode** populations. Nematode counts on average in the roots were down significantly this year by over 50 per cent from previous sampling years and the prevalence of lesion nematodes at locations was also lower. Simply randomness of sampling locations surrounded by the difficulty in accurately quantify soil pathogens might explain some of the lower population trend. We also cannot overlook though that environmental conditions of drought upon both the host plant and nematodes from the summer of 2013 to sampling in 2014 should be considered as negative mechanisms resulting in fewer nematodes. Estimated loss after accounting for crop growth was set at 1 per cent or nearly 2.4 million bushels based upon Kansas population counts and loss estimates for lesion nematodes made by scientists in other wheat production areas. The estimate compares to a 1.9% five year average loss.

Tan spot was ranked second in importance in terms of disease losses in 2014. The foliar disease was observed in early April and despite drought conditions through much of the growing season did advance up the plant from overwintering in crop debris. Flag leaf infections were seen in fields at late dough stages of 1-5% leaf area severity while in others only mid canopy infections were observed. The loss estimate was put at 0.1% and accounted for 240,000 million bushels in loss. The five year average for tan spot is 0.16% loss.

Wheat streak mosaic complex (curl mite transmitted wheat streak mosaic, High Plains, and *Triticum* mosaic) was third in importance but was not close to the five year average loss of 0.9%. Observations of wheat streak mosaic were few in the fall of 2013 and spring of 2014. When found in survey, virus incidences were less than 3% in fields. The statewide estimate for 2014 was put at 0.05% for the viral complex.

Fusarium head scab was noted in some fields of eastern Kansas where precipitation occurred during flowering. A 0.02% estimated loss was given to head scab and compares to a five year average of 0.08%.

Root and crown rots reports were received from survey visits in central and western Kansas production fields. Nearly all of these reports were consistent with dry land foot rot (DFR). DFR was diagnosed with dark brown discoloration/lesions on the stem near the soil line extending to the first joint. Wheat heads were bleached white similar to stem maggot problems. Stem maggot was common in some of the same areas in central Kansas as dry land foot rot. DFR heads did not pull out of the stem as with stem maggot. A 0.01% loss was made in 2014 for root and crown rots.

Bacterial leaf disease was similar to DFR in importance with a 0.01% loss estimate. Bacterial leaf streak/black chaff caused by *Xanthomonas campestris* pv. *translucens* was present in fields either under center pivot irrigation or where rains came in towards grain filling. The disease though was not as widespread as in recent years.

In terms of significance, what diseases were not of importance was perhaps the story of the 2014 crop in regards to loss estimates. Leaf rust, stripe rust, and stem rust were absent or at extremely low levels. Barley yellow dwarf virus was similar in the lack of importance to the rust diseases with almost no observations. *Septoria* leaf disease complex was not given any loss at all and the lack of loss compares to a 1.7% loss in 2013. In summary, 2014 will be remembered for the lack of any notable disease pressure and a year where drought was the overlying theme.

The yield loss table of the last 10 years (Fig. 2) demonstrates the variability that weather, cultivars, and cropping practices have on disease incidence and subsequent losses.

Figure 2. Ten years of disease loss estimates from 2005 to 2014 with 5, 10, 20 year averages.
 Note: Statistics summarizing total losses exclude lesion nematodes that were only recently added to the disease survey.

										5-YR	10-YR	20-YR	
2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	AVE	AVE	AVE	DISEASE
2	0.1	13.9	4.72	1.37	1	0.01	1	0.01	0.001	0.40	2.41	2.29	LEAF RUST
8	0.001	0.15	0.01	0.01	10.3	0.05	5.7	0.03	0	3.22	2.43	2.11	STRIPE RUST
					2.0	1.6	2.3	2.4	1.0	1.86	--	--	LESION NEMATODES*
0.01	0.8	0.19	0.01	0.44	0.3	2.74	2.3	0.25	0.001	1.12	0.70	0.99	BARLEY YELLOW DWARF
0.1	0.001	1.8	0.5	1	1.1	0.01	0.01	1.7	0	0.56	0.62	0.84	SEPTORIA COMPLEX
2	7	0.01	0.02	0.001	0.2	1.7	1.2	1.2	0.05	0.87	1.34	0.97	WHEAT STREAK MOSAIC COMPLEX
0.6	0.2	1.3	0.45	0.26	0.2	0.01	0.01	0.5	0.1	0.16	0.36	0.65	TAN SPOT
0.001	0.001	0.16	1.9	0.9	0.3	0.01	0.001	0.05	0.02	0.08	0.33	0.25	SCAB
0.05	0.05	0.01	0.001	0.001	0.1	0.01	0.01	0.01	0.001	0.03	0.02	0.12	SOILBORNE & SPINDLE STREAK
0.1	0.1	0.21	0.03	0.02	0.1	0.01	0.001	0.01	0.001	0.02	0.06	0.09	POWDERY MILDEW
0.001	0.05	0.001	0.001	0.01	0.001	0	0	0	0.001	0.00	0.01	0.03	TAKE-ALL
0.01	0.1	0.01	0.001	0.001	0.01	0.01	0.1	0.01	0.01	0.03	0.03	0.04	ROOT & CROWN ROT
0	0.001	0	0	0	0	0	0	0	0	0.00	0.00	0.02	STRAWBREAKER
0.01	0.05	0.02	0.01	0.04	0.03	0.01	0.05	0.01	0.001	0.02	0.02	0.02	BUNT & LOOSE SMUT
0	0	0	0.001	0.001	0.001	0.01	0.01	0	0.001	0.00	0.00	0.01	STEM RUST
0.001	0.001	0.001	0.03	0.04	0	0.01	0.03	0.03	0.01	0.02	0.02	0.01	BACTERIAL LEAF COMPLEX
0	0	0.01	0.001	0	0	0	0	0	0	0.00	0.00	0.00	SNOW MOLD*
0	0.001	0	0	0	0	0	0	0	0	0.00	0.00	0.00	AMERICAN WHEAT STRIATE*
0.001	0	0	0	0.001	0.001	0.001	0	0	0.001	0.00	0.00	0.00	CEPHALOSPORIUM STRIPE
12.9	8.5	17.8	7.7	4.1	13.6	4.6	10.4	3.8	0.2	6.5	8.36	8.41	TOTAL

- 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. NASS/Kansas Agricultural Statistics provided information for variety acreages and crop district yield estimates.
- 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.