

JULY 10, 2015

Special points of interest:

- *Flag smut of wheat was discovered in production fields of wheat in western and central Kansas.*
- *Flag smut spores were found in leftover certified seed that was planted in demonstration plots positive for FS.*
- *Stripe rust, wheat streak mosaic, leaf rust, and head scab were at significant levels to cause yield loss as the crop filled grain in May and June.*

Flag Smut Reemergence in Kansas

On May 6th, a discovery of flag smut, *Urocystis tritici* (syn. *U. agropyri*) was made by Dr. Erick De Wolf in a demonstration plot in Rooks County in NC Kansas. The wheat was headed and symptoms included twisted leaves and blackened lesions or sori (fruiting structures) from the fungus.

From that point in time, KDA Plant Protection staff, USDA-APHIS-PPQ, and KSU pathologists spent several thousand man hours addressing the reemergence of the disease. Flag smut is of interest for export certification and as a reemerging disease in many parts of the world.

Flag smut was known to be present in Kansas and other Mid-western states in the early 1900's and was studied extensively in the 1930's near Leavenworth at a KSU experimental field. Since then, the disease has not been observed in the field although *Urocystis* teliospores were identified in grain spore wash surveys of 2004-5. Positives came from northwest Kansas. One Decatur County grain sample had over 90 teliospores per 50 gram of grain which is a high spore load even for seed. Investigations that followed could not determine if the spores were of wheat origin or from other weedy grasses which

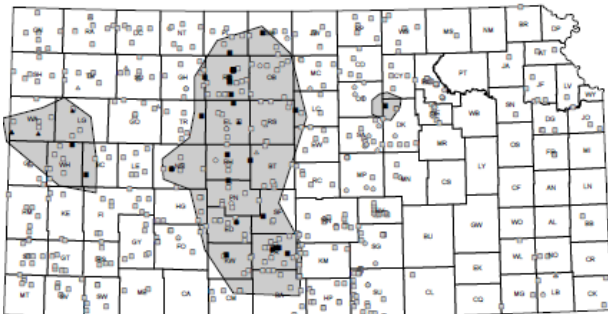
may not be a pathogen to wheat.

After the 2015 discovery of flag smut at the Rooks County demonstration plot and confirmation by a USDA identifier, KDA launched an investigation to determine the extent of the infestation and possible origin. It was found that a field not intended for certification was certified and that seed was used for county demonstration trials. The parent seed was not treated with a fungicide. It was also found a few weeks later that several production fields near the demo plot in Rooks County and neighboring counties were also infected. With that information KDA, KSU, and USDA formed three survey teams that spent two weeks surveying wheat production first in western Kansas and then in central counties. KDA finished the survey when the harvest was well underway in the third week of June.

As the map to the left shows, flag smut was present in a large region of central and western Kansas. KDA has formed a working group with stakeholders to address the issue in both the short term as planting of the 2016 crop is near and determination of long term strategies to reduce the infested areas for both export markets of seed and grain and to stop the disease from becoming a production issue.

Flag Smut Survey Map 7/07/2015

*Represents only 2015 survey data



The survey consisted of an inspection of about 3 acres per site by 2-3 trained personnel for a period of 10-15 minutes. Positives were confirmed by USDA-APHIS-PPQ national identifiers. Over 600 observations were made either in survey or investigations.

The above map shaded area represents the distribution of flag smut observations in production fields. Survey was conducted during May and June by Kansas Departmental of Agriculture with contributions from USDA-APHIS-PPQ and the KSU Extension Service.

From NASS-USDA statistics, Kansas planted wheat acreage in winter 2014 report was 9,600,000 statewide and about 1.7 million acres in the shaded FS area. Survey results from statewide survey indicated that 5.7 % of the fields or acreage were infected.

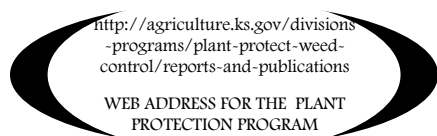
5.7% of 9,600,000 acres is 547,200 acres.
5.7% of 1.7 million acres is 96,900 acres.

Calculations by J. Appel, KDA
Map by J. Vogel, KDA

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Plant Protection and Weed Control Program

Plant Protection and Weed Control staff work to ensure the health of the state's native and cultivated plants by excluding or controlling destructive pests, diseases and weeds. Staff examine and analyze pest conditions in crop fields, rangelands, greenhouses and nurseries. Action taken to control potential infestations of new pests, whether they are insects, plants diseases or weeds, is beneficial to the economy and the environment.

Our Mission is to:

- Exclude or control harmful insects, plant diseases, and weeds;
- Ensure Kansas plants and plant products entering commerce are free from quarantine pests;
- Provide customers with inspection and certification services.

Plant Disease in Kansas addresses disease situations in field crops, trees and shrubs of native ecosystems and landscapes, and plants or plant products in the forestry and horticultural trades. The Kansas Department of Agriculture works cooperatively with Kansas State University and Extension programs, Kansas Forest Service, United States Department of Agriculture, and various commodity groups.



INVASIVE SPECIES

Flag smut observations of 2015 and some facts about the disease.

- Symptoms were observed after head emergence till kernel maturity.
- Symptom expression in a field can increase over time from heading through grain filling as more plants express the fall infection.
- Greatest infection percentage was 15-20% in one variety plot across numerous varieties. It appeared the disease was endemic to the area for several years.
- Survey production field infection levels was observed at trace to 0.1%.
- Seed investigation led to the conclusion FS infections occurred in the fall of 2013 and 2014 in Kansas.
- A small spore load of 4 spores in 200 grams of seed led to trace amounts of disease in several geographical distinct demo plots in 2015.
- FS when present in a farming operation is

likely to spread into many fields over time.

FACTS: Flag smut is a disease that can limit yield potential of susceptible varieties but does not pose a threat to grain quality or of human or animal health concern. FS is known to be in many wheat growing regions of the world including Australia, Mideast, Europe, and in the Pacific NW of the US.

Infection from spores in the soil or on the seed occurs with the young plant as it germinates and develops in the fall. The fungus grows systemically with the plant till heading.

Teliospores move to new fields or areas on seed, machinery, grain, hay and spread locally by natural events of water runoff, wind, and animal conveyance. Spores can survive over 4 years in soil.

Seed fungicide treatments are highly effective.

The disease is specific to wheat and crop rotations limit the build up of spores in the soil.

Images are of the black sori of FS (top), E. De Wolf, KSU and tightly twisted leaves and lack of heading (bottom) J. Appel KDA.

