K-STATE Research and Extension

Wheat Stripe Rust

Department of Plant Pathology | EP167 | Wheat Diseases

Stripe rust is a serious threat to wheat production in Kansas and the southern Great Plains. The disease had been reported in Kansas for decades, but warm spring temperatures typically diminished the risk of severe disease development and yield losses. Kansas, and several other states in the Southern Great Plains, experienced a series of stripe rust epidemics between 1999 and 2018. Research indicates the population of the fungus that causes stripe rust has changed and this new population is better adapted to warm temperatures. Therefore, stripe rust is likely to remain an important disease in Kansas.

Stripe rust is a significant problem in other parts of the world, including Europe and Australia, where the disease is referred to as "yellow rust."

Symptoms

Symptoms of stripe rust include long stripes of small yellow or orange blister-like lesions called "pustules" (Figure 1). The disease primarily occurs on the leaves; however, glumes and base of the awns also can be affected. The blister-like lesions produce massive amounts of spores that are easily dislodged. These spores may appear as orange dust on the clothing of individuals that have recently walked through heavily disease fields.

The genetic resistance of a variety can modify the symptoms of stripe rust. For example, the size of the pustules is often smaller on moderately resistant varieties (Figure 2). These disease symptoms may resemble

Quick Facts

- Stripe rust typically produces yellow or orange blister-like lesions that are arranged in stripes. The disease is most common on leaves but also can affect glumes and awns of some varieties.
- The fungus that causes stripe rust rarely survives the winter in Kansas and must be reintroduced from overwintering locations in Texas and Oklahoma each season.
- Planting disease-resistant varieties can effectively control stripe rust.
- The population of the stripe rust fungus changes over time and overcomes genetic resistance. It is important to have current information about resistant varieties (see *Wheat Variety Disease and Insect Rating*, MF991 for more information).
- Foliar fungicides also can be used to control the disease. The most effective fungicide applications are typically applied at the boot stage of crop growth and provide protection of the upper leaves that help maintain yield potential of the crop.

Figure 1. Symptoms of stripe rust on wheat.

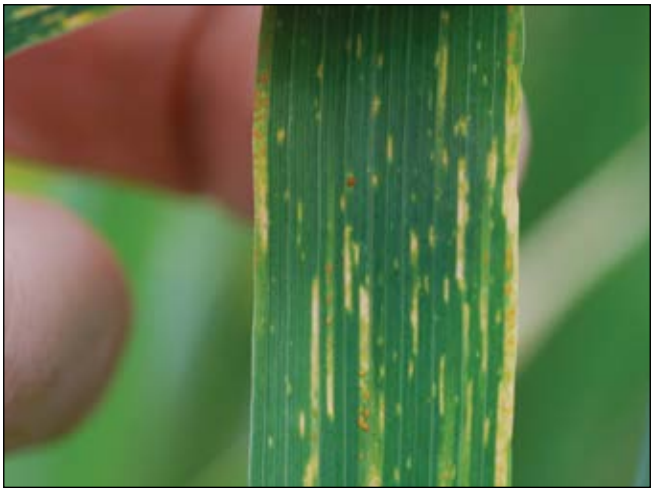

Figure 2. Symptoms of stripe rust vary among varieties. Moderately resistant varieties often have tan colored lesions.

bacterial leaf streak (black chaff) or Septoria leaf blotch. Stripe rust is occasionally confused with leaf rust or stem rust; however, these diseases tend to form darker lesions relative to stripe rust. The pustules of leaf rust and stem rust are not arranged in stripes and tend to be randomly distributed over the leaf surface.

Life Cycle

The fungus *Puccinia striiformis* causes wheat stripe rust. The fungus has specialized forms that are able to infect either wheat or barley. However, the forms of the fungi attacking barley are not well adapted for causing disease in wheat. The fungus cannot survive for extended periods on plant debris, but can persist for a long time inside a living host plant.

Stripe rust is favored by cool, humid weather and disease development is most rapid between 50 and 60 degrees Fahrenheit. The disease is inhibited when nighttime temperatures get above 68 degrees Fahrenheit or there are several days in a row with high temperatures above 80 degrees.

The disease does not typically overwinter in Kansas, and years with heavy yield losses are preceded by disease outbreaks in Texas and Oklahoma. Monitoring reports of disease in these areas provide an important early warning for Kansas producers.

Control

Planting disease-resistant varieties is the most effective and economical way to control stripe rust. The population of the fungus that causes stripe rust continues to change and overcome the resistance of many popular varieties. Information regarding disease resistant varieties can be found in the K-State Research and Extension publication *Wheat Variety Disease and Insect Ratings,* MF991.

Foliar fungicides can effectively control stripe rust. Applied when the crop is at the boot stage of development, the fungicides should provide protection for the upper leaves that contribute most of the energy used to produce grain. Product efficacy information can be found in *Foliar Fungicide Efficacy Ratings for Wheat Disease Management*, EP130.

Estimating Yield Loss

The yield loss caused by stripe rust is influenced by severity of disease and the timing of the infection relative to crop growth stage (figures 3 and 4). The largest yield losses occur when the disease develops on the upper leaves before heading. The risk of yield loss is reduced when infection occurs after the crop has reached the dough stages of grain development.

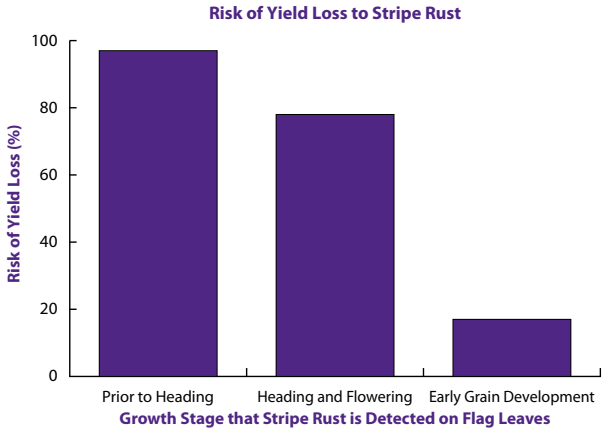

Figure 3. Yield loss risk is greatest when stripe rust becomes established on the upper leaves before the heading stage. The risk decreases as the crop approaches the later stages of kernel development.

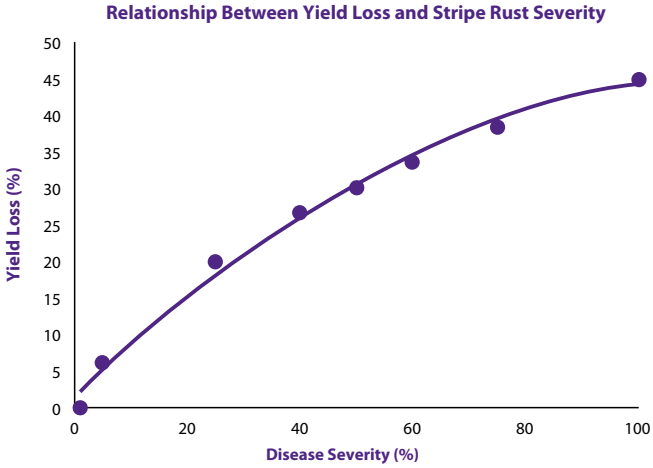

Figure 4. To use this chart, estimate the severity of stripe rust on the flag leaves during the early stages of kernel development (watery ripe – early milk), then find the corresponding yield loss estimate (Modified from Mundy, E.J. 1973. Pl. Path. 22:171-176)

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