



Extension FactSheet

Plant Pathology, 2021 Coffey Road, Columbus, OH 43210-1087

Leaf Rust of Wheat

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Over the last three decades the widespread use of rust-resistant varieties of winter wheat has substantially reduced the losses caused by leaf rust. Many races of the leaf rust fungus, *Puccinia recondita* f. sp. *tritici*, exist and varieties are not resistant to all races. Every few years new races of the leaf rust fungus arise and previously resistant varieties appear susceptible. The life span of a rust resistant variety is usually from 2 to 4 years. Wheat breeding programs must be maintained to incorporate new genes for resistance into new varieties.

Damage to wheat depends on its growth stage at time of infection relative to the degree of rust development. Epidemics that occur before or during flowering are most serious, especially when the flag leaf becomes severely infected. Leaf rust causes losses by reducing the number of kernels per head, by reducing the size of kernels, by lowering test weights, and by lowering the protein content of the grain.

The occurrence and severity of leaf rust depends on many factors. Large year to year differences in rust development depend on variations in the weather and the amount of rust inoculum overwintering in the southern states. In the fall, some leaf rust can be found on volunteer plants in Ohio. The importance of fall infected wheat in the occurrence and spread of rust appears to be minimal except on a very local scale. The great bulk of rust inoculum is blown up from the southern wheat growing regions in late spring. In Ohio, late May and early June are times when rust infection becomes critical. Leaf rust is more damaging on late maturing varieties in years when cool, moist weather persists into mid-summer.

Symptoms

Leaf rust pustules are small, up to 1/16 inch long, oval fruiting bodies (uredia) of the rust fungus (Figure 1). Reddish-orange urediospores (summer spores) develop within the uredia and rupture the epidermis of the leaf surface as the spores mature. Pustules can be either scattered or clustered on the leaves and leaf sheaths of infected plants. Each pustule contains thousands of spores which are disseminated by the wind. Rust pustules

can be distinguished from other leaf spot diseases by rubbing or smearing the orange rust spores on the leaf surface with your finger. Rust that has overwintered in the field develops first on the lower leaves and progress up the plant to the flag leaf by mid June. Usually, infections occur first on the upper leaves due to spores that have been deposited out of the air during spore showers. Under severe epidemics, pustules may develop on the awns and glumes of the heads or occasionally on the stem below the head.

During favorable weather for rust development, pustules increase in number until 30 to 50 percent of the leaf surface is covered. As the plant matures, black, submerged pustules develop on the leaves and leaf sheaths. These pustules (telia) contain the winter spores (teliospores). Teliospores do not infect wheat. Telia may not develop when plants become infected near maturity.

Disease Cycle

Leaf rust has a complex life cycle. To complete all stages of its life cycle, the fungus must produce four different spore



Figure 1. Wheat leaf with rusty red pustules of leaf rust.

types and infect a primary host, wheat, and an alternate host, meadowrue (*Thalictrum sp.*). For all practical purposes the alternate host and three of the four spore stages are functionless and play no part in causing epidemics of leaf rust in Ohio. In the Midwest, the urediospore stage is the primary spore form involved in dispersal and infection of the wheat crop. Urediospores overwinter on infected wheat in the more moderate climate of the southern states and Mexico. Urediospores produced on infected wheat are carried northward by the wind. When moisture is adequate, urediospores germinate and infect leaves within 6 to 8 hours after settling on the plant surface. Once established a new generation of urediospores may be produced every 7 to 14 days if environmental conditions are favorable. Frequent heavy dew, light rain, or high humidity and temperatures of 59 to 77 degrees F are ideal for rust development. Rust spreads by wind blow urediospores from plant to plant and from field to field until the crop matures. In the fall urediospores are blown southward and infect wheat and overwinter as urediospores or as mycelium in infected winter wheat leaves.

Physiologic Races

The leaf rust fungus is specialized into numerous physiologic races that are identified by their reactions on an established set of differential wheat varieties. Any given variety may be immune, resistant or susceptible to a race of rust. A complex system has been developed to keep track of the hundreds of known races. No wheat variety is resistant to all races of leaf rust.

Control

1. Plant leaf rust-resistant varieties adapted to Ohio conditions. A listing of the wheat varieties grown in Ohio and their reactions to leaf rust is available from county OSU Extension offices. Be willing to change varieties when epidemics of leaf rust occur.
2. Plant after the Hessian fly-safe date recommended for your area. Early planting increases the chance of fall infections. Severely infected seedlings are stressed and are more susceptible to winter injury.
3. Adequate fertilization based on a soil test should reduce the possibility of severe yield loss due to leaf rust. Where greater amounts of nitrogen have been applied to wheat without sufficient potassium and phosphorus, leaf rust has disproportionately reduced yields. Following soil test recommendations should increase yield without increasing the susceptibility of the crop.
4. Fungicides are available for control of leaf rust on wheat. Application of a fungicide is recommended only when the yield potential of the crop is high, the wheat variety is susceptible to leaf rust, the disease started early and the flag leaf is in danger of becoming infected. Obtain a copy of OSU Extension Bulletin 786 for more information on leaf rust from your county OSU Extension office. Current fungicide recommendation for leaf rust control can also be obtained from your OSU Extension office.

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