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Stripe Rust of Small Grains

Introduction

Stripe Rust, caused by the pathogen *Puccinia striiformis,* is a fungal disease affecting wheat, barley, rye, and a wide range of other grasses during cool, wet growing seasons [4]. Under appropriate conditions, significant yield loss can occur [2]. This factsheet will describe how to identify the disease, the disease cycle and management.

Disease Identification

Symptoms of stripe rust start as small chlorotic patches on leaves. Yellow to light orange colored erumpent pustules eventually emerge from these patches. Each pustule contains thousands of asexually-produced spores, which can be spread long distances by air currents to susceptible plants. On seedling leaves, pustules are not arranged in any fashion, and can be confused with other rusts. Patches run with the leaf venation, giving the lesions a distinct striped appearance when foliage produced after stem elongated is infected by the pathogen (Figure 1). Pustules rarely are found on the glumes and awns [2].

Figure 1. Typical symptoms of stripe rust on a wheat leaf. Photo N. Kleczewski

Symptoms vary with variety and environmental conditions. Resistant varieties may have no disease or lesions may be shorter or sporulate less compared to lesions seen susceptible varieties (Figure 2).

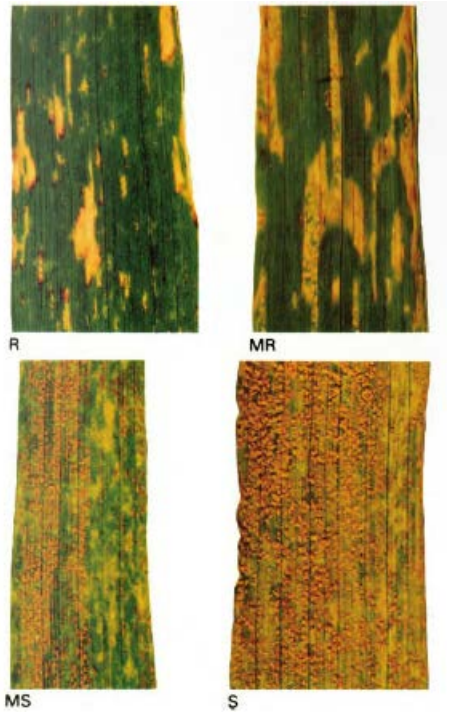

Figure 2. Stripe rust resistance types in wheat. R = resistant, MR = Moderately Resistant, MS = Moderately Susceptible, S = Susceptible [2].

Stripe rust can be distinguished from stem rust and leaf rust of wheat. The pustules of stem and leaf rust are usually darker than stripe rust and red to brown in color. Additionally, stem and leaf rust pustules are not arranged in stripes [2].

Disease Cycle

Stripe rust does not overwinter in Delaware. Each season, spores of the pathogen must move into the area on air currents from warmer regions. For this reason, disease outbreaks tend to be move severe following moderate winters. If the pathogen infects in the fall and the winter is mild, it may survive the winter as semi-dormant mycelium within plant tissues. More often infections occur in the spring, and epidemics are related to environmental conditions and the amount of susceptible varieties planted in the region.

Stripe rust is a cool-weather pathogen. Optimal conditions for disease include temperatures between 50-60°F and intermittent rains; however, some newer races of the pathogen may have higher temperature optima. Under optimal environmental conditions, the pathogen can infect, colonize, and produce new spores in 7-10 days. Thus the disease may spread and increase rapidly under favorable conditions. Disease progress slows dramatically at temperatures above 70°F and spore viability falls off rapidly as temperatures exceed 59°F. Spores and mycelium cannot survive temperatures above 90°F. The alternate host of the pathogen is barberry (*Berberis sp*), allowing the pathogen to sexually reproduce. This plant may potentially serve as a source of the pathogen in some regions [3].

Disease Management

Variety selection, cultural practices, and timely fungicide applications when disease is detected in the area are the main management strategies for limiting yield loss due to stripe rust.

Resistant Varieties

Planting resistant varieties is the best method for reducing yield loss due to stripe rust [2]. There are two main types of resistance to stripe rust, all-stage resistance and high temperature, adult plant (HTAP) resistance [1]. Growers should consult seed catalogues and regional University run variety trials for stripe rust ratings and consider planting varieties with good to excellent resistance to stripe rust. Avoid varieties where you have observed issues with stripe rust in the past.

Cultural Practices

Planting date

Avoid early plantings. Planting early increases the risk for Fall infections by the stripe rust pathogen. Plant after the Hessian fly-free date if possible.

Weed Management

Grassy weeds and volunteer wheat, barely, or rye plants can all act as reservoirs of stripe rust and lead to earlier infection in fields.

Chemical Controls

Fungicides should be applied to susceptible varieties if stripe rust has been detected in the region. Applications at flag leaf emergence (Feeke's growth stage 8) will help protect the flag leaf and reduce future disease impact. Fungicide applications are most efficacious and beneficial when applied before the disease has established to a significant degree. If stripe rust is already present in the field at the time of application, then triazole fungicides are a better choice because they exhibit more curative ability [2]. See the NCERA 184 Fungicide Efficacy Table located at the University of Delaware Field Crop Pathology Website for specific recommendations.

References

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2. De Wolf, E., *Wheat Stripe Rust.* Kansas State University Research and Extension, 2010. EP-167.
3. Jin, Y., Szabo, L. J., & Carson, M., *Century-old mystery of Puccinia striiformis life history solved with the identification of Berberis as an alternate host.* Phytopathology, 2010. **100**(5): p. 432-5.
4. Bockus et al., *Compendium of wheat diseases third edition*. St. Paul, Minn: APS Press, 2010.