

Wheat Leaf Rust in North Dakota 1986

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Leaf rust of wheat, incited by the fungus *Puccinia recondita*, is one of the most important diseases of wheat. The disease is a potential threat to North Dakota wheat growers whenever susceptible varieties are grown. Yield losses on susceptible varieties have been well documented (Dubin and Torres, 1981; Statler et al., 1984). The disease also is a potential threat because the fungus has vast variability in the natural population allowing it to move from the southern wheat growing regions of the United States to Canada in a few months. The pathogen also has the ability to change by mutations and parasitize previously resistant cultivars. These new races can build up in the natural population, causing epidemics which result in widespread losses (Dubin and Torres, 1981). These new races have forced growers to plant different cultivars or to apply foliar fungicides in an attempt to manage the disease. Smith (1978) reported that most of the wheat cultivar changes in North Dakota have resulted from shifts in the natural stem and leaf rust populations.

Leaf rust was severe in 1985 with estimated statewide yield losses ranging up to 27 percent in Texas and an average of 7.4 percent on winter wheat and 0.1 percent on spring wheat in the United States (Long et al., 1986). This was the largest loss ever reported for leaf rust on wheat in the United States. Leaf rust overwintered extensively throughout the southern United States in 1985. In 1986 lack of moisture limited leaf rust development somewhat in the southern United States, but leaf rust was severe and losses higher than 1985 in much of the northern winter wheat areas (Cereal Rust Laboratory, USDA, St. Paul, MN Rept. #6). The heavy rust in 1985 was a prerequisite to overwintering during 1985-86 and provided ample inoculum for the 1986 wheat crop.

Field surveys were conducted during 1986 to determine leaf rust severities in North Dakota. Approximately one field was surveyed every 20 miles. Fields surveyed were easily accessible and in the wheat growing areas of the state.

RESULTS AND DISCUSSION

Wheat leaf rust was first located in southeastern North Dakota on May 14, 1986. During the first survey only trace amounts were found on the older leaves of winter wheat fields. Previously rust had been reported as heavy in the southern states of Texas, Oklahoma, Kansas and Nebraska. By the next survey in late May, rust was found in low levels, trace to 5 percent, on all winter wheat fields. A lot of flecking also was present. Within two weeks rust levels were 40-50

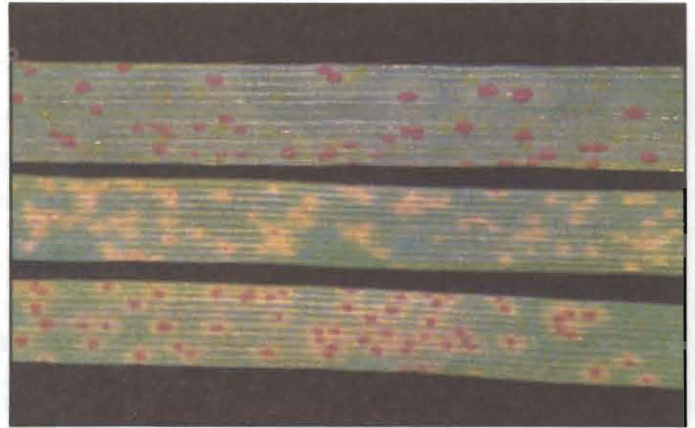


Figure 1.

- Top - Susceptible reaction - comparable to those found on winter wheats in 1986.
- Center - Resistant reaction - like that found on several spring wheats in 1986.
- Bottom - Moderately resistant reaction - which could cause yield reductions when inoculum is heavy.

percent on flag leaves of winter wheat. By July 1 many heavily infected plants were dying back, with 60-90 percent of the flag leaf area infected with rust.

Rust normally moves up the plant as the season progresses but the development on winter wheat was more rapid in 1986 than normal. Rust moved directly from the lower leaves to the top or flag leaf in one cycle in 1986. This indicated heavy spore showers. Rust infection occurred on flag leaves before fungicide applications could be made in many cases. As a result, losses due to wheat leaf rust were probably severe in many winter wheat fields in 1986, especially in the southeastern part of North Dakota. The winter wheats then provided heavy inoculum for the hard red spring wheats. In many instances it was observed that a spring wheat field next to a winter wheat field had rust earlier and at a higher rate than spring wheat fields some distance from any winter wheat fields.

In many fields, normally resistant cultivars were covered with necrotic spots known as the resistant reactions. For instance, Marshall is one variety with resistance in the field. However, this year it had a lot of moderately resistant and resistant reactions on the lower leaves. These hypersensitive

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reactions, if severe enough, can also reduce yields (Samborski and Peturson, 1960). As a result, several cultivars which are classified resistant to wheat leaf rust were sprayed in 1986.

In general, resistance displayed by most spring wheats remained stable and rust did not develop. Once the winter wheat leaves died, the primary inoculum source was reduced and the rapid rate of infection slowed. Fortunately, most varieties of spring wheat are resistant to leaf rust. Cultivars such as Butte 86, Coteau, Era, Solar, Len, Alex, Wheaton, Oslo, and Stoa provide adequate resistance to the natural rust population. Marshall is moderately resistant and will normally have adequate resistance when inoculum is not heavy as it was in 1986. Consult Extension Circular A-574, North Dakota Small Grain and Flax Variety Performance and Descriptions, for current varietal ratings.

Research at North Dakota State University has indicated that leaf rust develops more slowly on durum than on susceptible hard red spring wheats. Yields of durum wheats are usually not decreased when the final severities are less than about 20 percent. However, losses could occur under high severities.

Leaf rust overwintered over a large area of the United States during the winter of 1985-1986 (Cereal Rust Laboratory, USDA, St. Paul, MN Rept. #6). Leaf rust was severe and losses were reported during both 1985 and 1986 on susceptible wheat cultivars. Growers should be watchful for disease build-up during 1987. If conditions are favorable for the disease to overwinter in the South and if winter wheat again provides heavy inoculum, a situation similar to 1986 could develop in 1987.

Most of the winter wheat cultivars grown in North Dakota are susceptible to leaf rust and may require protection by

fungicides in years when inoculum is high. Fungicides currently registered for foliar application to wheat in North Dakota (1986) are mancozeb (Dithane M-45, Manzate 200, Penncozeb), benomyl (Benlate), triadimefon (Bayleton), copper hydroxide (Kocide 101 or Kocide 606), and sulfur (refer to the 1986 Field Crop Fungicide Recommendations or see the 1987 edition for next year). Only mancozeb (Dithane M-45 and Manzate 200, but not Penncozeb) and triadimefon (Bayleton) are registered specifically for leaf rust; both provide excellent control. A single application of triadimefon usually provides satisfactory control. If mancozeb is used, a second application is needed in 7-10 days. With mancozeb do not exceed more than three applications within 26 days of harvest. Fungicides should be applied only if you plant a susceptible variety, expect a good crop, find the disease on lower leaves, weather conditions favor rust development, and the price of wheat will pay for fungicide application.

LITERATURE CITED

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