

Wheat Leaf Rust in the United States in 2019

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Occurrence and Crop Conditions

In 2019 wheat leaf rust, caused by *Puccinia triticina* was widespread throughout the soft red winter wheat area of the Southeastern states, the Ohio Valley, and was also commonly found in the hard red winter area of the Great Plains and the hard red spring wheat area of the northern Great Plains. In the south Atlantic, Gulf coast region, southern Great Plains and Ohio Valley region, the average temperatures in April were slightly higher than normal in April (NOAA). The warm temperatures allowed infections of *P. triticina* to increase and spread across the winter wheat regions. In May and June temperatures were very close to average throughout the soft red and hard red wheat regions. The above average temperatures early in the growing season and close to average temperatures later allowed leaf rust to spread and compete with stripe rust caused by *Puccinia striiformis* f. sp. *graminis* which favors lower temperatures compared to leaf rust. Temperatures in the spring wheat region of the northern Great Plains were also close to average in May and June, respectively.

In Oklahoma losses due to leaf rust were estimated to be 8%, with 3% losses in Texas and Kansas. Losses in other states were at 1% or less. Overall estimated losses in the US due to leaf rust in 2019 were 24 million bushels.

Races and virulence of *P. triticina*

In 2019, 32 races of *P. triticina* were identified in collections of leaf rust infected leaves that were sent to the USDA-ARS Cereal Disease Laboratory. A total of 252 isolates were processed for race identification. Race MNPSD was the most common race at 45.2% of all isolates. MNPSD was found in the soft red winter regions of the southeastern states, and Ohio Valley, in addition to the winter and spring wheat region of the Great Plains. MNPSD and the closely related race MPPSD at 11.9% of all isolates, are virulent to the hard red winter wheat SY Monument, which is widely grown in Kansas and Nebraska. In addition, MNPSD and MPPSD are virulent to genes *Lr24*, *Lr39* and *Lr37* that are in many of the hard red winter cultivars. Race MBTNB was the most common race in the southeastern states and Ohio Valley. MBTNB is virulent to *Lr11*, which is present in the soft red winter wheat cultivars grown in these regions. Races TBBGS was at the highest frequency in the hard red spring region of the northern Great Plains. TBBGS is virulent to *Lr21*, which is in many of the spring wheat cultivars in this region, in addition to *Lr39*.

Virulence to *Lr24* and *Lr39* are highest in the southern to mid Great Plains region. Virulence to *Lr11* and *Lr26* is highest in the southeastern states, and virulence to *Lr18* was detected at low frequencies in all regions, but was most common in the Ohio Valley

region. Virulence to *Lr2a* and *Lr21* was highest in Minnesota and South Dakota and North Dakota.

The complete race frequency and virulence frequency to individual Lr genes are given in Table 1 on a separate file. Information on the individual collections, location, date, cultivar collected from, and race designations of the derived isolates are given in the Excel file in Table 2.

The postulated Lr genes in the ten most common hard red winter wheat cultivars in Texas, Oklahoma, and Kansas in 2019 are listed in Table 3. The postulated Lr genes in the ten most common hard red spring wheat cultivars in Minnesota and North Dakota in 2019 are listed in Table 4. When possible an Lr gene was postulated; ? indicates a gene postulation could not be made; + indicates that the cultivar was resistant to all isolates tested.