

Identification of Rust Diseases on Wheat

Three rust diseases occur on wheat: stem rust, leaf rust and stripe rust. They are named for the yellow to red or black spots or stripes (sori or pustules of the rust fungi) that erupt through the plant epidermis. The size and surrounding coloration of rust pustules can

vary with different cultivars. Some infections are visible only as chlorotic flecks or necrotic spots. Symptoms are most obvious in spring and summer, but may occur at any time after emergence. All aerial parts of the plant are subject to infection by the rust diseases.



CIMMYT

Stem Rust (Syn. Black Rust)

Puccinia graminis f. sp. *tritici*

Symptoms:

Stem rust symptoms usually appear on the stems and leaf sheaths, but leaf blades and spikes may also become diseased. Urediospores develop in pustules (uredia) that rupture the epidermis and expose masses of reddish brown spores. The pustules are larger than those of leaf rust, and are oval shaped or elongated. They may appear on both the upper and the lower surfaces of the leaf. As plants approach maturity, brownish black teliospores develop, either in the same uredial infection sites or in newly formed telial infections (sori). Teliospores frequently erupt through the epidermis.

Spore Morphology:

Urediospores of *P. graminis* are reddish brown, oval to elliptical, echinulate single cells measuring $15-24\ \mu\text{m} \times 21-40\ \mu\text{m}$.

Teliospores are dark brown to black, two celled, and elliptical to clavate in shape with a tapered apical cell. They retain a portion of the pedicel or stalk, have thick walls and measure $15-20\ \mu\text{m} \times 40-60\ \mu\text{m}$.



Uredia



Urediospores (400x)



Telia



Teliospores (400x)

Leaf Rust (Syn. Brown Rust)

Puccinia recondita f. sp. *tritici*

Symptoms:

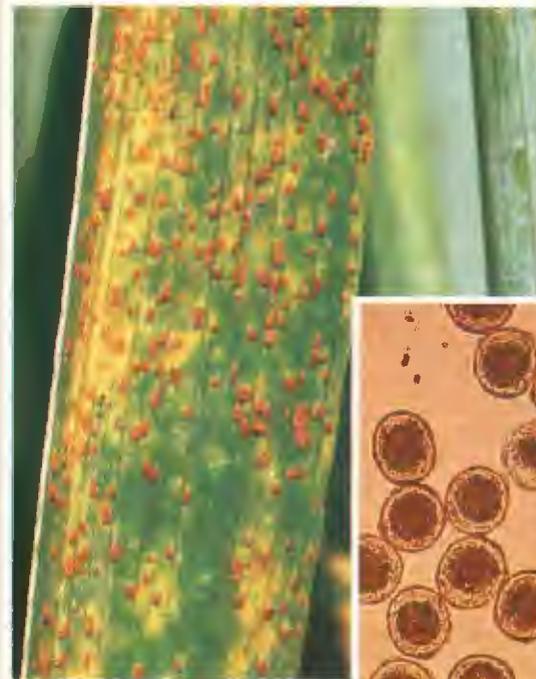
Leaf rust appears as small, oval-shaped, orange to reddish brown pustules scattered on the leaf blades and, in susceptible varieties, on the leaf sheaths. The pustules (uredia), commonly found on the upper surface of the leaves, break through the epidermis but do not cause visibly torn epidermal tissue.

Teliospores often develop in sori on leaf blades and on leaf sheaths during the latter stages of plant development. The teliospores form in the leaf tissues and are covered by the epidermis.

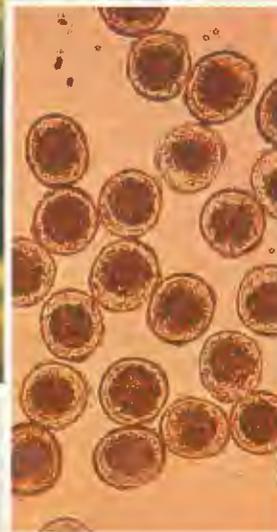
Spore Morphology:

The urediospores of *P. recondita* are orange to reddish brown, echinulate, spherical, and usually measure 15-30 μm in diameter.

The teliospores are dark brown to black, two celled with thick walls, and have a flattened to rounded crown or cap.



Uredia



Urediospores (400x)



Telia



Teliospores (400x)

Stripe Rust (Syn. Yellow Rust)

Puccinia striiformis

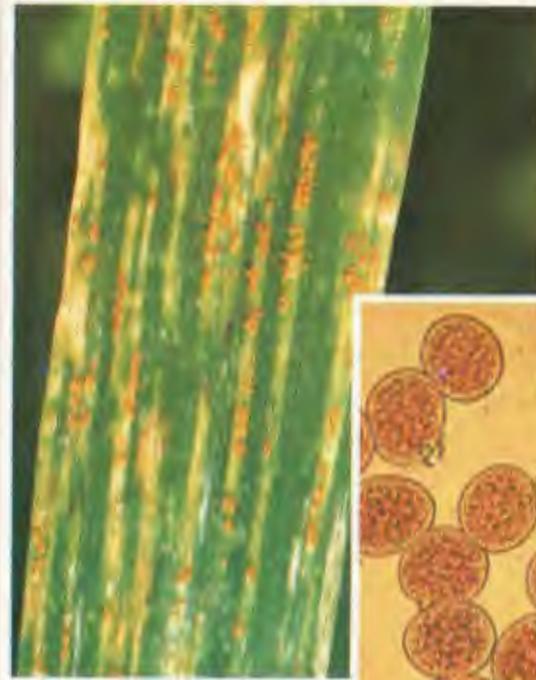
Symptoms:

Uredia generally develop in narrow, yellow, linear stripes mainly on leaves and spikelets. When the spikes are infected, the uredial pustules develop on the inner surfaces of glumes. Telial sori develop on leaf blades and sheaths as dark brown to black stripes that remain covered by the epidermis.

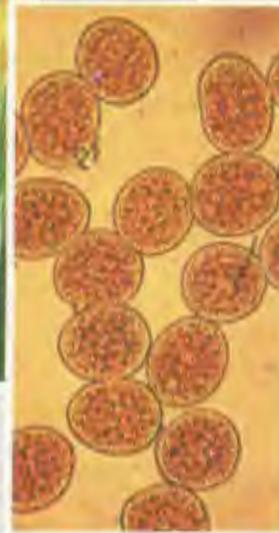
Spore Morphology:

Urediospores are yellow to orange in color, more or less spherical, echinulate, and measure 20-30 μm in diameter.

The teliospores are dark brown to black, and are two celled with thick walls. They are similar in size and shape to those of *P. recondita*, except that the cap or crown is flattened, not rounded.



Uredia



Urediospores (400x)



Uredia



Telia