

# Cereal Diseases

## Rusts

- A problem since the first cereal crops were grown.
- Are obligate parasites that require a living host to complete the life cycle
- Widely disseminated by wind borne spores.
- Incite serious epidemics because they can produce large numbers of spores (urediniospores).
- Have five spore stages and alternate between two hosts.

## Stem (black) rust of wheat

DISEASE: Stem (black) rust  
Pathogen: (*Puccinia graminis*)

HOSTS: Wheat, barley and barberry



The characteristic rust color on stems and leaves is typical of a general stem rust.

### SYMPTOMS:

- Plants show symptoms 7 to 15 days after infection.
- Presence of brick-red **uredinia** on the plant.
- sporulate on both surfaces of the leaves.
- Black **telia** are produced in the end of the growing season.



uredinia



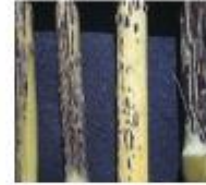
telia



Urediospores



Teliospores (**the survival stage**)  
in pustules on wheat.



Microscopically, teliospores of  
fungus are two celled.



## Importance:

- Is a significant disease affecting cereal crops.
- Infected plants produce fewer tillers and set fewer seed, and in cases of severe infection the plants may die.

## DISTRIBUTION:

Occurs worldwide wherever wheat is grown.

## YIELD LOSS:

- Losses are often severe (50 to 70%)
- Damage is greatest when the disease becomes severe before the grain is completely formed.
- Grains are shriveled
- Severe disease can cause straw breakage, resulting in a loss of spikes with combine harvesting.



## ENVIRONMENTAL CONDITIONS:

- Hot days 25-30 C, mild nights 15-20 C with wet leaves.
- Wind can disperse urediniospores over great distances.
- Rain is necessary for uredinospore transport.

## **Disease: Leaf (brown) rust of wheat**

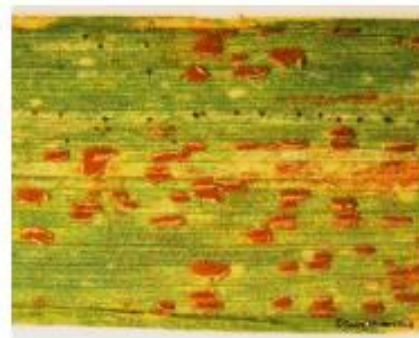
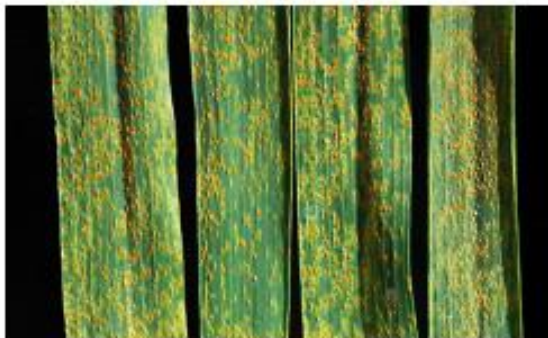
Pathogen: fungus *Puccinia triticina*  
(formerly *P. recondita* f. sp. *tritici*).

Leaf rust is very important in wheat growing areas of the world.



### Symptoms:

Symptoms are seen as individual orange to brown pustules.



The most characteristic signs of leaf rust infection are the rusty-red spores (Uredinia) in round to oval pustules breaking through the leaf surface.

## Importance:

- Is the most common rust disease of wheat on a worldwide basis.
- Losses of between 5 and 20% are normal but may reach 50% in severe cases.
- Urediniospores can be wind-disseminated and infect host plants hundreds of kilometers.

## Stripe Rust (Yellow Rust)

*Puccinia striiformis* (synonym *P. glumarum*)

### Hosts:

Wheat, barley and some perennial grasses may also become infected.



The infection is characterized by a yellow-orange spore that forms in parallel lines on the leaf surface.

### Symptoms:

- Symptoms usually appear earlier in the season than other rusts because the fungus develops at lower temperatures than the other rust fungi (6-12°C).
- Cool, wet conditions favor this rust.
- As the plants mature, the pustules turn dark and shiny when teliospores are formed.



### Importance:

- Cause significant loss to wheat yield and grain quality,
- Can also infect the developing head reducing grain number and size.

### Environmental conditions:

Less than 18°C (optimum 6 -12°C) with a minimum of three hours of leaf-wetness for new infections to occur.

## Survival:

Survives the summer on volunteer or self-sown wheat plants to allow a new epidemic to develop in the following season.

## Spread:

- The fungus is dispersed as wind-blown spores which produce new infections.
- This cycle is repeated many times during the cropping season causing epidemics to develop.

## Control:

- Remove volunteer wheat plants, alternative host/ weeds.
- Use resistant varieties.
- Use a seed or fertilizer treatment.
- Apply a foliar fungicide

## Management strategies to minimize the impact of rust diseases:

- All rusts can only **survives** from one season to the next **on living plants**, therefore removing volunteer wheat plants, alternative host/ weeds prior to sowing will minimize the inoculum.
- **Avoid susceptible varieties** by selecting more resistant varieties.
- Use a seed or fertilizer treatment to **suppress early infection**.

Effective **fungicides** for controlling rusts are available.

- Monitor crops during the growing season and apply **a foliar fungicide** early in the epidemic, if required.