
Leaf Blight of wheat

Dr. Deepa Srivastava
Assistant Professor,
Department of Botany
DDU Gorakhpur University
Gorakhpur



Content



Importance

Symptoms

Causal Organisms

Disease cycle

Management

References

Importance

- Leaf blight of wheat via *Alternaria triticina* is “one of the **most important foliar diseases of wheat in India**”.
- Infection can lead to a 46-75% weight reduction of individual grains with **yield losses reaching 60%**.
- **In the 1960s**, India saw widespread, heavy wheat yield losses due to *A. triticina* with the introduction of a popular **Mexican rust-resistant wheat variety**.
- It is not uncommon to see **yield losses of 20%** attributed to *Alternaria* leaf blight of wheat.
- The fungus is a **quarantine pathogen** and has prompted New Zealand, Brazil, and South African to impose regulations on the importation of wheat, requiring freedom statements from area before accepting imports.

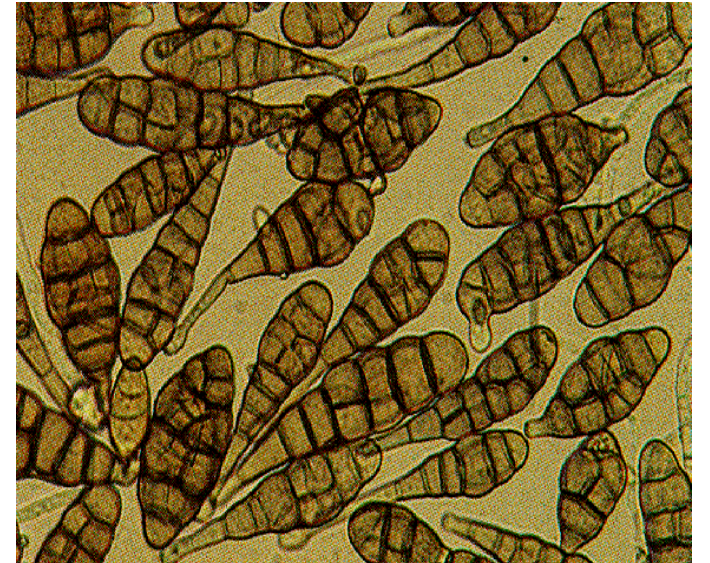
Symptoms

- Successful inoculation of *A. triticina* has been repeatedly confirmed in *Triticum turgidum* subsp. Durum (durum wheat) and *Triticum aestivum* (bread wheat) with bread wheat varieties showing more severe infection.
- Infection will **only occur on hosts older than three weeks** with symptoms appearing at **7–8 weeks of age**.
- Lesions will start as oval-shaped scars on the lower leaves and infect more leaves as the plant grows. Later in the season, the lesions **enlarge and coalesce, becoming darker and forming chlorotic margins around the necrotic lesions**.
- If the infection becomes sufficiently severe and widespread, the entire field will **exhibit a burnt appearance**. Depending on the initial concentration of inoculum and environmental conditions, infection can spread to the leaf sheath, stem, awns, and glumes.
- Spike infections lead to infected seed. These seeds may exhibit no symptoms, or they may become brown and shriveled. In either case, they will contain the disease-spreading agent successfully to the next season.



Causal Organism

- *Alternaria triticina* is a fungal plant pathogen that causes leaf blight on wheat.
- *A. triticina* is responsible for the largest leaf blight issue in wheat and also causes disease in other major cereal grain crops.
- It was first identified in India in 1962.
- The disease is caused by a fungal pathogen and **causes necrotic leaf lesions and in severe cases shriveled.**
- In addition to symptoms derived from nutrient extraction, ***A. triticina* releases several nonspecific toxins, often resulting in chlorotic leaf flag streaks.**
- Lesions are not easily differentiated from those of other leaf blight pathogens. However, they will have black powder of conidia and not pycnidia or perithecia common to some leaf lesion fungi, which distinguishes it from many ascomycete pathogens of wheat and cereal grains.



Classification of Pathogen

Kingdom: Mycota

Division: Eumycota

Sub-Division: Deuteromycotina

Form-Class: Hyphomycetes

Form-Order: Monilales

Form-Family: Dematiaceae

Genus: *Alternaria*

Species: *A. triticina*

Disease Cycle

- The fungus overwinters largely as seed-born spores.
- These asexual spores multiply in the soil and transfer primary inoculum to susceptible plant leaves through direct soil contact or by soil that is splashed onto the lowest leaves in rainfall or irrigation.
- At this point, the **polycyclic nature of *A. triticina*** is evident when conidia, the secondary inoculum are produced.
- Conidia germinate in temperatures **between 20-25°C and with 10 hours of water film on the leaves or 48 hours of humidity greater than 90%.**
- Conidia germinate, producing 2-4 germ tubes, each with an appressorium and penetration peg. Hyphae infect via direct penetration and proliferate **inter- and intra-cellularly**. Hyphae reach the deep mesophyll tissue within 72 hours of inoculation.

- Mycelium will spread to the epidermis and parenchyma tissue but not so deep as to infect the vasculature.
- Leaf tissue thickness becomes greatly reduced and chloroplasts of infected cells grow larger and irregularly shaped. Mycelium will produce conidiophores which extend out of host tissue stomata and bear conidia either singly or in chains.
- These conidia serve as secondary inoculum for further infections within the season.
- Lesions appear between 2–5 days after inoculation.
- Infections in the seed head produce spores for the next season.
- Conidia in leaf and stem tissue can survive in debris, but its viability is greatly reduced when left on top of the soil surface or in hot, wet environments; their survival is limited to 2 months on the soil surface and 4 months when buried.

Management

- Selection of resistant cultivar
- Planting of clean, disease-free seed.
- Seeds can also be treated with chemical agents or with hot water treatments.
- Biological methods, such as **soil treatments of *Bacillus spp.*** or fluorescent pseudomonads have proven effective.
- The fungi ***Trichoderma viride*, *Trichoderma harzianum* and *Pseudomonas fluorescens*** all exhibit antagonistic growth against ***A. triticina*** hyphae in vitro and led to significantly higher yields in treated versus control plants infected with the leaf blight.
- Once infection is detected, foliar fungicides, such as **mancozeb, ziram, copperoxychloride, and propineb**, can prevent further infection from secondary inoculum.
- One common recommendation for control in India is 2 applications of **copperoxychloride + Mancozeb 15 days apart.**

References

- Systematic Mycology & Microbiology Laboratory “*Alternaria Triticina* (Leaf Blight of Wheat).” Invasive Species Compendium, CAB International, 2 Oct. 2019, www.cabi.org/isc/datasheet/4534.
- R. S. Singh. Introduction to Principles of Plant Pathology 4Ed (PB 2019)
- R.S. Mehrotra and Ashok Agarwal “Plant Pathology” Mc Graw Hill, Publication
- George N Agrios “Plant Pathology” 5th Edition Publisher Elsevier Academic Press



Thank You

