

# IMPACT OF PLANT DISEASES ON CROP PRODUCTION

## FUNGAL DISEASES OF PLANTS:

### Plant Diseases with Major Impact on Humans

There are many examples of plant diseases that have made a major impact on society and have even changed human history.

More than 70% of all major crop diseases are caused by fungi

### A. BLIGHT DISEASES

1. Late blight of potato was responsible for the loss of 25% of the population of Ireland during the 1840s.

1 million people died from starvation or famine-related diseases.

1.5 million emigrated from Ireland



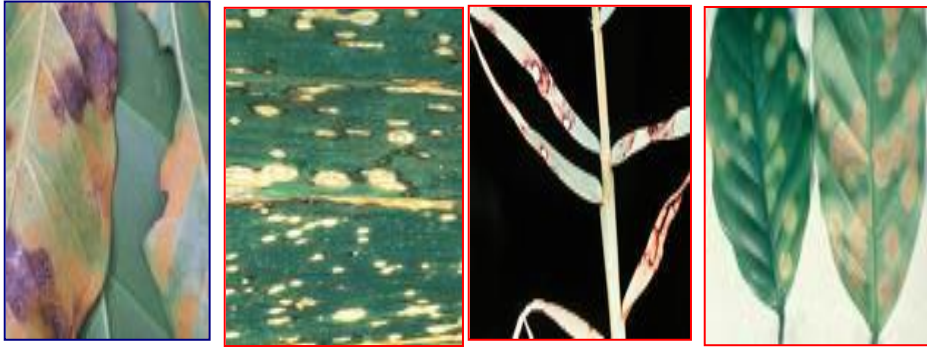
### 2. Brown spot of rice

[*Helminthosporium oryzae*]

It caused an epidemic that resulted in large-scale famine; 2 million people died of starvation during the great Bengal famine of 1942.



3. Southern leaf blight [(*Helminthosporium maydis*): *Bipolaris maydis*, synonym: *Drechslera maydis*, *Cochliobolus haterostrophus*.] A related fungus, which attacks corn and causes resulted in a widespread epidemic in the U.S. in 1970; ca. 15 % of the total corn crop was lost, with yields in some states reduced 50%



## B. RUST DISEASES

1. Coffee rust [*Hemileia vastatrix*] destroyed the coffee plantations in Sri Lanka (then Ceylon) in the 1870s and 1880s.

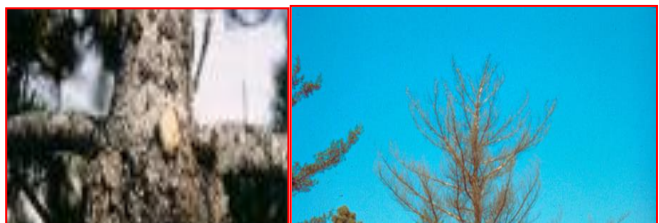
2. Apple Rust [*Gymnosporangium juniperi-virginianae*,] and pine trees [*Cronartium comptoniae*,] and the economies depending on these crops, have been devastated by rust fungi;

Cedar-apple rust causes yellow spots on the leaves and fruits of apple and crab apple (and related species), and produces galls on red cedar (juniper) trees

Epidemics caused by rust fungi have been noted for millennia.

3. Pine trees [*Cronartium comptoniae*,]

4. Stem rust of wheat: *Puccinia*



*graminis* subsp. *tritici*, which is responsible for stem rust of wheat

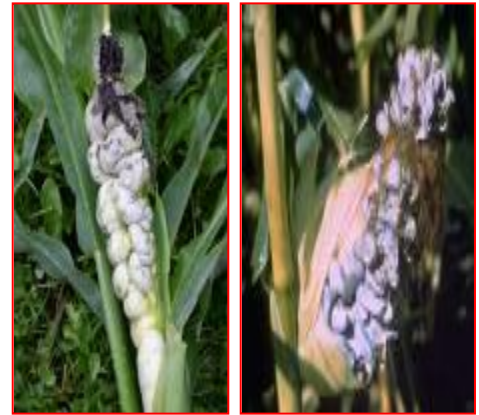
Wheat plants infected by the fungus are severely weakened but not destroyed, and the grain yield is significantly reduced; it is estimated that worldwide more than 1 million metric tons of wheat are lost annually to stem rust.

### C. SMUT DISEASES

Corn smut is caused by *Ustilago maydis*, which forms galls on any above ground part but is most conspicuous when the galls form on the ears

The smut fungi, like the rusts, are Basidiomycotina plant pathogens that cause

Significant losses of grain crops, incredible numbers of spores form, usually within galls; these masses of dark-brown or black spores, resembling soot or smut, give the common name to these pathogens. Corn smut is a widespread disease that is more common on sweet corn than on other varieties.



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### D. DUTCH ELM DISEASE

During the first half of the 20<sup>th</sup> century, the chestnut blight fungus caused the death of 80% of the Native American chestnut trees throughout eastern forests from Maine to Georgia.

The Dutch elm disease fungus, *Ophiostoma ulmi*, has led to the destruction of American elm trees and has altered urban landscapes by killing ornamental elms across the country.





The disease appeared in Europe around 1919, and the fungus was described in Holland in 1921; it was first found in the U.S. in Ohio in 1930. It quickly spread across the continent, and it has been estimated that more than 77 million elms have died. Although the fungus is responsible for the disease, elm bark beetles are the vectors that carry the fungal spores from infected elms to healthy trees.

### Plant diseases may limit the kind of plant and industry:

**AMERICAN CHESTNUT**---chestnut blight. *Cryphonectria parasitica*  
American Elm *Ophiostoma ulmi*



*Grape Vitis vinefera* bacterial disease----*Peirce's disease*



### Plant Diseases reduce the quantity and quality of plant produce:

Post harvest losses: Rots of storage fruits and vegetables.



### Apple Scab, *Venturia inaequalis*

Lesion on fruits Apple scab



## Citrus canker: *Xanthomonas axonopodis* pv. *citri*



Plant Diseases make the products poisonous to human and animal:

Ergot of rye---*Claviceps pupurea*

Aflatoxin production---*Aspergillus flavus*

**In Pakistan**

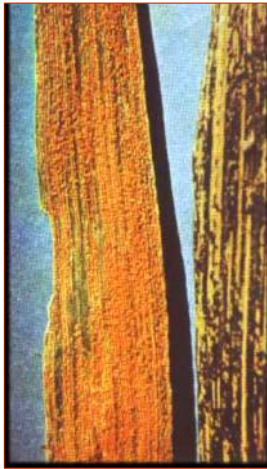


### 1. Ascochyta Gram blight: *Ascochyta rabiei*



## 2. Wheat rusts

### Comparison Stripe & Stem rust



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### Effects of Rust Plant growth and grain development



SAFDAR

**Monitory losses:**

Cultivation of resistant varieties----**less production.**

Chemical control

***Diseases by viruses***

