Lect. 1

Field Crop Diseases

Dr. Tahsin A.M.Amin

Salahaddin University

College of Agriculture Engineering Sciences

Plant Protection Department

2021 - 2022

Field Crop Diseases

- Field crop (wheat, barley, rice, corn, pea, bean,….)
- Field crops are a daily food and the key source of nutrition for million's of poor people´s a round the world.

Importance of the Plant Diseases

Estimated annual losses worldwide

36 % average of total losses yearly;

- 14 % are caused by diseases
- 10 % by insects
- 12 % by weeds.

➢ Considering that 14 % of the crops are lost to plant diseases alone, the total annual worldwide crop loss from plant diseases is about $220 billion.

➢ To these should be added 6–12% losses of crops after harvest.

➢ Besides these losses do not include losses caused by environmental factors such as freezes, droughts, air pollutants, nutrient deficiencies, and toxicities.

The losses can occur from the time of seed sowing in the field to harvesting and storage.

Principles of Plant Pathology

Plant pathology (gr., pathos -**"***suffering"*- *"logos",* study)

The study of suffering plant.

Phytopathology: Phyton (Plant)-pathology

Plant pathology:

- Study the organisms and environmental factors that cause diseases in plants.
- Study the mechanisms by which these factors induce disease in plants.
- Study the methods of controlling diseases and reducing damage.

Naming and Classifying Microorganisms

Naming microorganisms

- (Carl von linne´) Linnaeus established the **binomial system** of scientific nomenclature
- Each organism has two names: the **genus** and **species name.**

1707 – 1778

Botany, Biology and Zoology

Scientific Names

- A standardized nomenclature allows scientists from all over the world to exchange information.
- Are *italicized* or underlined. The genus is **C**apitalized, and the species name is lowercase.
- Are "Latinized" and used worldwide.
- May be descriptive or honor a scientist.

Important historical evidences of plant disease epidemics are:

- Wheat rust
- Irish Famine due to late blight of potato (Ireland, 1845 - 48).

Historical Perspectives:

The occurrence of rust diseases in cultivated cereals has significantly influenced the development of human civilisation.

- Biblical accounts, at about 1870 BC, indicate that rust epidemics forced the family of patriarch Jacob to seek refuge in Egypt.
- And the rust was recorded in the early Greek and Roman literatures where, in about 500 BC, ceremonial details indicate liturgies (religious ceremony) to appease Robigus, the Corn God, in an attempt to prevent crop failure.

Potato Late Blight

Irish Potato Famine

Between 1845 and 1849

- Up to one million people died
- Two million refugees

Definition of Disease:

Plant disease: is the abnormal growth and development of a plant.

(Continuous physiological and structural damage to plant tissues caused by biological and non-biological agents).

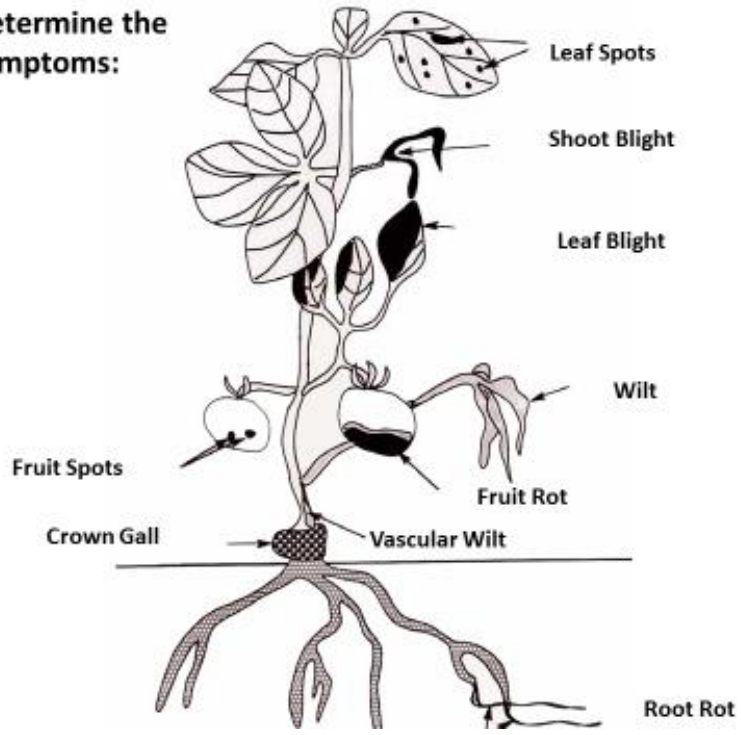
Crown Rot of rice

Loose smut (blast) of wheat

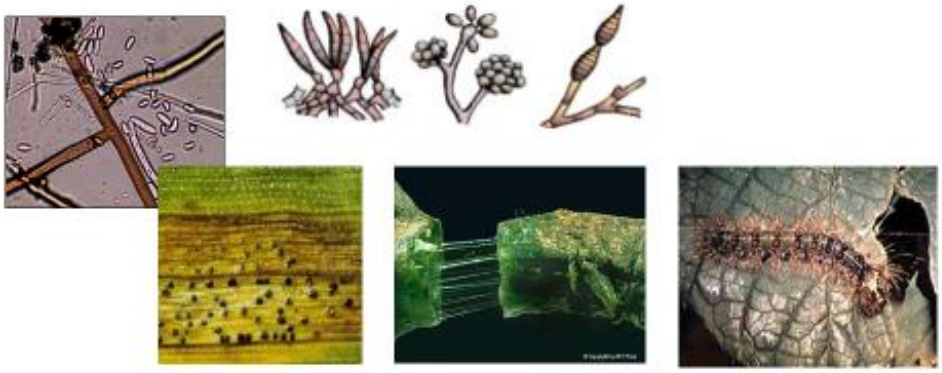
Symptoms and Signs

A Symptom: the physical expression of a change in the appearance and function of a plant (*e.g.*, leaf spots, wilting, galls on roots).

Determine the symptoms:



A Sign: is the visible presence of some structure formed by the pathogen on the host.
Examples: mycelium, spores, fruiting bodies, bacterial ooze, etc. or the damaging insect or its parts etc.



There are **two** types of Plant Diseases:

Abiotic noninfectious diseases (environmental factors)

Biotic infectious diseases(result from infection of a plant by a pathogen).

The pathogen grow and multiply rapidly on diseased plants

Ability to spread from diseased to healthy plants.

Classification of plant disease

disease caused by abiotic factors

1. Temperature
2. Soil moisture
3. Light
4. Nutrient deficiencies
5. Soil acidity or alkalinity (pH), salt problems
6. Toxicity of pesticides
7. Air pollution
8. Lack of oxygen
9. Mineral toxicities
10. Improper cultural

disease caused by biotic factors

(Infectious Diseases)

1- fungi
2- bacteria
3- viruses
4- nematodes

Are characterized by their presence on the surface of the plants or inside the plants (most pathogens).

Disease caused by a biotic factors

air pollution, e.g. SO_2 **Herbicide**

Disease caused by a biotic factors

Winter

Frost

Lack of Calcium

Salt

T. A.