

Salahaddin University- Erbil  
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4<sup>th</sup> Year Students



# Horticulture Disease

## Lecture 1:

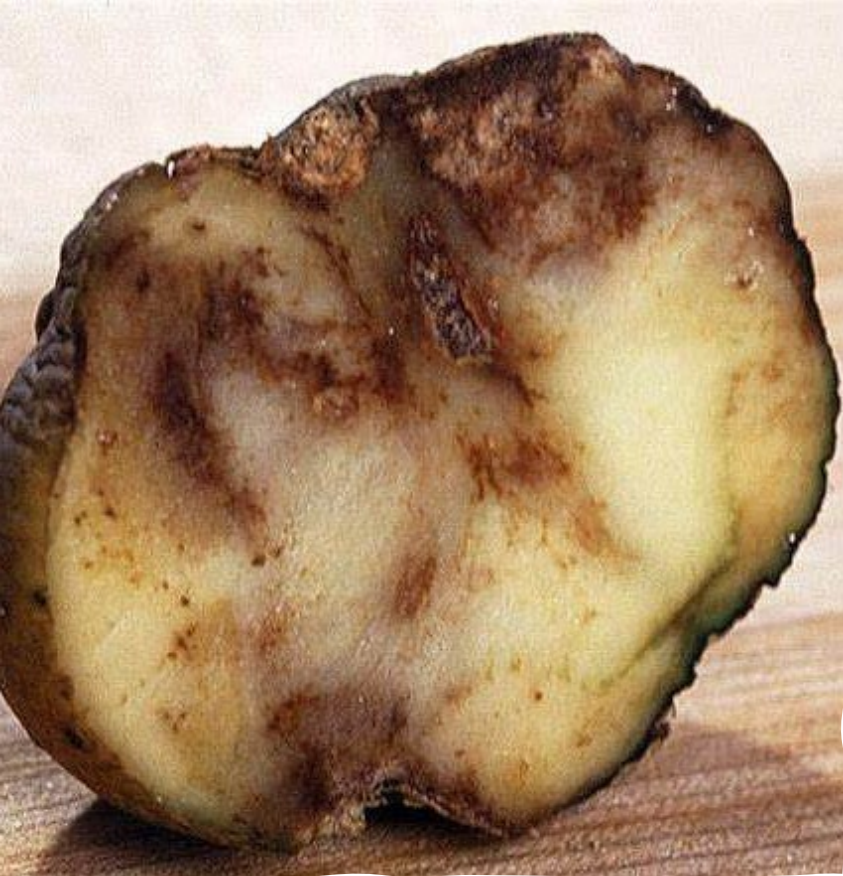
## Introduction to course & Plant disease

# Course book

- Lecture 1: Introduction to the course and Main concepts of Plant Disease
- Lecture 2: Plant disease Causes (causal agents)
- Lecture 3: Symptoms and signs of Horticulture Diseases (Root, Foliage, Stem)
- Lecture 4: Fruit diseases-Apple and pear diseases
- Lecture 5: Stone fruit diseases
- First Exam
- Lecture 6: Grape diseases and citrus disease
- Lecture 7: Field visit
- Lecture 8: Vegetable diseases- diseases of family solanaceae
- Lecture 9: Olive, fig, and pomegranate diseases
- Lecture 10: Walnut diseases
- Lecture 11: Diagnosis of Horticulture diseases (procedures & methods)
- Lecture 12: Management Strategies of Horticulture disease
- Second Exam

# What is Plant Disease?

- **Plant disease**, is the series of invisible and visible responses of plant cells and tissues to a pathogenic organism or environmental factor that result in adverse changes in the **form**, **function**, or integrity of the plant and **may lead to partial damage** or death of plant parts or the entire plant.
- **Plant disease**, is a deterioration of the normal state of a plant that interrupts or modifies its vital functions.
- **Plant pathology** is a science that studies plant diseases and attempts to improve the chances for survival of plants when they are faced with unfavorable environmental conditions and parasitic microorganisms that cause disease.
- The study of plant diseases is called **plant pathology**.
- Pathology is derived from the two Greek words *pathos* (suffering, disease) and *logos* (discourse, study).



# IRIS FAMINE in history

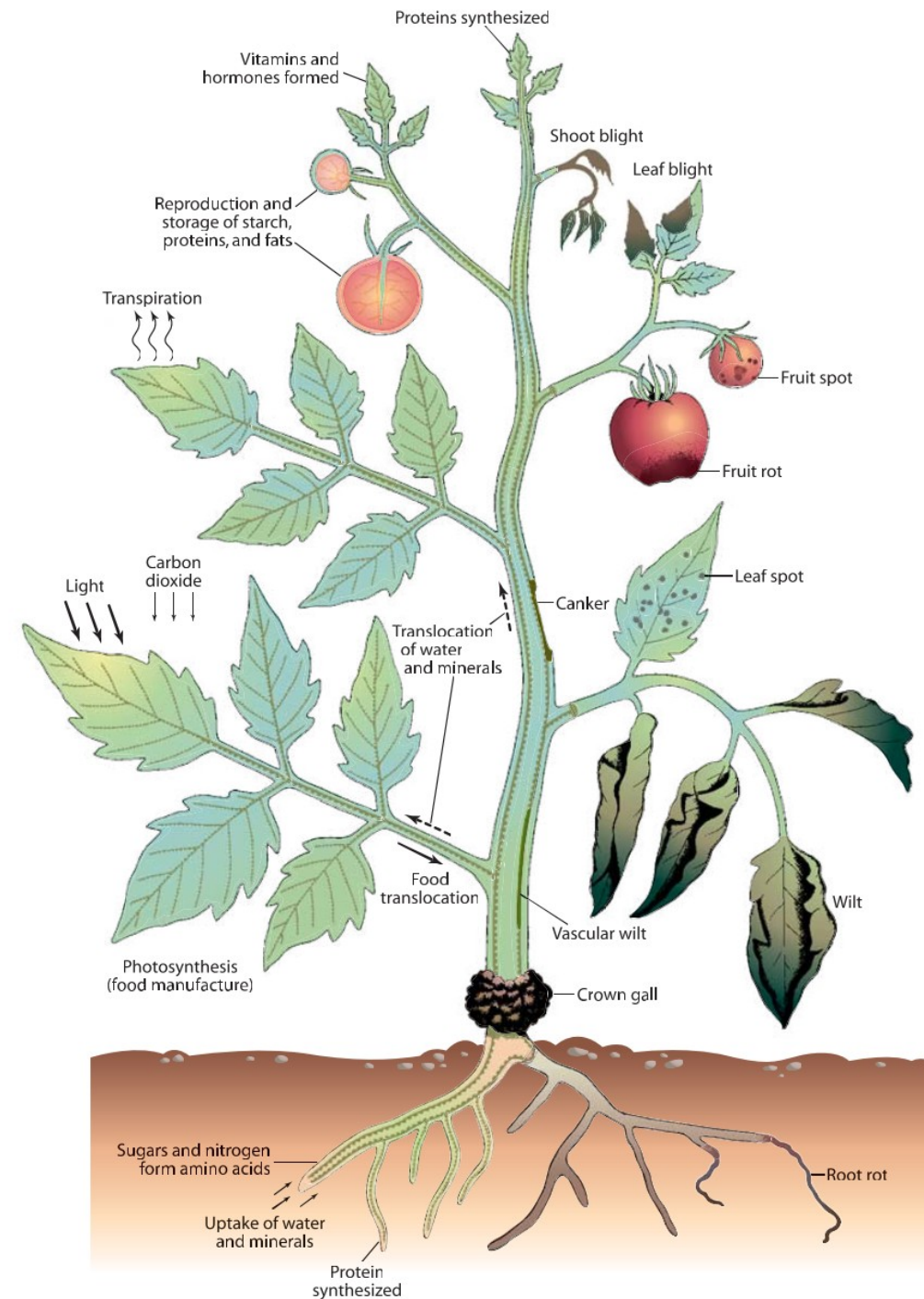
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- In 1845, the potato crop in Ireland was completely wiped out by late blight disease
- Caused great famine in 1846.
- This resulted in the death of hundreds of thousands of people
- Immigration of more than one and a half million Irish to United States.
- Irish Famine due to late blight of potato (Ireland, 1845).
- During a 15 year period 1 million Irish died of disease and starvation and another 1.5 million left to go to the U.S. or Canada



## • *Different Plant parts infected by different disease*

1. Infection of **roots** may cause roots to rot and make them unable to absorb water and nutrients from the soil.
2. Infection of **xylem vessels**, interferes with the translocation of water and minerals to the crown of the plant.
3. Infection of **phloem cells** in the veins of leaves and in the bark of stems and shoots, interferes with the downward translocation of photosynthetic products.
4. Infection of the **foliage**, interferes with photosynthesis.
5. Infection of **flowers and fruits** interferes with reproduction.



## **LOSSES CAUSED BY PLANT DISEASES**

### **A. Plant Diseases Reduce the Quantity and Quality of Plant Produce**

- Preharvest
- Postharvest

**Plant Diseases May Limit the Kinds of Plants and Industries in an Area**

### **B. Plant Diseases May Make Plants Poisonous to Humans and Animals**

### **D. Plant Diseases May Cause Financial Losses**

# Plant disease classification

## **Infectious, or biotic, plant diseases**

1. Diseases caused by fungi
2. Diseases caused by prokaryotes (bacteria)
3. Diseases caused by parasitic higher plants and green algae
4. Diseases caused by viruses and viroids
5. Diseases caused by nematodes.
6. Diseases caused by protozoa

## **Noninfectious, or abiotic, plant diseases:**

1. Diseases caused by too low or too high a temperature
2. Diseases caused by lack or excess of soil moisture
3. Diseases caused by lack or excess of light
4. Diseases caused by lack of oxygen
5. Diseases caused by air pollution
6. Diseases caused by nutrient deficiencies
7. Diseases caused by mineral toxicities
8. Diseases caused by soil acidity or alkalinity (pH)

- An organism that lives on or in some other organism and obtains its food from the latter is called a **parasite**.
- The removal of food by a parasite from its host is called **parasitism**.
- A **plant parasite** is an organism that becomes intimately associated with a plant and multiplies or grows at the expense of the plant.
- In some cases of parasitism, both the plant and the microorganism benefit from the association. This phenomenon is known as **symbiosis**. (e.g., the root nodule bacteria of legume plants and the mycorrhizal infection of feeder roots of most flowering plants).
- **Pathogenicity** is the ability of the parasite to interfere with one or more of the essential functions of the plant, thereby causing disease.



- **Biotrophs (Obligate parasites)** are organisms that require a host for the completion of their life cycle, they can grow and reproduce in nature only in living hosts. **Biotrophs** derive energy from living cells, they are found on or in living plants, can have very complex nutrient requirements and do not kill host plants rapidly. e.g., rusts, smuts, powdery mildews etc.
- **Necrotrophs (Nonobligate parasites )** are organisms that can live on either living or dead hosts and on various nutrient media, **Necrotrophs** derive energy from killed cells; they invade and kill plant tissue rapidly and then live saprotrophically on the dead remains.
- **Facultative saprophytes (hemibiotrophs, or semi-biotrophs)** are organisms that live most of the time or most of their life cycles as parasites but, under certain conditions, may grow saprophytically on dead organic matter. They have an initial period of biotrophy followed by necrotrophy.
- **Saprophytes** are the organisms which derive their nutrition from the dead organic matter only.

Comparison of generalized characteristics of biotrophic and necrotrophic plant pathogens

<b>Necrotrophs</b>	<b>Biotrophs</b>
Opportunistic, unspecialized ('non-obligate') pathogens	Specialized ('obligate') pathogens
Host cells killed rapidly	Cause little damage to the host plant; host cells not killed rapidly, but can induce hypersensitive cell death in incompatible interactions
Entry unspecialized via wounds or natural openings	Entry specialized e.g. direct (mechanical) entry (powdery mildews) or through natural openings (rusts)
Secrete copious cell-wall-degrading (lytic) enzymes and toxins	Few if any lytic enzymes or toxins are produced
Appressoria/haustoria not normally produced	Possess appressoria or haustoria
Seldom systemic	Often systemic
Usually attack weak, young or damaged plants	Plants of all ages and vigor attacked
Wide host range	Narrow host range
Easy to culture axenically (pure culture)	Not easily cultured axenically