

## TD 04: Diseases of Plants, Farm Animals, Soils and the Environment

### I. Plant diseases

Plant diseases are generally caused by **fungi, bacteria, viruses, nematodes** or **environmental factors** (such as drought, pollution, nutrient deficiency). They cause **spots, wilting, rotting, deformation, or death** of plants and reduce crop yield.

#### 1. Fungal diseases

Fungi are among the **most common plant pathogens**. They usually spread by **spores** carried by wind, water or tools.

- **Downy mildew** (for example on grapevine)
  - Caused by fungi-like organisms that prefer **humid and cool conditions**.
  - Symptoms: yellow or pale spots on the **upper side** of leaves, with **white or grey mold** on the underside.
  - Effect: leaves die, photosynthesis is reduced, and grape production decreases.
  - Control: good air circulation, avoiding leaf wetness, fungicide sprays.
- **Rusts** (on cereals and other crops)
  - Fungal diseases that form **orange, brown or black pustules** (small raised spots) on leaves and stems.
  - Very important on **wheat, barley and other cereals**.
  - Effect: reduce plant vigor and yield because the leaves cannot function normally.
  - Control: resistant varieties, crop rotation, fungicides.
- **Powdery mildew** (on grapevine, cucurbits, etc.)
  - Fungal disease that looks like **white powder** on leaves, stems and sometimes fruits.
  - Common on **grapes, cucumbers, courgettes, melons** and many other plants.
  - It prefers **dry, warm days and cool nights**.
  - Effect: leaves curl and dry, fruits may be deformed or of lower quality.
- **Grey mould (Botrytis)**, especially on fruits such as strawberries and grapes
  - Caused by **Botrytis cinerea**.
  - Attacks **flowers, fruits and stems**, especially in humid conditions.

- Symptoms: soft brown rot covered with **grey fuzzy mold**.
- Important in storage and transport because fruits rot quickly.

## 2. Bacterial diseases

Bacteria usually enter plants through **wounds, stomata, or natural openings**. They often cause **wilts, rots or leaf spots**.

- **Bacterial wilts and rots** (for example on tomato and potato)
  - Bacteria invade the **vascular system** (xylem) of the plant.
  - Symptoms: sudden **wilting of leaves and stems**, sometimes with brown discoloration inside.
  - In potatoes, tubers can **rot from the inside**, releasing a foul-smelling liquid.
  - These diseases can survive in soil and plant residues.
- **Fire blight**, mainly on apple and pear trees
  - Caused by the bacterium *Erwinia amylovora*.
  - Symptoms: flowers, shoots and branches look **burned** (blackened and curled).
  - It spreads quickly in **warm, wet weather**.
  - It is a serious disease in orchards and can kill young trees.

## 3. Viral diseases

Viruses are very small and can only reproduce **inside living plant cells**. They are often spread by **insects** (like aphids), **tools**, or **infected seeds and plants**.

- **Mosaic viruses**, mainly on tomatoes, potatoes and leafy vegetables
  - Symptoms: irregular **light and dark green patterns** on leaves (mosaic), sometimes with deformation.
  - Plants may be **stunted** (smaller than normal) and give fewer fruits.
  - They are often transmitted by **sap-sucking insects** or contaminated tools.
- **Grapevine mosaic diseases**
  - Viruses affecting grapevines, causing **yellow patterns, spots or rings** on leaves.
  - They reduce **vine vigor**, grape quality and yield.
  - Spread by planting infected material or through vectors (certain insects or nematodes).

## 4. Nematode diseases

Nematodes are **microscopic roundworms** that live in the soil and attack plant roots.

- **Root-knot nematodes**, which attack the roots of many crops
  - They cause **galls** (swellings) on roots.
  - Roots become deformed and cannot absorb water and nutrients properly.
  - Symptoms on the plant: **stunted growth**, yellowing, wilting even when soil is moist.
  - They affect many crops: tomatoes, potatoes, vegetables, etc.
  - Control includes crop rotation, resistant varieties and soil solarization.

## II. Diseases of farm animals

Farm animals (cattle, sheep, goats, pigs, poultry, etc.) can suffer from:

- **Infectious diseases** (caused by viruses, bacteria, etc.),
- **Parasitic diseases** (caused by internal or external parasites),
- **Metabolic diseases** (linked to nutrition and metabolism).

These diseases reduce **production** (milk, meat, eggs, wool) and may also be **dangerous to humans** (zoonoses).

### 1. Infectious diseases

- **Foot-and-mouth disease** (viral disease of ruminants)
  - Affects cattle, sheep, goats and other cloven-hoofed animals.
  - Symptoms: **fever**, blisters (vesicles) in the mouth and between the hooves, drooling, lameness.
  - Very **contagious** and spreads rapidly between animals.
  - Causes severe economic losses.
- **Bovine tuberculosis** (bacterial disease)
  - Chronic disease of cattle caused by *Mycobacterium bovis*.
  - Mainly affects the **lungs**, but also other organs.
  - Animals lose weight, have chronic cough, and may die.
  - It is a **zoonosis**: can infect humans, usually via unpasteurized milk.

- **Brucellosis** (bacterial disease, common in cattle)
  - Caused by bacteria of the genus *Brucella*.
  - Main sign: **abortions**, especially in late pregnancy.
  - Also causes infertility and reduced milk production.
  - Zoonosis too: in humans it causes “undulant fever” with long-lasting fever and fatigue.
- **Avian influenza** (viral disease of poultry)
  - Affects chickens, turkeys, ducks and other birds.
  - Symptoms: respiratory problems, drop in egg production, sometimes sudden death.
  - Some strains are highly pathogenic and cause **high mortality** in flocks.

## 2. Parasitic diseases

- **Coccidiosis**, affecting poultry, cattle and other animals
  - Caused by microscopic parasites (protozoa) that live in the **intestines**.
  - Symptoms: diarrhea (sometimes bloody), poor growth, weakness, and mortality in young animals.
  - Often a problem in crowded and dirty housing.
- **Intestinal worms (helminths)** in ruminants, pigs and poultry
  - Worms live in the digestive tract and **consume nutrients**.
  - Symptoms: weight loss, poor growth, anemia, diarrhea, reduced productivity.
  - Eggs of the worms are excreted in feces and contaminate pasture or bedding.

## 3. Metabolic diseases

- **Milk fever**, during the first weeks of lactation in dairy cows
  - Caused by a **sudden drop in blood calcium** after calving.
  - Symptoms: cows are weak, cannot stand, have cold ears and muscle tremors.
  - It is an emergency but can be treated with calcium injection.
- **Nutritional disorders**, such as vitamin or mineral deficiencies
  - Poor or unbalanced diets cause **deficiencies** in elements like calcium, phosphorus, magnesium, or vitamins A, D, E, etc.
  - Symptoms: weak bones, poor fertility, low milk or meat production, weak immune system.

- Correct feeding and mineral supplementation are essential.

### III. Soil and environmental diseases

Soils can also host **pathogens** that attack plant roots and stems. These are often called **soil-borne diseases**.

- **Fusarium wilt (*Fusarium* spp.)**

- Fungal disease that lives in the soil and infects plant roots.
- The fungus enters through the roots and blocks the **xylem vessels**.
- Symptoms: yellowing of lower leaves, **wilting** even when soil is moist, brown discoloration inside stems.
- Difficult to control because the fungus survives for a long time in soil and plant residues.

- **Root rot**

- Often caused by fungi (e.g. *Pythium*, *Phytophthora*, *Rhizoctonia*) or sometimes bacteria.
- Roots become **brown, soft, and decayed**.
- Above ground, plants show **wilting**, slow growth and may die.
- Favoring factors: waterlogged soils, poor drainage, compact soil, over-irrigation.