Lecture 3:

AGENTS CAUSING PLANT DISEASES

Diseases are caused by:

- living agents (biotic), called infectious plant diseases,
- nonliving agents (abiotic), called non-infectious plant diseases.

- **Biotic agents:**
- Including fungi, bacteria, viruses, nematodes, mycoplasma-lke organisms, and higher parasitic plants

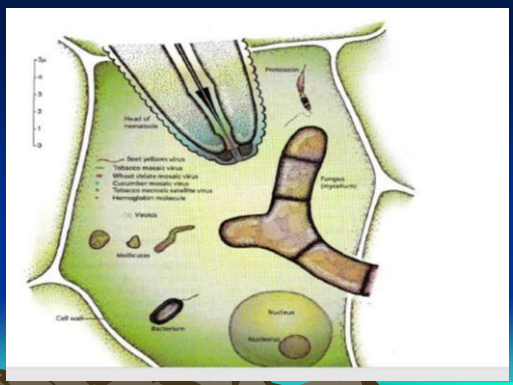
Non-infectious disease

Inorganic nutrient
Deficiency
Climate
Pollutants

Discovery of Pathogen

Koch's Postulates:

1. Pathogen consistently associated with disease
2. Pathogen must be isolated from diseased plant
3. Plant re-inoculated with pathogen
4. Pathogen must be re-isolated from diseased plant



DUNIA	TIPE SEL	JUMLAH SEL	MEKANISME NUTRISI
Monera	Prokariota	ekasel (unisellular)	Absorbsi fotosintesis
Protista	Eukariota	ekasel	Absorbsi pencernaan fotosintesis
Jamur	Eukariota	multisellular, ekasel	absorbsi
Tumbuhan	eukariota	Multisellular	fotosintesis
Binatang	eukariota	Multisellular	pencernaan

1. Fungi (Jamur/Cendawan)

General taxonomy:

Domain : Eukaryota
Kingdom : Fungi
Phylum(Division): Basidiomycota
Class : Basidiomycetes
Order : Uredinale
Family : Pucciniaceae
Genus: Puccinia
Species : *Puccinia graminis*

General characteristics

Kingdom Fungi

- have eukaryotic cells,
- form mycelium with chitinous walls,… hypha; colony
- develop from spores (sexual and nonsexual)
- the most important plant pathogens

General Characteristics of Fungi

- lack chlorophyll and conductive tissue.
- Of the >100.000 sp, >8000 species are known to cause disease in plants.
- a vegetative body (mycelium) made up of individual branches (hyphae) which may or may not have cross-walls (septa).

BACTERIA

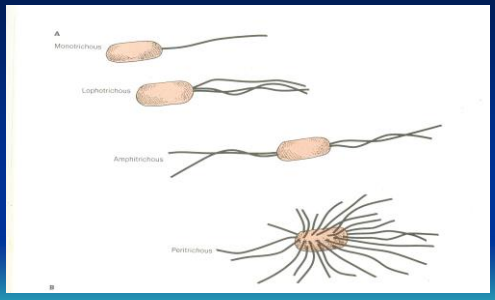
General characteristics :

- primitive organisms classified as prokaryotes,

- most of the genetic information in a bacterial cell is carried on a single chromosome with double-stranded DNA

- some bacterial cells contain extrachromosomal DNA as plasmids.
- unicellular

FLAGELLA



- three shapes: round (coccus, spherical or ovoid); rods (cylinders) or spirals (helices).

- All plant pathogenic bacteria are rod-shaped, 0.5-3.5 µm in length and 0.3-1.0 µm in diameter.

- About 200 out of the total 1600 known bacterial species are recognized as plant pathogens (sisanya = saprophytic decomposers).

Viruses and viroids

General characteristics:

1. very small; and it needs a living cell in order to reproduce.
2. Viruses are obligate parasites.
3. Viruses cause diseases in man and other animals, plants, fungi, bacteria, and even MLOs.

- Of the 1000 or more well characterized and classified viruses, over 500 cause diseases in plants and a plant may be simultaneously affected by more than one virus.
- The smallest plant pathogens, the most simply constructed; do not consist of cells (hanya asam nukleat (RNA or DNA) yang dibungkus dengan mantel protein).

Nematodes

General characteristics:

1. Kingdom Animalia, Division Nematoda.

2. Small eel-like worms, microscopic

3. Parasitic nematodes feed on plants by a stylet, which is used to suck liquid nutrients out of plant cells.

4. Reproduced by laying eggs.

5. The larvae develop through four molts,

6. Llife cycle is less than 30 days.

7. Pathogenic nematodes can parasite on the outside of plant tissues (ectoparasites) or wriggle inside the tissues and feed from within (endoparasites).

8. Cause damage by injuring cells, removing cell contents, or changing normal plant growth processes

Higher parasitic plants

Some higher plants that produce seeds are parasitic on other plants and are considered to be pathogens.

Most of these parasitic plants have modified rootlike structures that attach to plant tissues to obtain nutrients and water, but do not have root systems that can absorb nutrients from the soil.

Parasitic plants weaken the host by using nutrients that normally would be utilized by the host plant.

ABIOTIC AGENTS:

Physiological Disorder (non-infectious dis.) d

Extreme environmental factors:

- Temperature
- Soil moisture and air humidity
- Soil nutrients
- Light
- Air and soil pollutants
- Soil pH, soil nutrient….Herbisida

Characteristics and diagnosis:

Noninfectious diseases occur in the absence of pathogens, and cannot be transmitted from diseased to healthy plants

Occurring within a larger area
Associated with historical events