



وزارة التعليم العالي والبحث العلمي

جامعة الانبار / كلية الزراعة

قسم وقاية النبات

(امراض خضر - Vegetable diseases)



Fourth stage

المرحلة الرابعة

Plant Protection Dept.

قسم وقاية النبات

د. رشيد مشرف ذير

Dr. Rashid M. Theer

Losses caused by Plant diseases

- 1- Plant diseases are of paramount importance to humans. because they damage plants and plant products on which humans depend for food.
- 2- Plant diseases can determine the types of plants that can grow in large geographical areas.

Plant Diseases Reduce the Quantity and Quality of Plant Produce

Plants or plant products may be reduced in quantity by disease in the field as indeed is the case with most plant diseases, or by disease during storage.

Basic Procedures in diagnosis of Plant diseases

Pathogen or Environment

To diagnose a plant disease it is necessary to first determine whether the disease is caused by a pathogen or an environmental factor.

Diseases Caused by Fungi and Bacteria

When fungal mycelia and spores, or bacteria, are present on the affected area of a diseased plant, two possibilities must be considered:

- (1) the fungus or bacterium may be the actual cause of the disease
- (2) the fungus or bacterium may be one of the many saprophytic fungi or bacteria that can grow on dead plant tissue once the latter has been killed by some other cause, perhaps by even other fungi or bacteria.

Identification of a Previously Unknown Disease: Koch's Rules (Postulates)

The pathogen found seems to be the cause of the disease but no previous reports exist to support this, then the steps described on page 27 under Koch's postulates are taken to verify the hypothesis that the isolated pathogen is the cause of the disease

1-The pathogen must be present and accompanying the disease in all tested diseased plants.

2-The pathogen must be isolated and grown in pure cultures in nutrient environments or on susceptible host plants.

3-The pathogen must be taken from the pure culture and injected from healthy plants of the same species or variety of plants as the disease appeared and must produce the same disease on the injected plants.

4-The pathogen must be isolated again in a pure culture, and its characteristics must be exactly the same as those observed in the second step.

Parasitism and Pathogenicity

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**.

Development of disease in plants

A plant becomes diseased in most cases when it is attacked by a pathogen or when it is affected by an abiotic agent. Therefore, in the first case, for a plant disease to occur, at least two components (plant and pathogen) must come in contact and must interact. If at the time of contact of a pathogen with a plant, and for some time afterward, conditions are too cold, too hot, too dry, or some other extreme, the pathogen may be unable to attack

or the plant may be able to resist the attack, and therefore, despite the two being in contact, no disease develops. Apparently then, a third component, namely a set of environmental conditions within a favorable range, must also occur for disease to develop. Each of the three components can display considerable variability; however, as one component changes it.

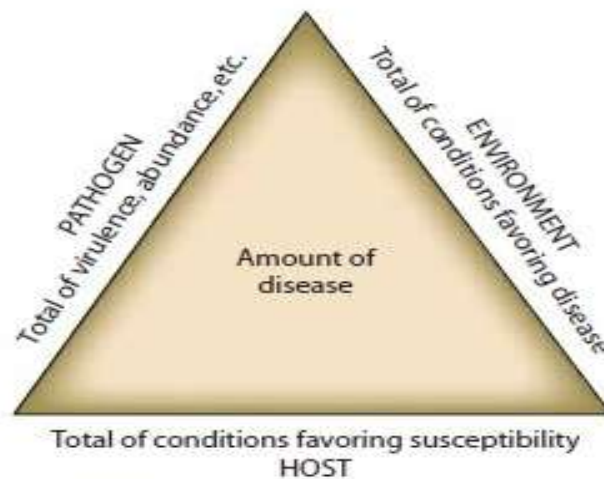


FIGURE 2-1 The disease triangle.

Inoculation

Inoculation is the initial contact of a pathogen with a site of plant where infection is possible. The pathogen that lands on or is otherwise brought into contact with the plant is called the **inoculum**.

That lands on or is otherwise brought into contact with the plant is called the **inoculum**. The inoculum is any part of the pathogen that can initiate infection. Thus, in fungi the inoculum may be spores **sclerotia** (i.e., a

compact mass of mycelium), or fragments of mycelium. In bacteria, mollicutes, protozoa, viruses, and viroids, the inoculum is always whole individuals of bacteria, mollicutes, protozoa, viruses, and viroids, respectively. In nematodes, the inoculum may be adult nematodes, nematode juveniles, or eggs. In parasitic higher plants, the inoculum may be plant fragments or seeds.

Types of Inoculum

1-An inoculum that survives dormant in the winter or summer and causes the original infections in the spring or in the autumn is called a **primary inoculum**, and the infections it causes are called **primary infections**.

2-An inoculum produced from primary infections is called a **secondary inoculum** and it, in turn, causes **secondary infections**. Generally, the more abundant the primary inoculum and the closer it is to the crop, the more severe the disease and the losses that result.

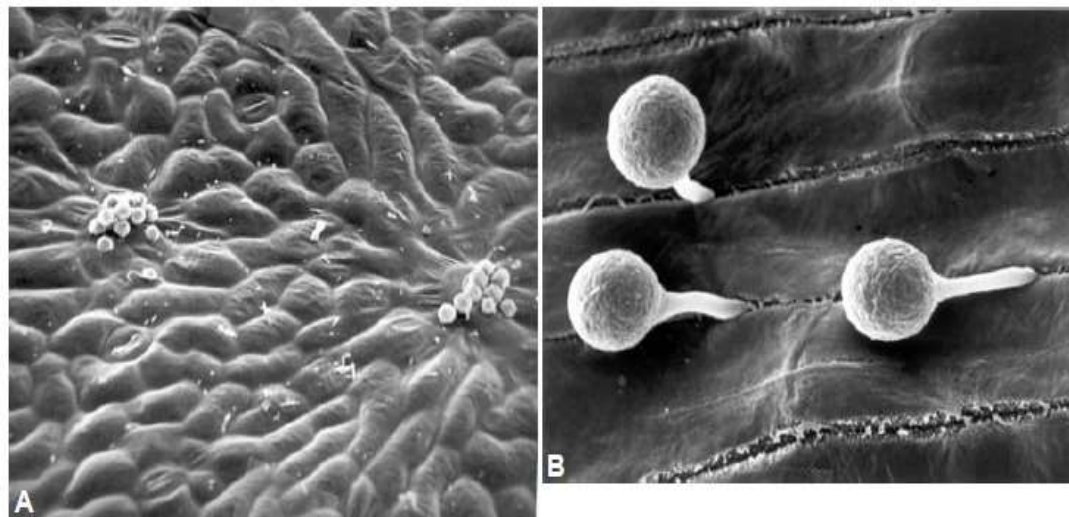


FIGURE 2-3 Types of inoculum and ways in which some pathogens enter a host plant. (A) Two groups of zoospores of the grape downy mildew oomycete have gathered over two leaf stomata. (B) Encysted zoospores of the soybean root rot pathogen *Phytophthora sojae* germinating and penetrating the root. (C) Mitospores (conidia) of a fungus that causes a corn leaf spot disease. (D) Bacteria of *Pseudomonas syringae* that causes bacterial spot and canker of stone fruits are seen in and surrounding a stoma of a cherry leaf. [Photographs courtesy of (A) D. J. Royle, (B) C. W. Mims and K. Enkerli, University of Georgia, and (D) E. L. Mansvelt, Stellenbosch, South Africa.]

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