

Insects in Relation to Plant Diseases

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- A broad subject
- Insect, pathogen and host plant
- Can be studied independently
 - But, these are inseparable
 - Disease that is caused is under consideration

Symbiosis

- *“Interaction between two different organisms living in close physical association, typically to the advantage of both”*
- Between insects and microorganisms is complex and frequent
- Results microorganisms to be plant pathogenic

Sucking insects and Pathogens

- Sucking insects, principally concerned in transmission of pathogens
- Pathogen
 - “*A bacterium, virus, or other microorganism that can cause disease*”
- Examples of symbiosis which involve plant pathogens are important

Pathogenecity

- Proofs of pathogenecity of fungi and bacteria
 - De Bary, Pasteur, Koch and Burill
- Role of Bees and wasps transmitting bacterial disease
 - Waite, 1881

Pathogenecity

- First review article by Norton, 1911
 - “ *The health of plants as related to insects*”
- Two categories
- Direct injuries
 - Physiological troubles following injuries
 - Disease caused by the presence of insects or their products

Pathogenecity

- Disease indirectly caused by insects
 - By dissemination of the pathogens

Classification of Plant Pathogens transmitted by arthropods and other animals

- Pathogens disseminated without wounding of plants
 - Mechanical dissemination only
 - Biological dissemination
 - Insects not obligatory
 - Insects obligatory

Classification of plant pathogens transmitted by arthropods and other animals

- Pathogens disseminated with wounding of plants
 - Mechanical
 - Biological
 - Insects not obligatory
 - Insects obligatory

Classification of plant pathogens transmitted by arthropods and other animals

- Pathogens disseminated by Injection
 - Fungi
 - Toxins
 - Viruses
 - Biological— passing through hemocoel
 - No multiplication in vector
 - Propagative, multiplying in vector
 - Mechanical

Insect and plant disease

- Great implications for world's food supply
- Cassava is starchy staple food for world's underfed population
 - Cassava mosaic is spreading unchecked
 - Decline of coconut trees
- Farmers of Nigeria suffer losses from toxin-secreting mealybug in Corn
 - Twists and distorts the corn

Bright Side

- Capsids
- “*A capsid is the protein shell of a virus*”
- A limiting factor in Africa for Cocoa production
 - Under control by modern methods
- Tolerant varieties
 - Lessen the impact of swollen-shoot virus diseases

What is Plant Disease

- *“Any disturbance that prevents the normal development of a plant and reduces its economic or aesthetic value”.*
- A disease interferes with the normal function of some part of the plant, resulting in lower yields or reduced quality.
- For the farmer, this leads to a decrease in income; for the consumer, reduced food supplies of lower quality and higher prices; and for the homeowner and turf manager, lower aesthetic value, less beauty, and higher maintenance costs.

Plant diseases

- Diseases are caused by
 - **Living agents** or **Biotic agents** (microorganisms and parasitic plants)
 - **Nonliving agents** or **Abiotic agents** (environmental factors, faulty nutrition, and chemical substances).
- In some diseases both pathogens and abiotic agents are involved.

Plant Disease

- A plant disease develops over a period of time
- An injury that may be caused by an insect feeding on a plant or damage from equipment or machinery occurs immediately or over a very short period of time.
- Usually a disease has been developing for several days before any symptoms on the plant are visible