

PLANT PATHOGENS

Learning Objectives

The learner will:

- Become familiar with various types of plant pathogens or disease agents.
- Examine various methods of disease management.

Plant Pathogen Overview

- A plant pathogen is any harmful introduced infectious agent, organism, or condition that reduces a plant's overall vitality, inhibits its growth, or limits the ability of the plant to survive and reproduce.
- Pathogens can be delivered in a multitude of different ways. These include: bacteria, fungi, viruses, nematodes, oomycetes, and abiotic toxicities.
- There are several different factors that need to be present in order to create an outbreak of disease on the farm. The pathogen must be present. There must be suitable host plants around. And there must be favorable environmental conditions for the growth and development of that particular plant pathogen.

Disease Agents

- *Bacteria:* These single cell organisms absorb the nutrition from their host plant and thrive by killing the plant and living off of their decomposing organic matter. This is often described as a saprophytic relationship. Bacterial pathogens cause blights, rots, and wilts.
- *Fungi:* Fungal pathogens are spread by many different environmental conditions such as wind water, seeds, human and other non-human vectors. (A vector is a host capable of transferring a particular pathogen.) Fungi that are capable of regenerating spores during the growing season and re-infecting plants are known as polycyclic. Fungi that must wait for next season are monocyclic.
- *Viruses:* Viruses are pieces of genetic material (RNA/DNA) and disturb the plants by mimicking naturally occurring genetic abnormalities. There are more than 700 plant viruses known. Viruses can be spread by tractors or equipment, tainted seed, or by a traveling vector.
- *Nematodes:* Nematodes are both a pathogen and a vector. Nematodes are microscopic worms and are one of the most abundant phyla with over 20,000

different species. A nematode either infects a plant by injecting a needle like mouth into the plant or it actually enters the plant with its entire body. The nematode's saliva is the infecting agent and disturbs the metabolic process of the plant and causes disease and death.

- *Abiotic*: This refers to deficiencies in the soil or surrounding environment that cause a debilitating illness that is harmful or fatal to the plant
- *Oomycetes*: These organisms act much like a fungi, however they have a very different evolutionary history. They have mobile spores and can be primarily spread by both wind and water. They can also be spread by vectors. An example of an oomycetes is “downy mildew” also known as “damping off.”

Disease Management

- Plants often have developed natural defenses against pathogens. Some plants have developed disease tolerance. Some plants have developed disease resistance. Plants that are disease resistant will exhibit characteristics that actually repel certain harmful disease known to attack that particular plant. Plants that are disease tolerant can live with a problem pathogen but survive without any substantial reduction in yield or overall health.
- Proper greenhouse management can be extremely helpful in the control of outbreak and spread of pathogens. Disinfecting all soil trays and propagating mediums greatly reduces the incidence of pathogens.
- A solid approach to crop rotation will also limit the spread and overall effect of certain diseases. This is a result of diversity increasing overall vitality, limiting host species, and reducing environmental conditions needed for disease to flourish and spread in similar varieties or families of plants.
- Recognizing pre-existing factors that may contribute to pathogen outbreak is an important aspect of disease control. An example would be being vigilant and wary of downy mildew in a very wet or coastal environment.
- In some organic situations, chemical control of disease is necessary and allowed by organic standards. Effectuated host plants can be physically removed or treated with such elements as copper, sulfur, or neem. It is always recommended that you consult with an expert before using or adding any amendment to your fields to help control disease.
- Overall plant vitality is probably the single most important element for fighting and combating disease in your garden or field. Pathogens have the tendency to attack weak or stressed plants in the garden. If a disease establishes itself using

the weaker plants it can often jump to the stronger crops. Therefore, maintaining conditions favorable to general plant vitality can significantly reduce the occurrence of disease. Removing harvested plants quickly and composting effectively will reduce instance of pathogens as well.

Assessment/Review

- What is a vector?
- What are several types of pathogens and how do they affect the plant?
- What essential disease prevention methods should be used on the farm to reduce the risk of pathogens?