

Diseases

- ▶ A **plant disease** is defined as a disturbance to the normal growth and development of a plant.
 - ▶ Diseases are generally classified as being infectious or noninfectious.
- ▶ **Infectious diseases** are caused by living organisms such as bacteria, fungi, or virus, which are often referred to as disease **pathogens**.
 - ▶ An infectious disease can be spread to other plants.

Pests

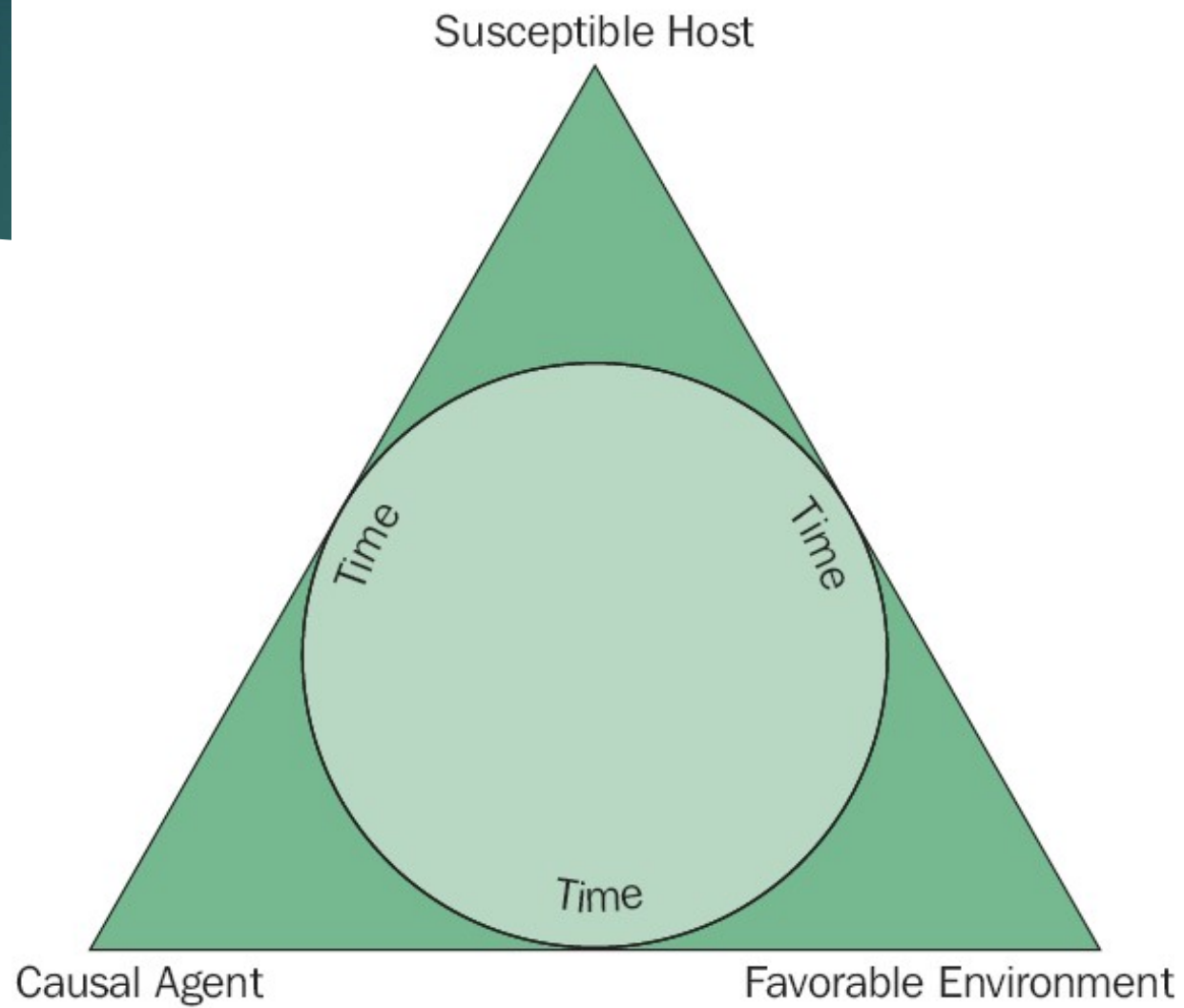
- ▶ **Noninfectious diseases** are caused by environmental imbalances and cannot be spread to other plants.
 - ▶ Noninfectious disease examples include *over watering, nutrient deficiencies, and air pollution damage*.
 - ▶ Plants are most susceptible to disease when they are under some type of *stress*.
 - ▶ The stress is usually associated with *environmental factors*.

Pests

1. The occurrence and severity of infectious plant diseases is based on **three factors**.

- ▶ A **susceptible plant** or host must be present.
- ▶ The **causal agent** or organism that produces a disease must be present.
- ▶ **Environmental conditions** conducive to the causal agent must occur.
 - ▶ The relationship of these three factors is known as the **disease triangle**.
 - ▶ Disease control programs are designed to affect each or all of these factors.

Pests



Pests

2. **Fungi** are a principal cause of plant disease.

- ▶ **Fungi** are organisms that lack **chlorophyll**.
 - ▶ They **absorb nutrients** from living or dead organisms.
 - ▶ Their bodies consist of **threadlike** vegetative structures known as hyphae.
 - ▶ When hyphae are grouped together, they are called mycelium.
 - ▶ Fungi can reproduce and cause disease by producing **spores** or mycelia.
 - ▶ The fungus can produce spores asexually or sexually.

Pests

3. **Bacteria** are one-celled or unicellular microscopic organisms.

- ▶ Bacteria can enter a plant only through **wounds or natural openings**.



Pests

4. **Viruses** are composed of nucleic acids surrounded by protein sheaths.

- ▶ They are capable of altering a plant's **metabolism** by affecting protein synthesis.
- ▶ Plant viruses are transmitted by seeds, insects, nematodes, fungi, and mechanical means.
- ▶ Viral diseases produce several symptoms including ring spots, stunting, malformations, and mosaics.
- ▶ A **mosaic** symptom is a leaf pattern of light and dark green color.





IPM

- ▶ For successful management of pests, the IPM program must be a **year-round** program.
- ▶ The strength of IPM is the combination of control measures used.
- ▶ Four broad areas of control include sanitation, cultural/physical control, biological control, and chemical control.

IPM

- ▶ Many pest problems can be greatly reduced, if not eliminated, with sanitation.
- ▶ **Sanitation** is simply the effort made to keep a greenhouse or garden clean.
- ▶ Many insects and diseases can be found in **plant debris**.

IPM

- ▶ **Cultural/physical control** methods are those methods that physically prevent activities of pests.
 - ▶ Used alone they probably will not provide complete control of pests and reduce certain problems.
 - ▶ Cultural/physical controls are also safe to humans and relatively easy to implement.
- 1. Stop the **introduction** of pests to the greenhouse when possible.
- 2. **Remove and destroy** heavily infested and diseased plants.

IPM

3. Maintain optimal cultural requirements for each crop (**growing medium, watering, fertility, temperatures, etc.**) to promote healthy growth.
4. Fungal diseases can be reduced by providing **good air circulation** around the plants. (re-fluffing soil)
5. The **yellow sticky traps** used as monitoring tools also serve as a means of physical control.





▶ **Biological controls** involve the use of living organisms to control pests.

- ▶ They may be microbial organisms, parasitic organisms, or predators.
- ▶ Biological control organisms for greenhouse use are found in nature and are considered environmentally safe.

1. A **bacterium**, *Bacillus thurengiensis*, effectively controls caterpillars.

- ▶ Aphids and whitefly can be controlled to an extent by species of bacteria and fungi.
- ▶ The bacteria and fungi are natural diseases of those insects.

IPM

2. Parasitic organisms help to control some pests.

- ▶ The parasites are natural enemies of the pest and live off the pest organism.
- ▶ An example is a tiny parasitic wasp that lays its eggs on the whitefly larva that feeds on plant leaves.
- ▶ The eggs hatch with the wasp larva inside the white fly larva.
- ▶ The wasp larva proceeds to eat the whitefly larva.
- ▶ The wasp matures, emerges from what is left of the whitefly, mates, and looks for whitefly larva on which to lay the next generation of eggs.



IPM

3. **Predatory** organisms can be released to devour certain plant pests.

- ▶ A beetle attacks whitefly larva and adults.
- ▶ A mite is used to control thrips.
- ▶ Ladybugs eat aphids.
- ▶ As with parasitic organisms, chemical pesticides should not be used with predatory organisms.
- ▶ Also, predatory and parasitic organisms should be released when pest populations are small.

IPM

- ▶ The use of chemicals to control pests and diseases is **chemical control**.
 - ▶ The chemicals used are called **pesticides**.
 - ▶ Although once used almost exclusively, control of pests with the use of pesticides is now viewed as only one component of an IPM program.
 - ▶ In fact, use of chemical pesticides is now often done only when absolutely necessary.
 - ▶ Application of pesticides must be done safely to reduce potential injury to people and the environment.