

Plant Pathology Fact Sheet

Managing the Greenhouse Environment to Control Plant Diseases

By Brian Eshenaur and Robert Anderson*

Numerous plant disease problems can arise in greenhouse situations. These diseases can cause extensive damage if allowed to develop unchecked. Since plant diseases are strongly affected by temperature and humidity, the best way to combat disease is to manipulate the greenhouse environment. Unlike the weather outdoors, we can control the greenhouse environment.

Plant disease control in the greenhouse is generally more effective if the following aspects of the greenhouse environment are managed properly:

Humidity

High humidity levels encourage the development of many plant diseases. The relative humidity is usually 25%-70% during the day in greenhouses and generally no problem. However, humidity levels are generally 90-100% during the night. During periods of rainy weather in winter, the



relative humidity may stay near 100% for a number of days and nights.

Maintain adequate plant spacing. When plants are crowded together, disease development is encouraged by the high humidity in the canopy. Plants hung overhead reduce normal water evaporation and contribute to high humidity in the crop canopy. Maintain air circulation during periods of high humidity. Most greenhouses are equipped

with air circulation, fan-jet or horizontal air flow, systems. These systems should operate continuously when high humidity occurs in the greenhouse, i.e., every night of the year and during rainy overcast days.

Ventilate the greenhouse to reduce internal relative humidity. Most winter evenings are cool enough to raise the humidity to 100% and cause considerable condensation in the greenhouse. This condensation can be reduced if the greenhouse is ventilated at dusk each day.

In the late afternoon, turn on the ventilation fans to exhaust the warm moist air from the greenhouse. The warm moist greenhouse air is replaced with cool/cold, moist air from outdoors. When this outside air is heated in the greenhouse it becomes much drier than the previous greenhouse air. This management practice greatly reduces the relative humidity in the greenhouse and reduces potential disease problems.

Watering

The risk of plant diseases is reduced when the foliage and flowers are kept dry. Most disease organisms need water on the plant surface for normal growth. Additionally, splashing water is the primary method of spreading disease from plant to plant.

Apply water only to the growing medium surface, when possible, rather than “showering” the whole plant. Water early in the day; don’t water after 4 p.m., except in the summer.

Watch plants closely and water judiciously. Remember that with variations in light levels, temperature and humidity the plants need for water will change. Watering practices should be attentive to these changes. Plants beneath overhead plants will not dry as quickly as neighboring plants in full sun.

Water thoroughly and do not water again until the growing medium is dry. Excess water in the growing medium weakens plants and makes them more susceptible to damping-off and root rotting diseases. Good drainage and the related good aeration of the growing medium is important to prevent root rot problems. Separate weaker plants that do not use water as fast as the strong plants; they will not be overwatered as easily.

Be sure to use a good growing medium. Professionally prepared media are generally the most effective and are recommended to commercial growers. When using mineral soil in a mix, be sure it is adequately sterilized. Never use more than 15% mineral soil in a growing media that will be used in containers less than 4 inches tall.

Sanitation

Keep the greenhouse clean and free of plant debris and outside soil. Remove dead leaves, flowers, plant refuse and weeds from the greenhouse. Debris should be gathered regularly and discarded as soon as possible after collecting. Immediate removal is important because certain fungal pathogens can develop and produce spores on the plant debris.

Weeds along walkways and under benches or even weeds growing just outside the greenhouse can harbor diseases that can be transmitted to greenhouse crops. Insects on weeds may vector plant virus diseases.

Non-sterile soil from outdoors should not be allowed into the greenhouse. Since many soilborne pathogens can be a serious problem if introduced into the greenhouse, the best control method is to exclude these pathogens from the greenhouse. This can be accomplished by using a soilless medium which is free of plant pathogens.

Surface sterilize all work surfaces and tools

regularly to prevent accidental disease spread. Diseases are often transferred in the greenhouse through used pots, dirty tools, messy work surfaces, unswept floors, etc. Precautions should be taken to prevent this. Surface sterilization of tools and work surfaces in and around the greenhouse can be accomplished by washing with a dilute solution of household bleach (9 parts water to 1 part beach) or the use of commercial disinfectants such as Greenshield and Physan.

* Brian Eshenaur is a former Plant Disease Diagnostician In the Department of Plant Pathology. Dr. Anderson is Extension Floriculture Specialist, Department of Horticulture and Landscape Architecture.

(Revised 10-04 by J. Hartman)