

Damping-off

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Plant Disease Management: Horticultural Crops

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Pathogens

Soilborne fungi *Pythium* spp., *Rhizoctonia solani*,
Thielaviopsis basicola

Host

Seedlings of many plants, including most vegetables and flowers

Symptoms/signs

Seeds may fail to emerge and when dug up and inspected are soft, dark colored and usually disintegrating. Seedlings fall over and die rapidly. Because Damping-off is caused by several different fungi, there are several different symptoms associated with disease. When infected with *Pythium* spp., the stem tissue is water-soaked, may become dark colored and collapse. Roots are usually dark and rotted. Seedlings infected with *Rhizoctonia solani* have reddish brown lesions on the stem and roots. Stems are often girdled or become water-soaked and soft, causing the plant to fall over. *Thielaviopsis basicola* causes a black root rot that may affect all or part of the root system. The fungus produces large spores around the root that look much like Tootsi-rolls. The spores are diagnostic and can be easily seen under low power of a microscope.

Environmental conditions

Damping-off occurs in both cool and warm soils since the fungi that cause disease are active at different soil temperatures and in moist to wet soils. The optimum temperatures for disease vary: *Pythium* is most active in wet, warm soils; *Rhizoctonia solani* causes Damping-off most frequently in cool, moist soils; and *Thielaviopsis* is active at cooler temperatures in wet to moist soils.

Disease

Damping-off is caused by several soilborne fungi found commonly in soils that may or may not have been previously cultivated. None of these fungi needs a wound or natural opening to enter the plant, but wounding can increase the severity of disease.

When environmental conditions are right and a susceptible host is present, *Pythium* produces motile spores that can infect a plant root within a few minutes. These spores germinate to produce a mycelium that grows into the roots, killing plant tissue as it grows. *Pythium* also produces sexual spores in the roots or in the soil that are resistant to adverse environmental conditions such as drying or cold temperatures

At a Glance

Damping off is caused by several different fungi under different environmental conditions:

- *Pythium* Damping-off — collapse of the stem at the soil line or below the soil surface or a pre-emergence rot; blackened rotted roots on older seedlings; usually in warm, wet soils.
- *Rhizoctonia solani* Damping-off — reddish brown lesions on the stem at the soil line that may girdle the stem; in warm to cool soils.
- *Thielaviopsis basicola* Damping-off — black root rot of seedlings; plants may grow out of disease but remain stunted compared to healthy plants; usually in cool soils.

Prevent disease using good cultural practices: plant when temperatures are optimum for seedling growth; plant into soils that are moist but not wet and maintain a uniform soil moisture; use vigorous seed and seedlings; plant at appropriate depth.

and can survive in a dormant state for months or years. These spores germinate in the presence of a susceptible host when environmental conditions are favorable. The hyphae then penetrate the host root.

Rhizoctonia does not produce spores but grows on dead organic matter in the soil from which it can invade the roots and hypocotyls of susceptible hosts. Once the host tissue has died, *Rhizoctonia* can continue to live on the dead organic matter or may form survival structures called sclerotia that can remain in soils for a long time without a food source or moisture. The sclerotia germinate when environmental conditions are favorable.

Thielaviopsis produces asexual spores that can survive in the soil for many years and are not dependent on excessive moisture for infection. Spores germinate when environmental conditions are favorable and a susceptible host is present, producing hyphae that invade the root.

Prevention/control

CULTURAL PRACTICES

Host plant resistance to the fungi that cause Damping-off is not available. Therefore, cultural practices are extremely important for prevention and control. Seed beds should be irrigated carefully to avoid excessive soil mois-

ture. Plant when environmental conditions are best for the most rapid growth of seedlings and use only healthy transplants. When buying young transplants, look for healthy white roots, sturdy stems and good color. Put seeds and transplants at the appropriate depth since deep planting slows emergence or growth and encourages disease.

In low desert areas, wait until temperatures cool down in October and November to transplant winter flowers to avoid *Pythium* and *Rhizoctonia* Damping-off. In high desert areas, where annual flowers and vegetables are planted in the spring, wait until days are warm enough for good plant growth to avoid infections of *Rhizoctonia* and *Thielaviopsis*. Healthy, fast-growing seedlings and soils that dry slightly between irrigations are the best prevention methods for Damping-off.

CHEMICAL CONTROL

In infested soils, seed treatments may give some control. Look for treated seed from the distributor. Many seed companies offer the option of treated or non-treated seed. Seed is treated with metalaxyl for control of *Pythium* and with PCNB (pentachloronitrobenzene) or Chloroneb for control of *Rhizoctonia*. No fungicide seed treatments are very effective for control of *Thielaviopsis basicola*.

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