Damping-off of Ornamental and Vegetable Seedlings

Damping-off is a common disease of germinating seeds and young seedlings. It may be found in greenhouses that grow vegetable or ornamental transplants. Several fungi or fungi-like organisms are capable of causing damping-off especially *Pythium* and *Rhizoctonia.* However, *Alternaria, Sclerotinia, Botrytis, Phytophthora* and *Fusarium* can also cause damping off.

Soil-borne fungi generally do not produce air-borne spores, but they are easily moved from contaminated soil to pathogen-free growing media by infected tools, hose ends, water-splash, and worker's hands. Some fungi such as *Alternaria* are seed-borne.

Favorable Conditions
Damping off can develop if seedlings are overwatered and the growing media stays wet too long. Excessive overhead misting or condensation dripping from greenhouse coverings to the growing media promotes damping off. Low media temperatures (below 68˚F) before seeds germinate can also promote damping off. Overcrowded seed flats, increase moisture and humidity levels around young seedlings, promoting damping off diseases.

Young seedlings are most susceptible to damping-off. However, later in the crop cycle, the same pathogens may cause "wire stem" with an off-color, twisted and constricted stem. Cabbage, cauliflower, tomato and pepper seedlings may develop wire stem.

Symptoms of damping-off include:

- seedlings failing to emerge (pre-emergence damping off)
- seedlings wilting, often with a stem lesion that appears water-soaked or is dark, necrotic and sunken at the soil line (post-emergence damping off)

Figure 1: Damping off on Arugula caused by Pythium aphanidermatum (on left) and on tomato caused by Phytophthora nicotianae. Photos by C. McGehee, NC State Extension

When seedlings are planted in flats, damping off pathogens spread radially from a central point of origin with seedlings dying in a circular pattern. In plug trays, infected plants may be more randomly affected as the pathogens move by splashing water. Seedlings that are germinated in poorly drained, cool soils are especially susceptible. Young plants that do emerge are weak and often wilt at or below the soil line.

Figure 2: Seedlings infected with damping off dying in a circular pattern. Photos by Heather Faubert, URI (on left) and Leanne Pundt, UConn (on right)

Stems of these plants may shrivel and become dark and woody (wirestem). The plants may not collapse, but remain stunted and die after transplanting into the field or garden.

Figure 3: Wirestem on broccoli caused by Rhizoctonia. Photo by Angela Madeiras, UMass.

Seeds may not germinate if the seed is old or if conditions have not been favorable for germination. If the seeds have germinated, but the emerging shoot is water soaked or decayed, damping off pathogens are most likely the cause.

If tender young seedlings are over-fertilized, roots appear shriveled and desiccated, as the plants die from high salt injury. Hot water, heat stress, lack of water and phytotoxicity from chemical sprays can also cause tender young seedlings to die.

Management: Prevent damping-off because it is difficult to stop once symptoms occur. Focus on proper sanitation practices, use of preventive biological fungicides, and providing proper cultural care for young seedlings.

Proper Sanitation Practices

- Use only certified disease-free seed from reputable seed companies.
- Use fungicide-treated seed, if available.
- Use commercially available soilless potting media that are free of damping off fungi.
- Use pasteurized soil, or properly produced compost-based growing mixes. Test pH and EC levels of compost before using to be sure the compost is finished.
- Alternatively, fill a pot with compost and a pot with a reputable potting mix, plant 4 or 6 bean seeds and compare results.
- Disinfect all flats, pots and tools before using.
- After disinfection, do not contaminate cleaned flats, by placing them on a dirty greenhouse floor or using dirty tools.
- Do not reuse plug trays with diseased plants. It is very difficult to remove all the organic matter in the small plug trays so that the commercial disinfectants can work.
- Discard **entire** infected flats.
- Do not just discard seedlings with symptoms of damping off. Seedlings may appear healthy, but can carry infected media and develop wirestem or root rot, as they get older.

Encourage Seedlings to Grow Rapidly

- Incorporate biological fungicides into your soilless mix or apply biological fungicides as a drench at planting**.** See Biological Fungicides fact sheet on the UConn Greenhouse IPM website under diseases for more information.
- Fill flats with pre-moistened growing media to avoid compaction. Lightly fill and brush containers. To avoid compaction, do not stack or “nest” filled trays or pots.
- Germinate seed under conditions that will ensure rapid emergence, such as with the use of bottom heat (70-75˚F).
- Avoid planting seeds too deeply, which stresses the seedlings.
- Provide adequate light for rapid growth.

Avoid favorable conditions for the pathogens (cold, wet conditions

- Avoid overwatering, excessive fertilizer, poor air circulation, and careless handling.
- Avoid planting seeds too densely, which reduces airflow around the young seedlings.
- Keep greenhouse temperatures warm with low humidity. Condensation on the plastic causes drips which can then lead excessive moisture and damping off.
- If damping off occurs, treatment with a broad-spectrum fungicide may be an option. However, tender young seedlings are more susceptible to plant injury from fungicide treatments (phytotoxicity) than more mature plants. See the latest edition of New York and New England Management Guidelines for Greenhouse Floriculture and Herbaceous Ornamentals and the New England Vegetable Management Guide (see section on vegetable transplants) for more specific up-to-date recommendations.

By P.S. Mercure, UConn Extension, 1998. Revised by Leanne Pundt, UConn Extension, latest revision 2023.

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