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Richard X. Latin

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Plant Disease Control

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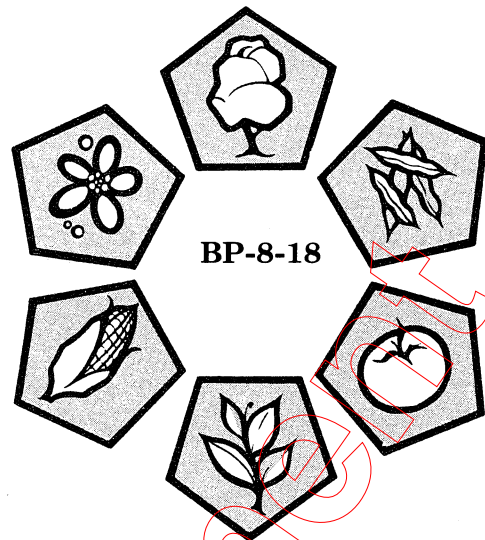
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## Plant Disease Control



# Damping-off of Vegetable Seedlings

Richard X. Latin, Extension Plant Pathologist

Damping-off is a disease which can affect almost all vegetables at their earliest growth stages. It occurs worldwide and may be caused by several soilborne fungi. Losses due to damping-off can be very severe and often appear as reduced stands in seed flats or rapid wilting and death of young seedlings. Prevention is the key to control of damping-off and can be achieved by several methods.

## Symptoms

Damping-off may occur before or after seedlings emerge from the soil. In the case of pre-emergence damping-off, fungi infect seeds as they germinate. As infection progresses, the seeds rot and eventually disintegrate. As a result of pre-emergence damping-off, poor stands become apparent days or weeks later.

Post emergence damping-off is most often observed in seed flats or among transplants. Fungi infect stems at or near the soil surface. The affected area of the stem takes on a water-soaked appearance and becomes constricted. Eventually the stems are unable to maintain structural support of seedlings which usually topple over and die within 24 to 48 hours (Figure 1).

In some cases, seedlings survive infection in seed flats or as young transplants and are planted in the field. Such plants are likely to exhibit a "wirestem" symptom characterized by an off-color, twisted, and constricted stem. Greatly reduced yields will result from wirestem plants.

## Cause

Damping-off is most often caused by any or all of three groups of fungi, namely *Pythium*, *Rhizoctonia*, and *Fusarium*. Species of genus *Pythium* are especially destructive in commercial vegetable

plantings. The fungi infect only very young tissues and prefer relatively warm soil temperatures (68 to 77 degrees F).

## Control

For control of damping-off, emphasis is placed on preventing infection. This is especially important from the time of seeding until the seedling stems become more mature (2 to 4 weeks). There are several disease prevention precautions that should be considered.

**Uncontaminated soil:** The first and foremost method of raising seedlings free of damping-off infection is the use of an uncontaminated soil mix. Home gardeners can sterilize small batches of soil

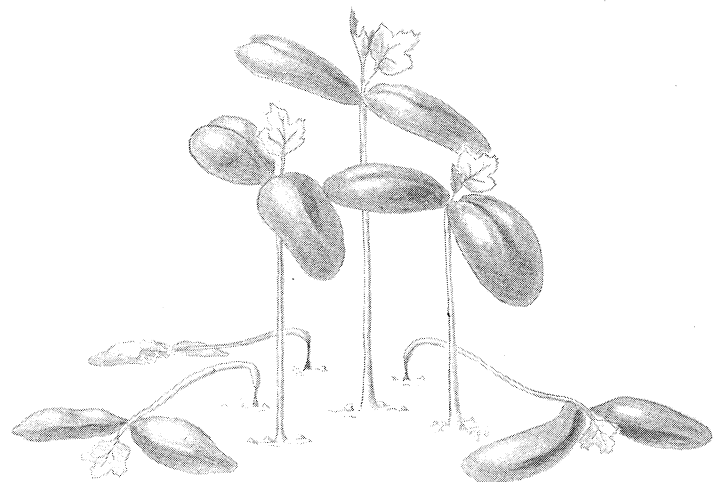


Figure 1. Seedlings with signs of damping-off.

at home or purchase presterilized seed starter soil from a local garden supply distributor. To sterilize soil at home, place moist (not wet) soil in a baking pan, cover with aluminum foil and seal down the edges. Insert a meat thermometer through the foil into the soil. Place the pan in the oven at 200 to 220 degrees F until the thermometer reads 160 to 180 degrees F. Baking time will depend upon quantity, type and moisture content of the soil. Good ventilation in the kitchen is advised because baked soil gives off an odor.

Commercial growers can opt for the presterilized soil mix or sterilize their own soil with heat or chemicals. Steam treatment at 248 degrees F (120 C) and 15 psi for 3 hours is sufficient to destroy most soilborne pathogens. Methyl bromide is a commonly used fumigant for soil sterilization in commercial greenhouses. Always read label directions and consult with a distributor before using a fumigant.

For an inexpensive added precaution, soil can be treated with fungicide prior to planting. Mix one tablespoon of Captan 50 WP in one gallon of water. Use the mixture to drench 50 square feet of soil.

The effort and cost of obtaining sterilized soil or soil mix will be wasted if precautions are not taken to prevent recontamination of the soil, especially until stem tissue approaches maturity. Recontamination can occur from soil introduced into the greenhouse on cold frames, or from unclean benches and containers.

**Seed treatment:** Seeds should be treated chemically for protection against infection in the event that soil is contaminated or recontaminated.

Most seeds sold commercially are already treated with fungicides as indicated on the package. The treatment involves coating the seeds with fungicides (Captan or Thiram) according to directions on the fungicide container label. The fungicide should kill damping-off pathogens in the immediate vicinity of the seed. It will remain effective for about 2 weeks, enough time for the seedling to develop some resistance to the fungi.

**Cultural control:** Losses attributed to damping-off might be reduced by manipulating the environment so that the seedling escapes infection. The fungi associated with damping-off thrive in a wet environment. Therefore, the disease is usually apparent where excess soil moisture exists. Also, poor sunlight and other conditions such as excess nitrogen fertilizer which do not promote seedling maturation are favorable for disease development. Cultural control usually involves any treatment which hastens stem maturation and discourages pathogen development. Control recommendations include the following:

1. Plant seeds shallow, in warm soil.
2. Avoid using heavy soils.
3. Irrigate in the morning to ensure rapid evaporation of surface moisture.
4. Balance nitrogen and potassium fertilizer properly with adequate phosphorus to hasten maturation (NPK 1:2:1). (Excess nitrogen will promote seedling growth and succulence rather than maturation.)

Cultural methods will often help; however, damping-off will not be adequately controlled without the use of uncontaminated soil and chemical seed treatment.