

Common Plant Diseases: Damping-Off



What is Damping-Off?

Damping-off is a common crop disease in Virginia. It affects seeds, seedlings and root systems either pre- or post-emergence.

When damping-off occurs before a seedling sprouts in the preemergence stage, the seed rots. If damping-off occurs postemergence, the seedling will collapse after sprouting. This affliction can occur in nurseries, on farms, in greenhouses or gardens (*see Fig. 1*).



Figure 1 - Healthy squash plants in the back, and squash plants affected by postemergence damping-off in the foreground. Photo by VSU Extension.

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Factors That Increase Your Risk of Damping Off



Soggy or poorly drained Soils



Planting the same crop in the same space for 1+ years



Cool-to-cold air & soil temperatures

..... DAMPING-OFF RISK FACTORS



Over watering, especially right after planting



Dense planting and poor air circulation



Excess nitrogen from fertilizers

Pathogens causing damping-off diseases can spread easily in contaminated soil, water or infected plants. Certain pathogens can overwinter in soils, causing damping-off problems the next year if contaminated soil is reused.

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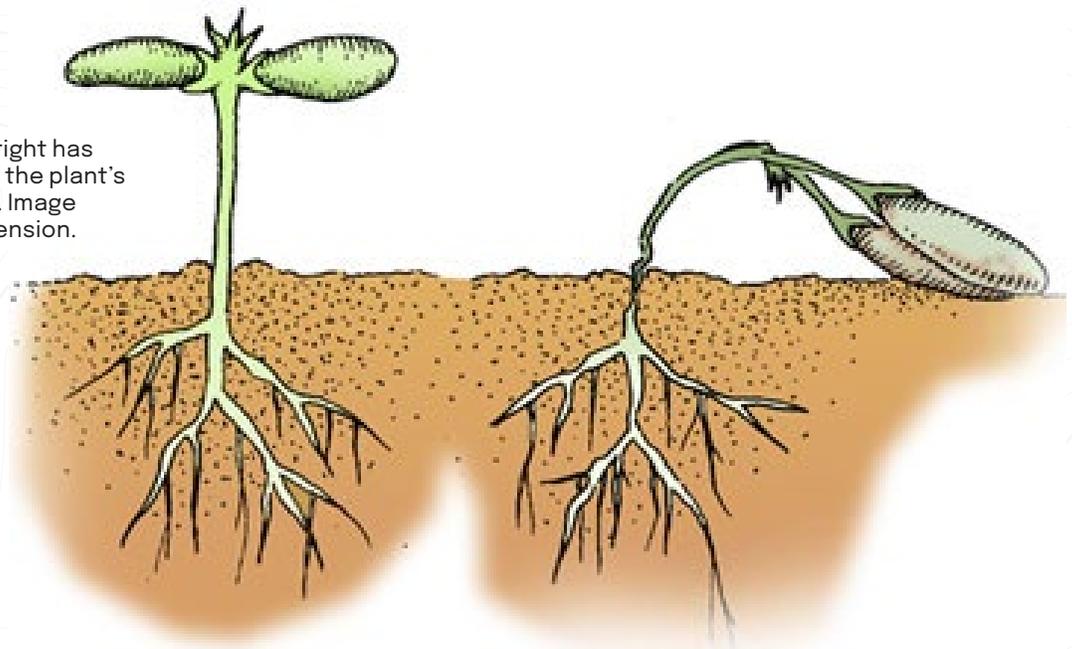
What Causes Damping-Off?

Soil, environmental conditions and practices contribute to damping-off. These factors can contribute to damping-off independently, or in combination with soil-borne pathogens.

Soil factors include excess moisture, cold weather, poor drainage or dry conditions after planting. Management risk factors like sowing seeds in low spots, under or over watering and over fertilizing increase vulnerability. Seeds may either fail to germinate or suddenly succumb at the soil line resulting in damping-off.

There are two primary groups of infectious disease agents that commonly contribute to damping-off. The most common types are water molds, like *Pythium* and *Phytophthora*. The next common pathogen types are soil borne fungi, such as *Fusarium* and *Rhizoctonia*, among other possible pathogens.

Figure 2 - The seedling on the right has damping-off, which has girdled the plant's stem, causing it to topple over. Image from University of Missouri Extension.



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Figure 3 - Bare spots in seedling tray where seeds failed to germinate. Photo by Mary Ann Hansen, Virginia Polytechnic Institute and State University.



Figure 4 - Tomato plant seedlings displaying discolored stems at the soil line. Photo by Craig Mauney, NC State Extension.

1. When damping off occurs preemergence, the seeds will fail to germinate. They will become soft, mushy and rotten. If damping-off occurs in your nursery or garden, you will often see bare patches or spots where plants have thinned out (see Fig. 3).
2. First, look closely at the base of stems or crown area of your seedlings. At or below the infection point or soil line, the stem will be visibly water soaked and discolored. The seedlings will droop once pathogens infect the vascular tissues (the plants' veins and arteries).

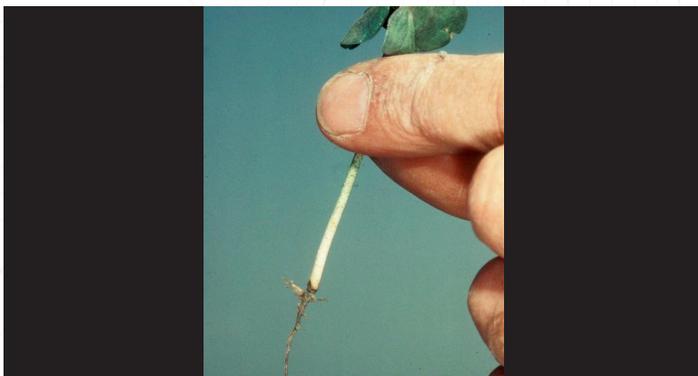


Figure 5 - Damping-off in a cotton seedling. Photo by Gerald Holmes. California Polytechnic State University at San Luis Obispo.



Figure 6 - Typical damping-off infection showing brownish watersoaked lesions. Photo by Bayer Crop Science.

3. As the basal part of the seedling continues to soften, the next symptom will appear: reddish-brown lesions on the stem at the soil line.
4. The other symptom is a wiry stem, as the seedling thins. At this point, it will likely fall over, wilt and then die.

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How To Prevent Damping-Off

Proper soil and operations management goes a long way in preventing damping-off. By following these steps, you can reduce potential pathogens' ability to cause diseases in your crops.

1 START CLEAN & STAY CLEAN

If you are growing seedlings in containers, make sure they're elevated and have holes at the bottom to allow moisture to drain.

If using plant or grow bags, the fabric must be porous enough to drain excess water. Raised beds, and using properly managed potting mix in an aerated grow bag can improve drainage.

2 ENSURE YOUR SOIL CAN PROPERLY DRAIN AND DO NOT OVERWATER.

The exact right time to plant varies based on your hardiness zone. Check your zone using USDA's Plant Hardiness Zone Map of Virginia on page 6.

Virginia Cooperative Extension publications offer helpful planting guides with recommendations for specific plants week by week for each zone in Virginia.

You can help control soil temperatures using seedbed heaters, for commercial or large scale growers, or by using row covers or low tunnels that retain heat and create a warmer microclimate for your seedlings.



Figure 7 - Example of proper mulching. Photo by VSU Extension.



Figure 8 - Simple raised structures for seedlings provide warmth while the ground is too cold to plant. Photo by VSU Extension.

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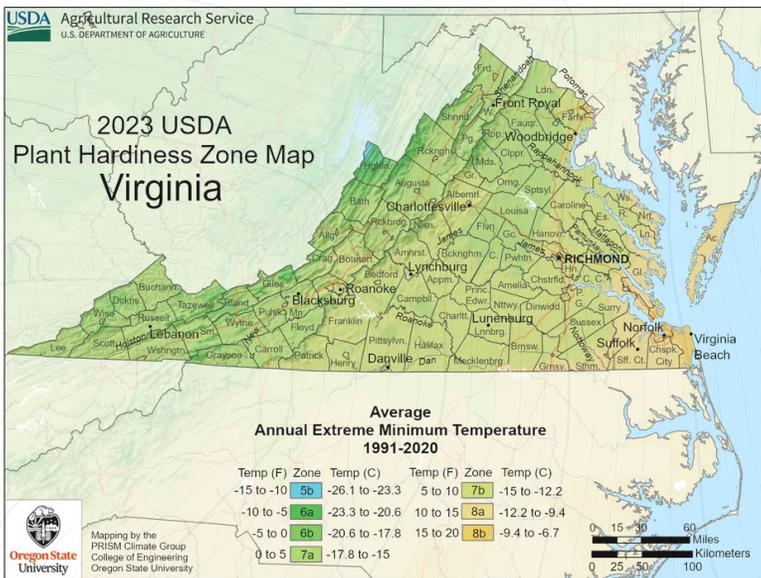
3 WAIT FOR SOIL TEMPERATURE TO WARM BEFORE PLANTING

Get your seeds from a reliable source, and plant them in clean, uncontaminated soil. Before the planting season, disinfect your tools, containers and worksites.

You may want to purchase seeds treated with conventional fungicides or organic biofungicides. Follow all safety precautions on the package label when using treated seeds.

4 ROTATE YOUR CROPS

One of the benefits of crop rotation is damping-off prevention. The harmful fungus in the soil searches for a familiar host when it germinates. When you plant different crops each season, the fungus won't find the same crop as before and will wither away. You can also select cover crops that nourish your field or garden, and physically or chemically suppress weeds and pathogens.



Pro Tip

Follow this link to access planting dates and helpful hints for home garden vegetables:

<https://tinyurl.com/VA-vegetable-planting-guide>

USDA has an interactive map available at:
<https://planthardiness.ars.usda.gov/>.
Enter your zip code, or zoom in/out and pan the map until you locate your zone.

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Figure 10 - Soil solarization can kill pathogens in your soil. Photo by University of Florida, Institute of Food and Agricultural Sciences Extension.



Figure 11 - Multi-species cover crop in the off-season. Photo by VSU Extension.

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USE SUN POWER

Solarization uses the sun's radiation and heat to kill soil pathogens. Cover moist soil with clear plastic and expose it to full sunlight for four-to-six weeks (Fig 10). While this amount of consistent sunlight is not guaranteed in Virginia, this practical remedy could potentially salvage your crops in case of severe soil contamination. New techniques like anaerobic soil disinfestation (ASD) use solarization to create saturation in the presence of a carbon source such as molasses or cover crops (Fig. 11).

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UTILIZE BIO-PRODUCTS & MICROBES

You can find biologically based products that can improve germination or help seedlings grow faster. These contain, for example, the beneficial fungus *Trichoderma*. Encouraging these microbes to thrive in your soil will help stave off damping-off diseases. You can find the Organic Materials Review Institute's product directory for organic production at <https://www.omri.org/omri-lists%20>.

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Dr. Mersha's work explores urban agriculture, specialty crop and gardening, and biologically based approaches to soil-borne disease management.

RECOMMENDED RESOURCES

1. Planning the vegetable garden:
<https://www.pubs.ext.vt.edu/426/426-312/426-312.html> 2.
2. Pest Management Guide - Horticultural and Forest Crops:
<https://www.pubs.ext.vt.edu/456/456-017/456-017.html>
3. Mid-Atlantic Commercial Vegetable Production Recommendations:
<https://www.pubs.ext.vt.edu/456/456-420/456-420.html>

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