

Insect/Disease Information

VEGETABLES

Damping-off

For those of you starting greenhouse transplants, you have probably encountered the disease called damping-off. "Damping-off" is a generalized term for a root disease caused by a number of soil borne fungi including *Pythium* and *Phytophthora* species, *Rhizoctonia solani*, and *Thielaviopsis basicola*.

These fungi species are found in almost all soils, and even if you are growing plants in sterile media, they can be introduced into the soil through contact with a contaminated surface such as a greenhouse floor, shovel, or old transplant trays.

The disease can occur in the greenhouse or the field, and although seedlings are most susceptible, established plants can also become infected. All vegetables are susceptible. Infection will only occur unless the pathogen is present in the soil or potting media, and the proper environmental conditions are met: cool, cloudy weather and wet soil.

Pre-emergence damping off is when the seed is directly infected and the plant does not germinate. Post-emergence damping off affects the seedling or established plant. Symptoms of minor infections include chlorosis (yellowing) of the foliage and stunted growth. Severely affected plants will wilt and collapse at the soil line. The stem will appear wet and discolored, often turning brown or black.

There are a variety of ways to manage and prevent damping-off:

- Use disease-free seed.
- Alkaline soils (above 6.0) can favor infection. Test your irrigation water pH and buffer if necessary.
- Always use sterile or pasteurized potting mix. Use new trays or sterilize old trays with 10% bleach.
- When transplanting seedlings, do not bury the crown.



Div. of Plant Industry, FL Dept. of Agr. and Consumer Services

- Keep seedling trays on a bench or use gravel or other hard surface on the greenhouse floor. Do not over-water and make sure soil is well-drained. If seeding directly outdoors, wait until soil has warmed, use raised beds or berms, and do not plant in areas with heavy soil.

Chemical treatments: captan, metalaxyl (Subdue), fosetyl-al (Aliette), iprodione (Nevado)

Botrytis on Tomatoes



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Botrytis is a fungus that is found world-wide and can cause a wide variety of diseases on a wide variety of plants. It can occur both in the greenhouse and the field, and on tomatoes, it is known as gray mold.

In the greenhouse, you will notice stem lesions at, or just below soil level. Infections usually occur through tiny wounds or dead leaves, and spreads rapidly in cool, humid conditions. Any other tissue touching an infection will also become diseased. Eventually, a gray fuzzy "mold" will form, killing that plant tissue, but not necessarily killing the plant.

To manage gray mold, improve air circulation in the greenhouse, provide adequate spacing between plants, do not injure plants, and remove and diseased tissue immediately.

Sometimes chemical application is necessary, but note that it will not suppress existing infections, but protects tissue from new ones. Examples of materials to use include *Bacillus subtilis* (Serenade), fenhexamid (Decree), chlorothalonil (Bravo).

Production Information, continued

Organic Fertilization Guidelines

A healthy soil yields healthy plants, and before implementing any fertilization program, consider a soil test to analyze soil nutrient and organic matter content.

Managing soil organic matter in the vegetable garden is essential. Adding generous amounts of compost or manure helps to build soil micro-flora, which in turn helps to improve the physical condition of the soil. Soils rich in organic matter also hold more water.

Apply a 1-3 inch layer of compost to the soil surface, and fork it in to the top 5 inches. Nutrients from the addition of compost are supplied slowly early in the season, and as plants grow and temperatures warm, nutrients are released more quickly.

Manure can also be added to the vegetable garden several weeks before planting. Let it sit for a few weeks and then fork it into the soil. For a 1000 sq. ft. garden, applying 250-500 pounds of large animal manure will improve soil fertility significantly while adding considerable organic matter. If using chicken manure, use 100-200 pounds. (Some plants do not grow well in soil fertilized with manure, including potatoes, sweet potatoes, peas, and beans.) The chart below shows the nutritional value of various manures:

Animal	Percent Water	Pounds Per Ton		
		N	P	K
Chicken	25	34	37	30
Beef	80	14	9	11
Dairy	84	12	5	12
Horse	60	12	5	9
Sheep	65	21	7	19
Pig	75	10	7	13

Organic fertilizers can also be used to add nutrients to the soil. These materials can be more expensive, although they only need to be applied to the planted area. Examples include blood meal, bone meal, guano, fish emulsion, cottonseed meal, and others. It is important to look at the nutrient ratio on each product and apply the amount indicated.

Using green manure cover crops over the fall and winter will add a great deal of organic matter to the soil when tilled under in the spring. Green manure crops can be leguminous (peas, beans, clover, vetch) or non-leguminous (annual rye, oats, wheat). Leguminous plants fix nitrogen whereas the grasses are economical, easy to establish, and quickly produce a large amount of organic material.

Mulches will also add nutrients and organic matter to the soil, but they should not be used near the plants as they can cause burning as they heat up in decomposition. Mulching also suppresses weeds, retains moisture, and reduces the need to cultivate. A variety of materials can be used as a mulch including grass clippings, hay, sawdust, pine needles, leaves, compost, and newspaper. Any materials that are high in nitrogen, such as sawdust, will tie up nitrogen from the soil during the decay process, so mix it with another material such as compost, or apply nitrogen, to prevent nitrogen deficiencies.

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