

AGRICULTURAL GUIDE

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Cotton

Cotton seed and seedling diseases and their control

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Seedling diseases cause serious losses to Missouri cotton each year. Failure to get a uniform stand of cotton is due largely to seedling diseases. Cold, wet soils are conducive to most seedling diseases. These conditions occur frequently in Missouri.

Injuries caused by these diseases can result in stand losses that necessitate replanting. The U.S. Cotton Disease Council reports that seedling diseases cause average losses of 3 percent nationally. Farmers in southeast Missouri lose 5 percent annually to seedling disease.

Causes

Seedling diseases of cotton are caused by a complex interaction among young cotton plants, disease-causing organisms and the environment. Some fungi that cause these diseases are carried on or inside the seed. Other fungi live from season to season in the soil and can attack either the seed or seedlings.

Infections by these fungi cause seed rots, seedling death or root rots (Figure 1). When cotton seedlings die between seed germination and emergence, pre-emergence damping-off occurs. Post-emergence damping-off occurs when seedlings die after emergence. Seedlings often are infected near the surface of the soil.

The pathogenic organisms that cause seedling diseases are found in all cotton-producing areas of the United States. Bacterial blight, *Ascochyta* blight and anthracnose are seed-borne. Although the organisms differ from area to area, the soil-borne pathogens most commonly infecting Missouri cotton are species of *Rhizoctonia*, *Fusarium* and *Pythium*. *Fusarium* and *Pythium* favor cool, wet soils; *Rhizoctonia* favors warm, wet soils.

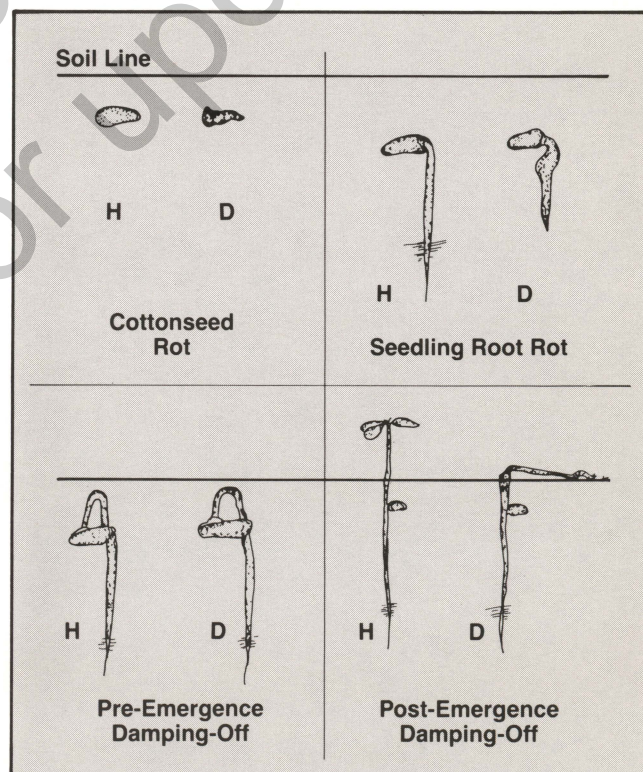


Figure 1. The four major phases of the cotton seedling disease complex: seed rot, seedling root rot, pre- and post-emergence damping-off. (H=healthy; D=diseased.)

Illustration taken from *Cotton Seedling Diseases and their Control* by James B. Sinclair, Louisiana State University.

Table 2. Cotton soil fungicides

Chemical and company	Rate/100 lb.	Application	Remarks
TERRACLOR 2E (PCNB 23.8% - 2 lb. emulsifiable concentrate) Uniroyal	½ to 1 gal. /A 15 gal. of water	In-furrow Spray	Controls damping-off— <i>Rhizoctonia solani</i> . Spray on seed and surrounding soil at planting time. Do not allow feeding or grazing of cotton foliage by livestock.
TERRACLOR 10% G (PCNB 10% granule) Uniroyal	10 to 20 lb. /A	In-furrow Granules	Controls damping-off, seed and seedling rots— <i>Rhizoctonia solani</i> . Apply over seed and covering soil at planting time. Do not allow feeding or grazing by livestock.
*TERRACLOR SUPER X EC (PCNB 23.2% + Terrazole 5.8% emulsifiable concentrate) Uniroyal	2 to 3 qts./A mixed in 5 to 15 gal. of water	In-furrow Spray	Controls seedling disease complex— <i>Rhizoctonia</i> , <i>Pythium</i> , <i>Thielaviopsis</i> and <i>Fusarium</i> spp. Spray all the soil that surrounds and covers the seed. Do not allow feeding or grazing of cotton foliage by livestock.
*TERRACLOR SUPER X G 2.5% (PCNB 10% + Terrazole 2.5%) Uniroyal	10 - 15 lb. /A	In-furrow Granules	Controls seedling disease complex— <i>Rhizoctonia</i> , <i>Pythium</i> and <i>Fusarium</i> spp. Apply over seed and covering soil at planting time. Do not allow feeding or grazing of foliage by livestock.
TERRACLOR SUPER X G with DI-SYSTON (PCNB 6.5% + Terrazole 1.63% + Disulfoton 6.5%)	15 lb./A drill planting 5 lb./A hill-drop	In-furrow Granules	Controls seedling disease complex— <i>Rhizoctonia</i> , <i>Pythium</i> and <i>Fusarium</i> spp., and for early season control of thrips, aphids and mites. Apply in-furrow at planting time. Do not allow feeding or grazing of foliage. Soil temperature and moisture should be favorable for good germination and emergence.
TERRACLOR SUPER X G with THIMET (PCNB 6.5% + Terrazole 1.63% + Phorate 6.5%) Uniroyal	15 lb./A drill planting 5 lb./A hill-drop	In-furrow Granules	Control is same as above. Reentry statement: Do not re-enter fields before 24 hours after application.
RIDOMIL 2E (Metalaxyl 25.0%) Ciba-Geigy	¼ - ½ pt. /13,000 linear feet in 5 - 15 gals. of water	In-furrow Spray	For control of seed rots and seedling diseases (<i>Pythium</i> spp.). For broader spectrum disease control, Ridomil 2E should be combined with 2-4 qts. Terraclor 2E. Observe all precautions and restrictions in Terraclor 2E label.
*RIDOMIL PC 11G (PCNB 10% + Metalaxyl 10%) Ciba-Geigy	10 lb. per 13,000 linear feet of row (12.3 oz./1,000 linear feet)	In-furrow Granules	Controls damping-off, seed and seedling rot diseases caused by <i>Pythium</i> spp. and <i>Rhizoctonia solani</i> . Do not allow feeding or grazing of foliage by livestock, or illegal residues may result.

*Soil treatment fungicides that are commonly available in Southeast Missouri

Unless soil temperatures and moisture are appropriate for germination, no amount of seed treatment material will help.

Seed is **infested** when disease organisms are carried on the outside of the seed. If the seed has infections under the seed coat or in seed tissues, it is **infected**. Seed treatment materials are **disinfestants** or **disinfectants** depending upon their ability to destroy organisms on the surface or under the surface.

Seed treatment materials used to protect the seed from organisms in the soil are called **protectants**. Practically all effective cotton seed fungicides are disinfestants, and many have protective qualities. These materials may be applied in several forms:

- **Dusts** that can be applied in commercial applicators or in the hopper box.

- **Powders or flowables** used for making slurries in commercial applicators, and

- **Liquids** applied commercially as spray mists.

Table 1 lists some seed treatment fungicides or fungicide combinations that are labeled for cotton seed.

5. Use a soil-treatment fungicide for extended protection. In-the-furrow soil fungicides are effective for extended protection against seedling diseases. They are not a substitute for the seed treatment fungicides, but they increase the protection of young seedlings. Once the seed germinates and grows through the soil, several species of soil fungi can attack the roots or lower stems. If fungicides are not present to kill or slow down their activity, losses from seedling diseases can be serious, especially in poor weather conditions. The use of soil fungicides has significantly increased stands and uniformity in tests conducted at the Delta Center, a University of Missouri experiment station.

The two general methods for incorporating soil fungicides into the furrow and covering soil are: (1) in-furrow granules, and (2) in-furrow sprays.

In-furrow granules are applied to the soil in a 6-inch band over the open furrow. Fungicides in

granular form can be applied by using any gravity-flow granular applicator like those used for applying granular insecticides. They are commonly available for cotton planters. The granules are metered through a distribution tube that is placed between the seed drop tube and covering discs.

Advantages in using granular application of fungicides are: (1) easy handling; (2) the applicator can work off the drives on the planter or can have a simple electric drive; and (3) the equipment is easily available and less expensive than what is needed for in-furrow sprays.

In-furrow sprays are usually wettable powders or emulsifiable concentrates that are sprayed into the furrow. The necessary equipment includes a tank, appropriate control valves and a pump operated from the power take-off. Hoses lead from the pump to each planter unit. Two spray nozzles per row are fitted above the row. A cone nozzle is mounted over the seed, and a fan nozzle is directed toward the furrow and covering soil. In-furrow sprays of fungicides are effective in providing extended protection.

The disadvantages of this method are that more complicated equipment is needed, and refilling tanks of water and mixing the fungicide materials can be time consuming. Also, the competition for use of the power take-off can create some problems if a grower wants to apply a pre-emergence herbicide at the time of planting. Some labeled soil fungicides are listed in Table 2.

The fungicides suggested above have EPA label registrations. Trade names are used for simplicity. The University of Missouri does not endorse any materials. The mention of specific products does not warrant or guarantee the performance of these products nor does it imply approval of the products listed to the exclusion of comparable products.