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Cotton Seedling Diseases: Answers to Frequently Asked Questions

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Q:What are cotton seedling diseases and what causes them?

A:Several different, normally harmless, microscopic organisms that live on organic matter in the soil can attack cotton seedling roots in the spring. These organisms are called fungi. The ones most commonly found attacking cotton are named Pythium, Fusarium, Rhizoctonia and Thielaviopsis. A plant may be attacked by one of these or by several at the same time. Each of these organisms causes a different disease, and the symptoms are different for each disease. However, they are collectively known as seedling diseases.

The organisms that cause seedling diseases are present in most soils. Once established, they remain there indefinitely. They produce structures that enable them to survive in the soil from year to year.

Seedling diseases become worse when the soil is cool and wet. In 1992, Missouri cotton yield losses to seedling diseases were estimated at 7,692 bales valued at $2.7 million.

Q:How do cotton seedling diseases damage cotton?

A:The organisms that cause seedling diseases penetrate and grow within the cotton root by secreting chemicals which dissolve the root tissue. The organisms absorb the nutrients they need for growth from the rotting root. The damage they do to roots may vary from slight injury (which the root may outgrow), to moderate injury (the plant lives but the root is permanently damaged), to seedling death. Damaged roots are unable to absorb water and nutrients as well as a healthy root. The plant therefore will grow more slowly, usually sheds young bolls more quickly during summer drought, matures later, yields less and produces poorer-quality lint.

Q:What are the symptoms of seedling diseases?

A:A healthy cotton seedling root is white and firm. The central root (tap root) is long and numerous small, white roots emerge from the upper area. A stand of healthy cotton seedlings is uniform with no skips. Seedling diseases affect young plants in several ways. Infected seedlings that emerge have dark, rotted areas (lesions) on the lower stem and roots. The tap root may be destroyed, leaving only shallow-growing lateral roots to support the plant (Figure 1). Seedlings may wither and die after the disease kills the root (Figure 2). Plants that survive but have permanent root damage are often weak, more susceptible to other diseases and environmental stresses, and unproductive. Sometimes seedling diseases will kill entire fields of young cotton, but more often they cause thin, uneven stands of weakened plants (Figure 3) that grow slowly, yield poorly and have low-grade lint.

Figure 1. Shallow lateral roots left after the tap root has been destroyed by seedling disease.

Figure 2. Seedlings damaged or killed by seedling disease.

Figure 3. A thin, uneven cotton stand due to seedling disease.

Q:What can be done to prevent seedling diseases?

A:There is no way to eradicate the problem, but the following steps can be taken to minimize damage:

- Plant seeds that germinate quickly and produce vigorous seedlings. There are two germination tests, a warm test and a cool test, that are useful for predicting how a seed lot will perform in the field. In general, the warm germ test (about 86 degrees F) will estimate the percent emergence under highly favorable conditions, while the cool germ test (64 degrees F) will estimate emergence under more typical, somewhat adverse conditions. Minimum acceptable percent germination levels for cotton planting seed are 80 percent on the warm test and 50 percent on the cool test. The warm germination test results are printed on most bags of seed. Growers should ask their seed dealer for the warm and cool germ test results for their planting seed, and should only plant seed that germinates well, especially when planting early or in heavy soil. Fungicide seed treatments on most commercially sold seed are there to protect seed from rot and are very useful.
- Plant in fertile soil. Seedling emergence is retarded in acidic soils (pH less than 5.5) or alkaline soils (pH greater than 7.0), or soils low in phosphorus or potassium. Starved, slow-growing seedlings are more susceptible to damage by seedling diseases. Growers should make sure that soil nutrient levels and pH levels in their fields are adequate for best cotton growth and yield.
- Seedling diseases are worse when the soil is cold and wet. In general, the top of a raised bed is dryer and warmer than flat soil. To minimize seedling disease, plant on raised beds to maximize drainage and increase soil temperature of the seed bed, and plant when five days of warm weather are predicted.

- At planting, use an in-furrow or hopper-box fungicide for extra protection against organisms that cause seedling diseases (Table 1). The fungicides applied to seed by the seed supplier help protect the seed and seedling against rot (see Step 1), but will not protect the seedling from all diseases. A fungicide applied to seed in the hopper (hopper-box) or in the furrow at planting (in-furrow) will provide additional protection against seedling diseases. Hopper-box treatments are applied to the seed in the hopper or to the seed just prior to putting them in the hopper, and in-furrow applied fungicides are placed in the furrow at planting. In-furrow applied fungicides are available in granule or liquid formulation. The use of in-furrow fungicides has significantly increased stands in tests conducted at the University of Missouri Delta Center.

Table 1. Cotton hopper-box and in-furrow fungicides.

Product	Use	Rate
Terrachlor Super X (granular)	In-furrow	10-15# (12-18 oz./1,000 row ft.)
Terrachlor Super X (liquid)	In-furrow	2-3 qts.
Ridomil PC (granular)	In-furrow	7-10# (8.5-12 oz./100 row ft.)
Terrachlor EC + Ridomil 2E	In-furrow	2-3 qts. + 4-8 oz.
Prevail	Hopper-box	8-16 oz./cwt. seed
Deltacoal	Hopper box	Greater than 1.75 oz./cwt. seed

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