

## VEGETABLE SEEDLING DISEASES

Seedling plants of almost all vegetable crops are vulnerable to a variety of soil-borne fungi affecting plants at an early growth stage. Seedling diseases are often a disease complex involving two or more different fungi such as *Pythium* spp, *Rhizoctonia solani* and *Fusarium* spp., which attack the germinating seeds or young seedlings and kill plants at an early stage. Seedling diseases can cause serious losses in conditions such as cold wet soils that slow the germination and growth of the young plants and the susceptible seedling stage is prolonged.

Symptoms of these diseases may appear as seed rot/decay, seedling decay before emerging from the soil (pre-emergence damping off), seedling decay after emerging from the soil (post-emergence damping off) or seedling root rot. In pre-emergence damping off, the seed decays in soil and never germinates, or the seed germinates but young seedlings rot and die before emergence. In post-emergence damping off, newly emerged or young seedlings wilt, collapse and die soon after emergence. Damping off results in a poor plant stand in the field.

The most common fungi responsible for seedling diseases are *Pythium* species and *Rhizoctonia solani* and these are common in most agricultural soil including the soils of San Joaquin Valley. Other fungi that infect vegetable seedlings are *Phytophthora* species, certain *Fusarium* species and *Thielaviopsis basicola*. As several different fungi cause these diseases, symptoms of these diseases vary.

## SYMPTOMS

*Pythium* spp. can cause seed rot and pre and post emergence damping off. Rotted seed will be water soaked, soft and mushy. The roots of infected plants appear greyish-black and stunted. The seedling stems are often water soaked, soft and discolored. In fields with poor drainage, the pathogen causes root rot and the plants will be yellow and stunted.



Figure 2. Cucumber seedling damping-off caused by *Pythium*



Figure 1. Yellow tan mushy spots on seedlings due to damping off

Symptoms on seedlings infected with *Rhizoctonia solani* are often difficult to distinguish from plants infected with *Pythium* spp. Symptoms include seed rot and damping off. Older seedling may develop tan-brown or dark lesions on the stem and roots. More than one races or anastomosis groups (AG) (*Rhizoctonia solani* species complex is classified by anastomosis groups) of *Rhizoctonia* can cause seedling infection on various vegetable crops.



Figure 3. *Rhizoctonia* spp. injury (left and right) and *Pythium* spp. injury in center to young seedlings



Figure 4. Damping-off of pepper transplants

The classification of the genus *Fusarium* is always complex and confusing. There are several species of *Fusarium* that cause vegetable seedling diseases but the infection by these fungi is very host specific. Often times *Fusarium* is a secondary pathogen that may follow infections by *Pythium* or *Rhizoctonia* spp. and together these fungi could cause substantial stand loss. Symptoms may appear as root discolorations, and a reddish dry rot may be visible on the roots. Other symptoms are similar to those caused by *Pythium* and *Rhizoctonia* spp.

## MANAGEMENT

Host plant resistance to manage seedling diseases is not available; therefore, cultural practices are crucial for prevention and management of seedling disease. Proper growing conditions that favor rapid germination and growth of seedlings are critical for minimizing the effect of seedling diseases.

Fields should be prepared thoroughly before planting to ensure well-drained soils and remove low spots, remove compaction layers, aid breakdown of plant residue that may serve as a source of inoculum.

Use high quality seeds with high germination percentage. High quality seed will generally establish quickly and produce vigorous seedlings. If possible, always use certified seed that are verified as disease free. Plant seeds and transplants at an appropriate depth and under favorable soil temperature and moisture conditions to enhance germination and emergence. Avoid planting too heavy for proper nutrition and resources for the seedlings.

Seed treatments can be helpful in preventing seedling diseases and seed treatments are available for various vegetable crops. Many seed suppliers offer the option of treated or non-treated seed. Some fungicides are also available that may be effective as a drench or foliar application. Some of these fungicides are specific to the type of fungi they control, so one or more fungicide may be required. Consult with your local farm advisor to determine which seed treatments and fungicides are available for a particular crop.

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