2003 BELTWIDE COTTON CONFERENCES, NASHVILLE, TN – JANUARY 6-10

CDC SEEDLING DISEASE WORKSHOP 2003
PRE-EMERGENCE DAMPING-OFF OF COTTON SEEDLINGS BY PYTHIUM SPP. AND RHIZOPUS ORYZAE

C.R. Howell
USDA/ARS, SPARC, CPRU
College Station, TX

Abstract

Pre-emergence damping-off of cotton seedlings can be attributed mainly to three different soilborne pathogens. These are *Pythium ultimum*, *Pythim aphanidermatum*, and *Rhizopus oryzae*. During early planting when the soil is moist and the soil temperature is 60 to 65°F, *P. ultimum* is the major pathogen isolated from diseased seeds and seedlings. In later plantings where the soil temperature is 70 to 75°F, most pre-emergence damping-off is incited by either *P. aphanidermatum* or *R, oryzae*. If only *P. ultimum* is present in the soil, planting in warmer soil will be of benefit. However, if either of the other two pathogens are present, later planting will be of little benefit. Disease incited by the *Pythium* spp. can be controlled by seed treatment with metalaxyl or other fungicdes designed to control water molds. However, these fungicides do not inhibit *R. oryzae*, and seed treatments with fungicides containing PCNB are necessary in order to control disease incited by this fungus. Therefore, disease control when all these pathogens are present in the soil requires seed treatment with a combination of fungicides. The disease syndromes incited by the three pathogens are all triggered by the same phenomenon. When the cottonseed germinates it releases chemical compounds into the soil that induce pathogen resting structures to germinate. Once this has occurred, the pathogen propagule germinates and the cotton seedling is quickly killed. Seed treatment with the biocontrol agent *Trichoderma virens* controls disease incited by all three pathogens, because it metabolizes the compounds that induce pathogen propagule germination before they reach the pathogen. The resting structures therefore remain dormant in the presence of the seed. At low soil temperature, *T. virens* is less effective than at higher temperature, and seed treatment in combination with metalaxyl may be necessary. It has been generally accepted for years that the seed of all cotton cultivars are uniformly susceptible to pre-emergence damping-off pathogens, and that fungicde treatments are necessary in order to escape the disease. However, this is probably only true when low quality planting seed is used. With high quality seed, resistance to pre-emergence damping-off varies considerably among cotton cultivars. Resistance is related to the production and release of pathogen propagule stimulating compounds by the seed during germination. Those cultivars that do not release pathogen-stimulating compounds during seed germination are virtually immune to the disease, while those that do are very susceptible. Once pathogen propagule germination has taken place, none of the cotton cultivars tested show any resistance. Resistance, therefore, is really a form of escape.