

**ECOLOGY AND BIOCONTROL OF PRE-EMERGENCE  
SEEDLING DISEASE PATHOGENS OF COTTON**

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**Abstract**

The number of cotton seedlings subject to pre-emergence damping-off in the 2001 biological seed treatment tests at College Station, Texas was dependent on the cultivar planted. The cultivar Sure-Grow 747 was found to be highly susceptible to the pre-emergence damping-off pathogens occurring in our seedling disease plots, while the old cultivar Stoneville 213 and the more current cultivar Deltapine 50 were very resistant. Resistance, however, could be overcome by coating the seed with wheat bran prior to planting. Four pathogens, *Pythium ultimum*, *P. aphanidermatum*, an unidentified *Pythium* sp., and *Rhizopus oryzae* were isolated from diseased SG 747 seeds and seedlings. The disease producing capacity of these isolates on cotton was proven by Koch's postulates, and all were shown to be highly pathogenic to cotton. Seeds and seedlings incubated in infested soil at 14-20°C were most often infected by *P. ultimum* and the *P. sp.*, while those incubated at 25°C were infected mostly by *R. oryzae*, and to a lesser extent by *P. aphanidermatum*. Seed treatment with Metalaxyl controlled disease incited by the *Pythium* spp., but not that incited by *R. oryzae*, while seed treatment with Terrachlor controlled *R. oryzae*, but not the *Pythium* spp. Seed treatment with both Terrachlor and Metalaxyl controlled disease incited by all four pathogens. Disease incited by these pathogens could also be controlled by seed treatment with wheat bran and peat moss preparations of the biocontrol fungus *Trichoderma virens*, including strains that were deficient for antibiotic production, mycoparasitism, and induction of terpenoid synthesis in cotton radicles. Soil amendment with wheat bran negated the protective effect of the biocontrol agents, but not that of the fungicides. Mixture of wheat bran extract, or exudates collected from resistant and susceptible cotton cultivars, with pathogen propagules and culture on Noble agar, showed that wheat bran extract and exudates from susceptible cultivars induced germination and growth of pathogen propagules, while exudates from resistant cultivars did not. These results indicate that disease in susceptible cultivars is induced by compounds in exudates from those cultivars that are released during germination, and which stimulate pathogen propagule germination and growth. Disease resistant cultivars do not emit pathogen stimulants during germination. Disease control by the biocontrol agent *Trichoderma virens* is effected by metabolism of pathogen propagule germination stimulants emitted by the germinating seed before they can act on the pathogen, thereby rendering the seeds and seedlings resistant to disease. Assay of a number of currently grown cotton cultivars for resistance or susceptibility to pre-emergence damping-off in infested soil has shown that resistance to disease is related to cultivar and, among resistant cultivars, to seed quality.