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GREENHOUSE AND MICROPLOT STUDIES ON POSSIBLE CAUSAL AGENTS OF COTTON SEED ROT

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Abstract

Seed rot was first observed in South Carolina in 1999. It occurred 3- to 4-weeks after flower initiation in fields with high yield potential. Bolls exhibited no outward symptoms or abnormalities. Affected seed were poorly developed, often hollow, and exhibited thickening or uneven development of seed coats. Bolls with seed rot did not mature normally and often were hard locked and unharvestable. Surveys indicated that seed rot occurred in all counties and on all cultivars sampled. Seed rot has been observed in 2000 and 2001 in South Carolina. Symptoms resembling seed rot have been reported from Alabama, Florida, Georgia, Mississippi, North Carolina, and Texas. The cause of seed rot is unknown. It is independent of insect feeding and has not been correlated with any weather event or pattern. It has not been linked to a specific variety or genotype. Many species of bacteria can be recovered from seed and bolls exhibiting seed rot. No species could be determined to be the causal agent under field conditions. This work reports on greenhouse and field microplot pathogenicity tests involving bacterial species isolated from symptomatic seed or plant parts. Three greenhouse and two field microplot tests were conducted with various bacterial isolates to determine if any were capable of causing seed rot. Isolates tested were obtained primarily from symptomatic seed and bolls in the field. After surface sterilization of symptomatic tissues they were placed onto plates containing TSBA and PDA. After incubation bacterial colonies were picked and single colony purified. These isolates were identified to species using FAME analysis. Isolates chosen for study were either species frequently recovered from symptomatic tissue or known to be pathogens of other hosts. Isolates which exhibited high levels of seed rot were retested. In all tests both seeds and flowers were inoculated. Bacteria were grown in 50 ml TSB for 48 hr, then centrifuged and the pellet resuspended with 50 ml SDW. One ml of this bacterial suspension was pipetted onto each seed at planting. Flowers were inoculated with bacteria grown on TSBA for 48 hr, then 2 loopfuls of bacteria were suspended into 1 ml SDW and 200 ul injected into the flower prior to its opening. All treatments were replicated a minimum of four times. Bolls were cut transversely and rated for seed rot severity 28- to 40-days-after flowering. Three greenhouse and 2 field microplot tests were conducted. Symptoms of seed rot were observed in all tests. However the highest incidence of locules affected ranged from 32% to just 2% in the greenhouse tests and from 20 to 25% in the microplot tests. Low levels of seed rot were usually detected in the nontreated checks. A total of 80 isolates representing 10 genera and 21 species were tested in either greenhouse or field microplot studies. Isolates of the same species exhibited a wide range of scores within a test. However, specific isolates were associated with high levels of seed rot in both greenhouse and field microplot tests. These isolates warrant further study. Species such as *Agrobacterium radiobacter* and *Erwinia amylovora* which are pathogenic on other hosts did not appear to produce high levels of seed rot.