

INTRODUCTION TO TWO NEWLY RECOGNIZED DISORDERS OF COTTON – BRONZE WILT AND SEED ROT

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Abstract

Bronze Wilt and Seed Rot are *ad hoc* terms that have been widely used by growers, consultants, researchers, the agricultural media, and litigants to describe cotton plants exhibiting symptoms suggested by the names themselves. Neither condition is formally described as a disease, because in neither case has a cause been definitively demonstrated. Both disorders have caused economic losses to growers, in yield losses and litigation; and to planting seed companies in litigation, settlements, and withdrawal of commercialized varieties from the market. To avert further losses, the cotton industry must focus resources to describe the disorders as unique constellations of symptoms, and conduct research programs directed to conclusively identifying the cause of the disorders, thereby formally describing them as diseases, if such is merited. When these objectives are accomplished, researchers may then proceed to screen for susceptible germplasm and to develop disease management programs, as may be appropriate.

Bronze Wilt – Distribution, Symptoms, and Possible Cause

Bronze wilt has been observed in several areas of the cotton belt, from east Texas through the Southeast, from 1995 until the present. Symptoms typically noted in the field are early season stunting, wilting during flowering, followed by discoloration of the upper foliage - often to copper shades, followed by recovery or progressive appearance of more severe symptoms, including stem reddening, square and sometimes boll shed. In very severe cases, usually associated with drought, some to many of the affected plants may die. Bronze wilt symptoms have been associated with loss of secondary root mass, and the presence of very high numbers of certain biovars of *Agrobacterium* spp. in affected roots. To this point, attempts to confirm *Agrobacterium* spp. as the causative agent(s) have failed, in part, because negative controls, i.e., uninfected plants, could not be maintained in controlled experiments. Infection of the control plants may have occurred because of the extreme infectivity of the pathogenic biovars. Bronze wilt is definitely not *Verticillium* or *Fusarium* wilt, as no discoloration or infection is found in the xylem. However, brown staining may be found near nodes in the phloem of many specimens of affected plants, after stem reddening is seen. There is also a strong association of Bronze Wilt with varieties. Numerous susceptible varieties have been withdrawn from the market, and planting seed company literature identifies certain varieties still being marketed as susceptible to Bronze Wilt.

Seed Rot – Observations and Uniqueness of Symptoms

Seed rot was first reported in South Carolina in 1999, when growers scouting for stink bugs (*Acrosternum*, *Euschistus*, and *Nezaria* spp.) discovered malformed and discolored seed in otherwise healthy bolls. Similar symptoms were also found in Alabama and the Coastal Bend of Texas, and probably in Florida in 1999; and in South Carolina, Georgia, Mississippi, and the Coastal Bend of Texas in 2000. Seed rot is manifested as a failure of fertilized seed in bolls of well-fruited plants to mature. Viewed externally, the affected bolls appear normal. Symptoms first appear as flat, hollow, or poorly developed seed. The affected seed may become discolored, typically pink to brown, then may disintegrate. Soft rots, caused by either bacteria or fungi typically are not found, but may be present, perhaps as secondary infections. The affected locules cannot be harvested with conventional cotton pickers because they remain compact and constricted. Lint in the affected locules does not dry and expand (fluff).

Symptoms of seed rot can be differentiated from poor pollination, supernumerary carpel, damage from plant bug (*Lygus* spp.) or stink bug, and boll rot. Several researchers suspect that seed rot is triggered by environmental stress that leads to disruption of normal physiological development. To this point, no hypothesis explaining seed rot has been demonstrated. Seed rot does not appear to be associated with any particular variety or groups of varieties, rather surveys in South Carolina in 1999 and 2000 found seed rot throughout the state in bolls of essentially all the varieties grown in the state.