

INTERNAL BOLL ROTS ASSOCIATED WITH FEEDING BY HEMIPTEROUS INSECTS: A REVIEW

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Summary

When stink bugs, plant bugs and cotton fleahoppers feed on bolls and buds, the locks within the boll often become discolored or rotted. Such symptoms are usually caused by microbial pathogens introduced by insects. The roles of pathogens have been determined by antiseptically isolating microorganisms from locks of field-grown bolls prior to opening; isolating pathogens from sterile water washes of insects; and caging of feral insects on greenhouse grown bolls followed by antiseptic isolations. Pathogenicity has been confirmed through inoculation with fine needles. The results of these studies show that a variety of bacteria, including *Bacillus*, *Pantoea*, *Flavomonas*, *Pseudomonas*, *Klebsiella*, *Serratia* and *Enterobacter* species, and fungi, including *Nematospora coryli*, *Phoma exigua* and *Verticillium nigrescens*, are introduced by insect feeding and cause internal boll rots.

Infections of insect-punctured bolls by *Nematospora coryli* were especially abundant in Florida, Georgia and Texas in 2005, 2006, and 2009. About 95% of punctured locks were infected in certain boll collections. This infectious yeast caused seed necrosis and yellow or brown discoloration of fibers as well as "tight lock" or "hard lock". Locks infected by a single puncture when 14-days-old showed a mean reduction of 50% in seed cotton and seed weight. Fibers showed a marked reduction in micronaire but no reduction in length or strength. Affected locks are readily infected by secondary fungi, such as *Alternaria*, *Cladosporium* or *Fusarium* species. The affected locks also readily drop from bolls and may be lost in harvest. *Nematospora coryli* appears to have special relationships with the southern green stink bug (*Nezara viridula*), brown stink bug (*Euschistus servus*), green stink bug (*Acrosternum hilare*) and leaffooted bug (*Leptoglossus phyllopus*). It was readily acquired and transmitted by these insects without adversely affecting their feeding vigor.

The cotton fleahopper (*Pseudatomoscelis seriatus*) showed a special relationship with the bacterial pathogen *Pantoea ananatis*. Of the insects collected from various crops and weeds or reared from eggs on green beans in the laboratory, nearly 80-100% were infested with the bacterium and transmitted it to a majority of flower buds during feeding. *Pantoea ananatis* readily rotted the ovary in flower buds leading to abscission of squares, buds and young bolls.

It may be possible to reduce insect injury to cotton by targeting the pathogen transmitted by the insect. When 14-day-old bolls of more than 100 cotton lines and cultivars were inoculated with *Pantoea agglomerans* or *Nematospora coryli* there were significant differences among lines and cultivars in the amount of damage caused to locks. Seed cotton losses resulting from *N. coryli* varied from less than 10% to more than 90% in different popular cultivars. Understanding insect/plant pathogen relationships may also allow establishment of better thresholds for insecticide treatments since boll damage is confounded by infestation of the insect with highly virulent plant pathogens.