Thinking About Biological Control

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In the roots of turf there is a constant battle for a niche in which to live. If the "bad guys" (pathogens) win the battle, the result is disease. If the "good guys" (biological control microbes) win the battle, the result is healthy turf. To achieve biological control, a manager can add biocontrol organisms to a crop. Also effective is using those management practices that encourage growth of the "good guys" to the detriment of the "bad guys". We present here a scanning electron microscope (SEM) photograph to help you conceptualize one mechanism of biocontrol.

The fungus pathogen *Gauemannomyces graminis* is the causative organism for the take-all disease of wheat. The same fungus causes take-all patch in cool season amenity turfgrasses. It's interesting that new seedings of both wheat and turf are susceptible to *Gauemannomyces graminis.* The "bad guy" is in the soil, or is carried in on seed or by wind, and causes disease before populations of the "good guys" are established.

For the micrograph on page 132 of Ultrastructure of the Root-Soil Interface the caption reads: "In certain soils where wheat has been grown for a number of years in the presence of *Gauemannomyces* the severity of the disease decreases: this is known as take-all decline. In plants grown in such 'suppressive' soils, many of the Gauemannomyces hyphae become colonized by bacteria". In the text, the authors theorize that bacteria (good guys) kill the fungus (bad guys) by attaching to the fungus cell wall. After attachment, the bacteria destroy an area of the fungus cell wall. A hole forms in the fungus wall. These holes are presumed to be fatal, because with time the fungal hyphae collapse.

To see a review of this book: on the Internet go to WWW.wisc.edu/plantpath/ > APS net > publications > APS press > books > Ultrastructure of the Root-Soil Interface. You should find a book review here. Now, if you go back to the Plant Pathology home page you can access the UW-Madison library system and will find that

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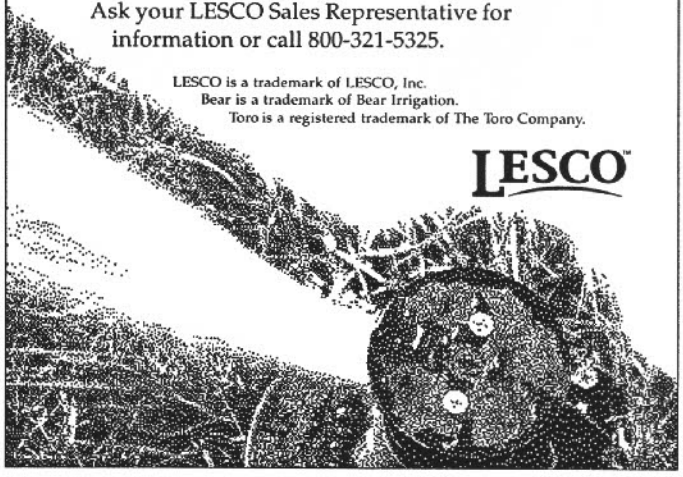

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this book (QK644 F67 1983) is available at both Steenbock and the Plant Pathology libraries. Beginning on page 132 there are a series of electron micrographs of *Gauemannomyces graminis* and a bacterium that are almost identical to the electron micrograph we present here.

The photographs here are not of the take-all fungus. They are of the fungus *Thielaviopsis* from poinsettia roots. Perhaps for each fungus plant pathogen there is a biological control bacterium.

Scanning electron microscope photograph of the fungus *Thielaviopsis* grown on artificial media, magnification 3,000X. H indicates thread-like hyphae of the fungus. Spores of this fungus develop in thick-walled pods containing several spores, P. The pod eventually breaks apart to release individual spores, S. Three circles have a single bacteria in the center. There are several hundred bacteria in this photograph. Four arrows indicate holes that bacteria have made in the fungus wall. Note that there are two hyphae labeled—the one with holes is beginning to collapse.

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