The purpose of these research studies is to evaluate valid alternative methods of pest control for use in integrated turf management systems. Projects investigate alternative pest control methods that include:

1. Biological control;
2. Nonchemical control including cultural and mechanical practices;
3. Allelopathy;
4. Selection and breeding for pest resistance;
5. Ecological balance of turfgrass species; and
6. Application of integrated turf management practices utilizing IPM and low cultural inputs.

University of California, Riverside

Investigation of Turf Disease Decline for Potential Development of Biological Control Methods

Increasing restrictions on the use of chemical pesticides demands a shift in emphasis from chemical control to alternative disease control methods. One alternative is the biological control of plant disease through the use of "beneficial" microorganisms that are antagonists of disease-causing microorganisms. This is the first year of a project to investigate sites, where disease has declined naturally, as potential sources of microorganisms for the development of biological control methods. Increased activity of antagonistic microorganisms may be associated with disease decline expressed at a site over several seasons, or within the green, recovered central areas that often appear within brown, symptomatic patches of turf as the disease spreads.

The study was initiated with a bermudagrass field plot previously inoculated with *Leptosphaeria korrae* (cause of spring dead spot) at the University of California at Riverside (UCR) Experiment Station. Disease had spread sufficiently so that green, symptomless patches were obvious in the center of brown, diseased areas; hence, a comparison of microbial profiles from each of these areas could be performed. Thus far, 135 different bacteria and fungi have been isolated from this UCR field plot. These microorganisms are being tested for the ability to reduce growth of several turfgrass pathogens (*Leptosphaeria korrae, Sclerotium rolfsii*, and *Rhizoctonia solani*) in culture. Experiments are also underway to test the most promising microorganisms for their ability to reduce disease in the greenhouse.

Identification of disease decline sites in California, studies to determine the disease-suppressiveness of turf samples from these sites, and a comparison of virulence of pathogens from these sites are planned for the next project year.

Dr. William Casale
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Pathogenicity and Biological Control of Gaeumannomyces-like Fungi

The two objectives of this project are to: 1) develop a model system for determining the relationship between melanization of fungal structures and pathogenicity (ability to cause disease) of *Gaeumannomyces* species and related fungi, and 2) determine the biological control potential of non-pathogenic mutant strains of *Gaeumannomyces* fungi for control of turfgrass patch diseases.

At least five turfgrass patch diseases are caused by soilborne fungi with dark-pigmented (melanized) hyphae and an ectotrophic growth habit on roots. These diseases include summer patch and necrotic ring spot of Kentucky bluegrass, spring dead spot and bermudagrass decline of bermudagrass, and take-all patch of bentgrass. The causal agents of these diseases are *Magnaporthe poae, Leptosphaeria korrae, L. narmari, Ophiosphaerella herpotricha, Gaeumannomyces graminis var. graminis,* and *G. graminis var. avenae*. DHN (1,8-dihydroxynaphthalene) melanin is the most common fungal cell wall melanin. Inhibition of the production of DHN melanin has been demonstrated to be a disease control method, primarily with the plant pathogens *Pyricularia oryzae* and *Colletotrichum* spp. In addition, melanin deficient mutants of these species are capable of colonizing plant tissue, but can not penetrate the plant tissue.

Compounds which inhibit DHN melanin were