Introduction

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:

- Biological control
- Nonchemical control including cultural and mechanical practices
- Allelopathy
- Selection and breeding for pest resistance
- Ecological balance of turfgrass species
- 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 - Dr. William L. Casale and Dr. Howard D. Ohr

In response to environmental concerns and increasing restrictions on the use of chemical pesticides, alternative disease control methods must be developed to reduce our reliance on these materials. Biocontrol of plant disease through the use of "beneficial" microorganisms that are antagonists of disease-causing microorganisms is one such alternative. Since March 1991, sites where disease has declined naturally were investigated for potential biocontrol agents. The disease decline at these sites may be due to increased activity of indigenous microorganisms antagonistic to the pathogen.

A total of 147 microbial organims were isolated from a UCR bermudagrass plot showing decline of spring dead spot caused by *Leptosphaeria korrae*. 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. Among this collection are 41 bacteria and 19 fungi which inhibited the growth of *Sclerotium rolfsii* (cause of southern blight) by antibiosis and 6 fungi that parasitized *S. rolfsii*. Growth of *Rhizoctonia solani* (cause of brown patch) was inhibited by 25 bacteria and 26 fungi from the collection. At the time of this report, tests with *L. korrae* were not completed.

In greenhouse experiments, two bacterial isolates, JT78 and JT80, were most effective at reducing disease caused by *S. rolfsii* and *R. solani* in perennial rye. No detrimental effects were observed on plants by these biocontrol agents, even when applied at high concentrations. Field testing the potential of biocontrol agents was initiated at two bermudagrass plots infected with *L. korrae* and results are pending.

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 continuing.

University of Florida

Pathogenicity and Biological Control of Gaeumannomyces-like Fungi - Dr. Monica Elliott

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 six turfgrass patch diseases are caused by soil borne 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, take-all patch of bentgrass, spring dead spot and bermudagrass decline of bermudagrass, and take-all root rot of St. Augustinegrass. *Gaeumannomyces graminis* var. *graminis* is associated with the diseases on bermudagrass and St. Augustinegrass grown in the southern United States.

All of these fungi are 'ectomycorrhizal' which means they colonize roots, and therefore, move with the roots. For vegetatively-propagated turfgrass, the pathogen, if present in the sod fields, will be moved with the turfgrass to the new planting location. One method for control would be to introduce a biological control agent into the new planting location prior to planting. An organism that could occupy the same niche as the pathogen would be a viable candidate for biological control. One such group of organisms are mutants of the pathogens that have been rendered non-pathogenic.

DHN (1,8-dihydroxynaphthalene) melanin plays