

# Integrating Biologically Based Strategies for Turfgrass Pest Management: Phase II

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## Objectives:

1. To develop and refine environmentally oriented management practices for long-term maintenance on golf courses.
2. Evaluate the interaction between resistant plants and natural control of fall armyworm using both field and laboratory experiments.
3. Evaluate the efficacy of standard chemical, microbial and alternative approaches to controlling fall army worm.

**Start Date:** 2000

**Project Duration:** 3 years

**Total Funding:** \$37,671

The encompassing objective is to develop and refine best environmentally-oriented management practices for long-term maintenance on golf courses. The potential for compatibility among two biologically-based management strategies, host plant resistance and biological control, will be evaluated in this three-year project.

In Phase I, genotypes were screened for potential resistance to a guild of insect pests that limit turfgrass growth, establishment or appearance. During Phase II we are developing strategy that will allow enhancement of biological control with parasitoids and predators by using grasses with partial resistance to selected turfgrass pests. Using turfgrasses with intermediate resistance introduces sustainability into the system by reducing the potential for insect pests to overcome the plant's defenses. By combining plant resistance to insects with enhanced activity of natural enemies, a more stable system may result with greatly reduced need for chemical intervention.

Research conducted during 2001 determined that predaceous arthropods are significantly influenced by turfgrass species



Field samples suggest predaceous insects are significantly influenced by turfgrass species.

and cultivar. Seasonal vacuum and pitfall sampling in six cultivars demonstrated that common predaceous arthropods that occur naturally in the turfgrass environment were differentially abundant depending on turfgrass species and or cultivar. Big eyed bugs, primarily *Geocoris uliginosus*, were more numerous in TifSport, Sea Isle 1, and 561-79 than in Cavalier, Palisades or TifEagle. Foliar spiders were most abundant in Palisades, followed by Cavalier and TifSport. Rove beetles and centipedes were also more numerous in these three cultivars.

Ground beetles were most numerous in Palisades in vacuum samples. Minute pirate bugs were more abundant in both paspalums and Tifeagle than the other three cultivars in the experiment. Ants and parasitic Hymenoptera were equally common among all species. Plant feeding leafhoppers were most abundant in Sea Isle 1 and 561-79, followed by Tifeagle and Tifsport bermudagrasses. Correlation analysis indicated a significant positive relationship between the numbers of big eyed bugs sampled and leaf hopper nymphs and adults.

Other predaceous Heteroptera were also weakly, but significantly, correlated with leafhopper nymphal and adult abundance. Big eyed bugs, ants and leafhoppers were most common in paspalum. Foliar spiders, ground beetles, centipedes and rove beetles in vacuum samples were most abundant in zoysia. Parasitic Hymenoptera were equally abundant among turfgrass species. In pitfall samples, ground dwelling spiders were most common in 561-79 paspalum and Tifsport bermudagrass. Tiger beetles were most often found in Sea Isle 1 and Tifeagle plots. Carabids (ground beetles) were also most common



Arthropods were sampled using vacuum methods and pitfall traps.

ly collected in Tifeagle pitfalls.

In field studies, addition of big eyed bugs reduced armyworm survival by about 50%. Turfgrass cultivar also influenced armyworm survival. The addition of big eyed bugs did not significantly reduce the number of fall armyworms when they were feeding on a very susceptible turfgrass such as Tifeagle. When larvae were feeding on a less susceptible grasses, big eyed bugs were able to significantly reduce armyworm survival. Previous and current research suggests that larvae feeding on susceptible grasses grow more quickly than those feeding on resistant grasses and may more rapidly escape the suitable prey size acceptable to the big eyed bug. Conversely, differences in armyworm survival in plots to which big eyed bugs had been added were not significant on the very resistant Cavalier zoysiagrass.

## Summary Points

- Research conducted during 2001 determined that predaceous arthropods are significantly influenced by turfgrass species and cultivar.
- Research suggests that larvae feeding on susceptible grasses grow more quickly than those feeding on resistant grasses and may more rapidly escape the suitable prey size acceptable to the big eyed bug.