Integrating Biologically Based Strategies for Turfgrass Pest Management: Phase II

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Objectives:

1. Evaluate the occurrence and impact of beneficial arthropods on plant genotypes with varying resistance to fall armyworm, *Spodoptera frugiperda.*
2. Compare efficacy of alternative products and conventional insecticides on armyworm resistant and susceptible turf.

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 biologically-based management strategies, host plant resistance and biological control was evaluated in this three-year project. The combined effect of host plant resistance and selective insecticide application was also evaluated.

Interactions between host plant resistance and biological control may be advantageous or disadvantageous for pest management. Turfgrass cultivars have rarely been tested for extrinsic resistance characteristics such as occurrence and performance of beneficial arthropods on plant genotypes with resistance to known turf pests.

Among six turfgrass genotypes tested, bigeyed bug, *Geocoris uliginosus* (Say) nymphs varied in ability to reduce fall armyworm, *Spodoptera frugiperda* (J. E. Smith), larvae. The six grasses tested ('Sea Isle 1' and 561-79 seashore paspalum, *Paspalum vaginatum* Swartz; 'TifSport' and 'TifEagle' bermudagrass, *Cynodon dactylon* (L.) x *C. transvaalensis* (Burtt-Davy); and Cavalier and 'Palisades' zoysiagrass (*Zoysia japonica* von Steudel and *Z. matrella* (L.) Merrill) represented a range in resistance to *S. frugiperda.*

In the laboratory, the greatest reduction in *S. frugiperda* larvae by a low density of *G. uliginosus* occurred on the resistant Cavalier zoysiagrass. A seven-fold difference in larval weight between those feeding on susceptible versus resistant grasses suggested that on the resistant grass larvae remained for a longer period in a size range susceptible to predation.

Researchers at University of Georgia are evaluating the potential compatibility of host plant resistance, use of natural enemies and alternative products for pest management in turf.

Results of laboratory studies were not directly translated to the field where a diverse predatory arthropod community varied in composition depending on turfgrass genotype. In the field, the greatest reduction in *S. frugiperda* larvae by a low density of *G. uliginosus* occurred on Sea Isle 1 and 561-79 seashore paspalums.

In the field, predaceous Heteroptera were most abundant in paspalum and bermudagrasses, while Carabidae, Staphylinidae and Araneae were more common in zoysiagrasses as measured by vacuum samples. Carabids from pitfall traps were more common in bermudagrasses, Araneae and Staphylinids were similar among grass taxa, and Cicindellidae were most common in paspalum and bermudagrasses.

Predation was never significantly decreased on resistant turfgrass cultivars in any of the experiments, indicating no negative tritrophic interactions.

In field plots treated with reduced rates of halofenozide, differences in larval survival varied up to ten fold on different genotypes (host-plant + insecticide) compared to less than three fold differences in survival in controls (host- plant effects alone).

Summary Points

- Influence of turfgrass genotype on beneficial arthropods (extrinsic resistance) was evaluated.
- Occurrence and abundance of beneficials varied with turf type.
- Fall armyworm suppression by the bigeyed bug, *G. uliginosus,* was greatest on Cavalier zoysiagrass in the lab and on Sea Isle 1 and 561-79 paspalum in the field.
- Insecticides applied at low rates to turfgrasses with partial pest resistance provided better armyworm control than the same rates applied to more susceptible grasses.