

Identification of Genetic Insect and Mite Pest Resistance in Turfgrasses

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Objectives:

1. Establish a regional center to identify genotypes of *Cynodon*, *Zoysia*, *Buchloe*, *Paspalum*, *Agrostis*, and *Poa* with genetic resistance to insects and mites (i.e., fall armyworms, black cutworm, sod webworms, greenbug and host-specific eriophyid mites) for use in cooperating turf breeding programs.
2. Bioassay resistant lines with insect diets to characterize the mechanisms of resistance and determine their biochemical nature.
3. Develop effective and efficient procedures to accommodate screening and identify typical breeding populations previously unavailable to plant breeders.

Start Date: 1998
Project Duration: 5 years
Total Funding: \$125,000

This Regional Center to Identify Genetic Insect and Mite Pest Resistance in Turfgrasses was established as a result of funding from the USGA Green Section and several other resources. The primary goal for this center has been to identify genetic lines of several species of turfgrass with resistance to the primary pests of each species of turfgrass and to characterize the mechanisms of resistance.

Zoysia vs. Hunting Billbug

The hunting billbug (*Sphenophorus venatus vestitus*) feeds on both cool- and warm-season grasses, but is most damaging to zoysiagrass and bermudagrass. Plant canopy damage caused by hunting billbug larvae was measured as leaf and shoot firing. Diamond and Zorro exhibited only 6-10 % plant canopy damage, respectively.

In contrast, Meyer and Palisades exhibited 44 to 45% damage, respectively, and were the most susceptible cultivars. The four cultivars of *Zoysia matrella* (Diamond > Zorro > Cavalier > Royal) exhibited resistance. Meyer (the industry standard) has now been documented as highly susceptible to zoysiagrass mite, fall armyworm, tropical sod webworm, tawny mole cricket, differential grasshopper and hunting billbug.

Poa Hybrids vs. Fall Armyworm

TBPC 25-11-25 Texas bluegrass (*Poa arachnifera* Terr.) has been hybridized with Mystic Kentucky bluegrass (*P. pratensis* L.) to produce 53 interspecific hybrids. These hybrids were characterized for fall armyworm (*Spodoptera frugiperda*) resistance. Results of these experiments provide us with a good indication of the heritability of fall armyworm resistance.

Poa pratensis vs. Fall Armyworm

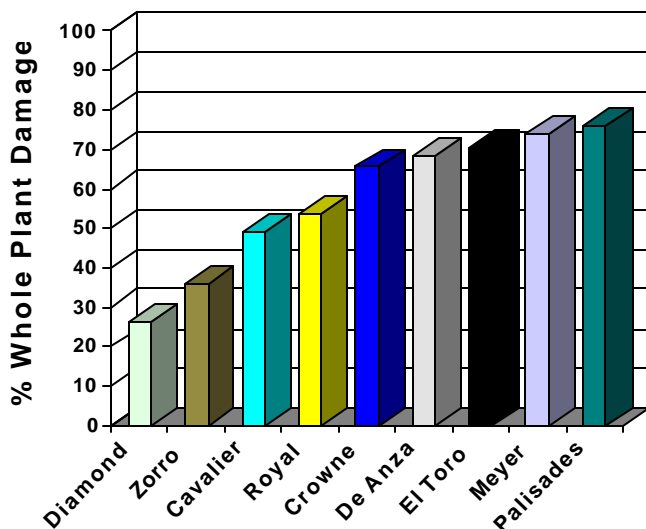
This experiment was conducted to identify additional cultivars of *P. pratensis* that could serve as parents with high fall armyworm resistance for future hybridization with *P. arachnifera*. Fall armyworm larvae were the most susceptible to Wabash (100%), Adelphi and Eagleton (95.8%) and Monopoly (91.67%) at 7-days-old (after only three days of feeding). Glade (8.33%) was the most susceptible.



Growth reduction caused by hunting billbug larval feeding (left) compared to untreated paired plant (right) for susceptible Meyer zoysiagrass.

Zoysiagrass Hybrids vs. Fall Armyworm

Work is continuing to identify the degree of heritability of fall armyworm resistance among hybrids between Cavalier and Diamond zoysiagrass. We successfully made approximately 250 hybrids between Cavalier (highly resistant) and Diamond (susceptible). We are in the process of evaluating each of these hybrids to determine the range of resistance among the hybrids and gain enough information to characterize the heritability of the resistance factors.



Percentage reduction in whole plant mass due to hunting billbug larval feeding on nine cultivars of zoysiagrass.

Summary Points

- Evaluating insect resistance/tolerance of bermudagrass, zoysiagrass, buffalograss, seashore paspalum, bentgrass, and bluegrass.
- Nine bermudagrass lines have been identified with resistance to bermudagrass mite, *Eriophyes cynodontiensis*.
- Hunting billbug resistance found in zoysiagrass.
- Bermudagrass and zoysiagrass screened for resistance to armyworm and other *Lepidoptera* species.