Evaluation of Golf Turf Management Systems with Reduced Chemical Pesticide Inputs

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Objectives:

1. Evaluate the aesthetic and functional performance of golf putting greens managed with few or no chemical pesticides.
2. Determine the environmental and economic impact of golf putting greens managed with few or no chemical pesticides.

Start Date: 2001
Project Duration: 2 years
Total Funding: $58,000

This project was designed to provide information on the feasibility and performance of golf course turf managed with few or no chemical pesticides. The need for this information is urgent in light of recently passed and pending legislation in New York State and other regions of the country. Golf turf managers faced with operating their facilities under constraints on the use of chemical technology need information on how to maintain acceptable, playable golf course turf. At the same time, those advocating pesticide restrictions need to be aware of the "costs" of implementing the policies and the resulting impacts on golf turf performance.

The project is sited on one of the five golf courses at the Bethpage State Park, Long Island, NY. Current golf course pest management practices ("unrestricted") are compared with IPM and non-chemical management. Further comparisons are made between standard cultural practices and "alternative" practices that we believe will reduce turfgrass stress and thereby minimize pest problems. The experiment was designed as a 2 x 3 factorial, with the three pest management and two cultural management regimes. Each green serves as a replicate, so that all 18 greens are used to accommodate three replications of the six management systems. This project explores total management systems, as practiced by turf managers, rather than focusing on individual technologies and isolated practices.

Alternative cultural practices included mowing at 4.4 - 4.7 mm (0.175 - 0.188 in), frequent hydrojecting and vertical mowing, reduced frequency of clean-up passes, and hand watering of known dry spots prior to wilting. For pest management, some cultural and biological practices were employed specifically to prevent or reduce pest problems on some or all of the non-chemical and IPM greens, such as: rolling greens in the morning to reduce incidence and severity of dollar spot; increasing fertility to aid recovery from dollar spot injury; application of entomopathogenic nematodes (*Heterorhabditis bacteriophora*) against annual bluegrass weevil larvae and cutworm caterpillars; manual removal of weeds, and application of compost to reduce disease severity.

Researchers at Cornell University are evaluating the aesthetic and functional performance of golf putting greens managed with few or no chemical pesticides.

Systems are being evaluated for aesthetic and functional performance, pest occurrence, turfgrass species population dynamics, tissue and soil nutrient content, organic matter dynamics, rooting, nematode populations and pesticide impact (as measured by an environmental impact quotient). In addition, the feasibility of each system will be evaluated with a golfer satisfaction survey and an economic analysis. Increased labor needs were a component of both the IPM and non-chemical management systems, and will be considered as part of the economic analysis.

In 2001, dollar spot was the primary pest in all treatments throughout the season and was the target of most pesticide applications. Other pests of less significance included annual bluegrass weevils, black cutworms, anthracnose, crabgrass and goosegrass. Pesticide applications on the IPM greens were 27-30% less than on the unrestricted pest management greens, and quality on five of the six IPM greens equaled the unrestricted pest management greens. As of late August, we were unable to retain acceptable quality on any of the non-chemical greens and two of those greens have been closed since that time. If results from non-chemical management in our first year of the project were extrapolated to an 18 hole course, revenues would definitely be lost. We hope that higher quality can be maintained on the non-chemical greens in 2002.

Summary Points

- The feasibility and performance of golf course turf managed with few or no chemical pesticides was assessed.
- Golf course putting greens were maintained under the unrestricted current standard pest management, IPM, or non-chemical pest management regimes.
- The current standard cultural practices were compared with alternative stress-reducing practices.
- IPM greens received 27-30% fewer pesticide applications than the unrestricted current standard pest management system.
- Five out of six IPM greens were of equal quality to those managed under the current unrestricted standard.
- All non-chemical greens were below acceptable quality from late August through October.