

Title: Evaluation of Golf Putting Green Management Systems with Reduced Chemical Pesticide Inputs

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B. Nontechnical Summary

This project will provide long-term information on the costs and turfgrass quality associated with golf course turf managed with few or no chemical pesticides. Many golf courses in New York State and other areas of the U. S. and Canada are being compelled, or are choosing, to reduce or eliminate the use of chemical pesticides. Turfgrass managers need better information on how cultural practices and alternative pest management strategies can be combined to maintain acceptable, playable golf course turf. Furthermore, those advocating pesticide-restrictive policies are often unaware of the costs of implementing the policies and the resulting impacts on turfgrass quality.

Our project was established in 2001 with funding from NE IPM beginning in 2005. It explores total management systems, as practiced by turf managers, rather than focusing on individual technologies and isolated practices. Two cultural and three pest management systems are being compared in a factorial design, utilizing all 18 greens of a high-use public golf course. The site is a living laboratory, research and demonstration site and results are already providing a great deal of information on low- and non-chemical turfgrass management. This project addresses important scientific, environmental and social aspects of golf, and compares them in ways that are useful to golf managers as well as the general public.

C. Introduction

Golf courses throughout the United States and Canada are being challenged to reduce or eliminate the use of chemical pesticides. In New York State, many public golf courses have been affected by legislation that phases-out and/or eliminates chemical pesticide use. Such laws have been passed for municipal properties in Suffolk, Westchester and Albany Counties, and the City of Buffalo. In addition, at least 20 laws that would restrict pesticide use on golf courses in other areas of the state are currently under consideration. Those advocating pesticide-restrictive laws and policies are often unaware of the costs of implementing the policies and the resulting impacts on golf turf performance. Furthermore, the knowledge and tools to implement such policies are not currently available to golf turf managers.

Golf courses are important green space in urban and suburban communities. According to the U.S. Golf Foundation <<http://www.ngf.org/>>, there are 18,643 golf courses in the United States and up to 36 million people play golf annually. Over 3,000 courses are located in the Northeast region, with New York ranking as the fifth highest golf state nationally with 860 courses. Golf

courses provide recreational area for golfing, jogging and walking and also serve as wildlife habitat. Courses commonly abut residential property, and are frequently situated near wells, wetlands, streams and other water sources. For these reasons, community residents are often concerned about the pest management practices being used.

The 2004 New York State Turfgrass Survey (Ropel et al., 2004) indicated that golf courses spend more than \$23 million dollars annually on pesticides with 74% spent directly on fungicides. When factored together with labor expenditures for pesticide application, pest management costs exceed \$40 million annually. When asked about significant problems they are facing today, 65% of golf course managers rated disease management as their highest concern. Furthermore, when asked about significant future problems, government regulations and loss of chemicals were the two most frequent answers.

Golf turf managers who want, or are required, to minimize their reliance on chemical technology need information on how to maintain acceptable, playable golf course turf. Unfortunately, there is a dearth of information available on individual practices and technologies to reduce pesticide use, and especially on how these alternative cultural and pest management technologies integrate and work together in a system. Many types of cultural innovations, while proven under field laboratory conditions or in growth chambers, need to be ground-truthed to demonstrate their ability to be integrated into modern turfgrass management programs.

D. Objectives

The goal of this project is to provide long-term information on the costs and turfgrass quality associated with golf course turf managed with few or no chemical pesticides.

Objective 1. Produce aesthetically and functionally acceptable golf turf under six unique management systems. There are 3 pest management strategies (unrestricted current standard, IPM, Bio-based Reduced Risk [formerly nonchemical]) and 2 sets of cultural management practices (standard and alternative).

Update: The six management systems are being maintained. With the exception of low quality velvet bentgrass greens, quality was almost always acceptable for all treatments throughout the 2005 season. In 2006, there have been no green closures as of August 18, for the first time in the six years of the project.

Objective 2. Evaluate and compare the aesthetic and functional turfgrass quality, pest occurrence, and pesticide impact in each management system.

Update: All evaluations and comparisons are being conducted on a regular basis.

Objective 3. Analyze the economics of each system, including golfer satisfaction.

Update: Golfer satisfaction surveys are being conducted on an annual basis, and data for economic analysis is being collected on an ongoing basis.

Objective 4. Publicize results to golf course managers, policy makers, golfers, environmental and health advocates and the general public.

Update: See section F. Progress.

E. Approach

The experiment was designed as a 3 x 2 factorial, with three pest-management (Unrestricted, IPM, Bio-based Reduced Risk [formerly nonchemical]) and two cultural-management regimes (standard and alternative). The experimental design resulted in six management systems. Each green served as a replicate, with all 18 greens of the Bethpage Green Course used to accommodate three replications of the six management systems.

F. Progress

Progress is reported as 2005 results that follow.

Turf Quality: In 2005, all treatments (except the velvet bentgrass and one early season rating on the reduced risk poa/bentgrass greens) maintained acceptable visual quality (rating ≥ 6) throughout the season, and significant differences among treatments for visual quality were rare. Quality of the velvet bentgrass greens was poor for much of the season, but not because of pest management issues.

Ball Roll: There were no significant effects of any treatments on ball roll, however we were significantly below our target values for standard culture of at least 9 ft.

Pest Incidence and Pesticide Use: In 2005, the majority of pesticide applications were for disease management, especially dollar spot and brown patch. In general we continued to see a decline in overall weed and insect incidence. The IPM greens received 57% fewer traditional chemical fungicide and 75% fewer insecticide applications than the unrestricted greens. Although numbers of pesticide applications are easily compared, they reveal nothing about the qualitative effect of these pesticides. A more meaningful evaluation of the significance of the reductions and changes in pesticide use is gained by comparing the environmental impact (EIQ) (see next paragraph).

Environmental Impact: We used the Environmental Impact Quotient (EIQ) for both selecting low impact products, and to assess the cumulative impact of all products applied during the season. The total field EIQ value was calculated for each treatment for the 2005 season, and values of the IPM and reduced risk treatments were 80-85% lower than those of the unrestricted treatments.

Golfer Satisfaction Survey: Golfers were surveyed in 2005 to assess their perceptions of the visual and performance quality of greens managed under the various pest management and cultural treatments. Generally, results can be summarized that golfers accepted the quality of greens as managed in all treatments. In addition, golfers were queried on their opinion of pesticide use on golf courses, and the majority chose an IPM approach. The 2006 survey was recently conducted, but results have not yet been analyzed.

Outreach and Impact: In August of 2005, a field day was held with approximately 45 golf course managers and a few environmental advocates and community members attending. In addition, the project was presented at several winter meetings for turfgrass managers. A poster was exhibited at the 5th National IPM conference in St. Louis, and a full-length report was published in the NYS IPM Program's Annual report (see appendices).