CASE STUDY

NEW YORK STATE BEST MANAGEMENT PRACTICES FOR GOLF COURSES

Reducing Environmental Impact of Pest Management

Project Details

- **Golf Course Profile:**

  Location: Horseheads, NY
  Annual rounds of golf: 25,000
  Staff: 10 Full-time; 3 Temporary
  Acreage: 230
  Public or Private: Public

- **BMP Implementation:**
  Integrated Pest Management practices to reduce pesticide usage; calculation of Environmental Impact Quotient (EIQ) to select reduced risk pesticides.

Project Summary

Soaring Eagles Golf Course utilized a progressive Integrated Pest Management (IPM) program to understand pest cycles and the environmental conditions that promote pest outbreaks, treating pest problems when and where they were anticipated to occur or supported by scouting reports. When control intervention was required, they used the Environmental Impact Quotient (EIQ) as a risk assessment approach to pesticide selection. The EIQ is a pesticide selection tool to assess the risk of pesticides to applicators, human health off-site movement and non-target organisms.

Program Overview

The course management staff at Soaring Eagles initiated training and implementation of a new IPM program to reduce the environmental impact of pesticides applied to the course. A site assessment identified areas with poor light, inadequate air movement, or root interference from trees. Soil conditions were studied to identify drainage problems where water might accumulate, areas of poor hydraulic conductivity that left surfaces chronically wet, and areas with high organic matter accumulation. In addition, emphasis was also given to limit the areas of management: areas that could be removed from frequent fertilizer and pesticide applications.

Following this review, course management changes were made as follows:

- implemented a soil management program using cultivation techniques to relieve compaction, improve air content and maintain adequate drainage
- increased light and frequent topdressing to dilute surface organic matter
- reduced mowing stress by implementing good mower set-up, alternating rolling and mowing and skipping clean up passes
- updated nutrient management practices to provide a consistent level nitrogen inputs
- updated irrigation practices to distribute water uniformly and apply to match evapotranspiration (ET) losses
- applied preventative applications of EPA-classified reduced risk pesticides
- increased use of predictive models for key pests to more precisely time pesticide applications
- implemented EIQ to select lower risk pesticide products

The Common Problem So Often Overlooked: Dollar Spot

Surveys with many cool-season locations often indicate the same list of frequent or persistent pest problems. Soaring Eagles is no different. A review of the self-identified pest targets for 2009 to 2014 (Figure 2) indicates over 50 percent of the fungicide applications targeted dollar spot, which accounted for one third of all pesticide applications. If you consider further that many plant growth regulators (PGRs) also assist with dollar spot control, then more than 75 percent of all fungicide applications involved dollar spot. Oddly, dollar spot might be the most common pest problem that pesticides are applied for, but is rarely discussed as a major problem because of the many available controls.

Figure 1. Dollar spot.

If and when pesticides are required to treat dollar spot, tools are available to select products based on their efficacy and environmental risk and economics, with consideration also being given to the chemical class (FRAC Code) so that rotation can minimize the risk of developing chemical resistance.

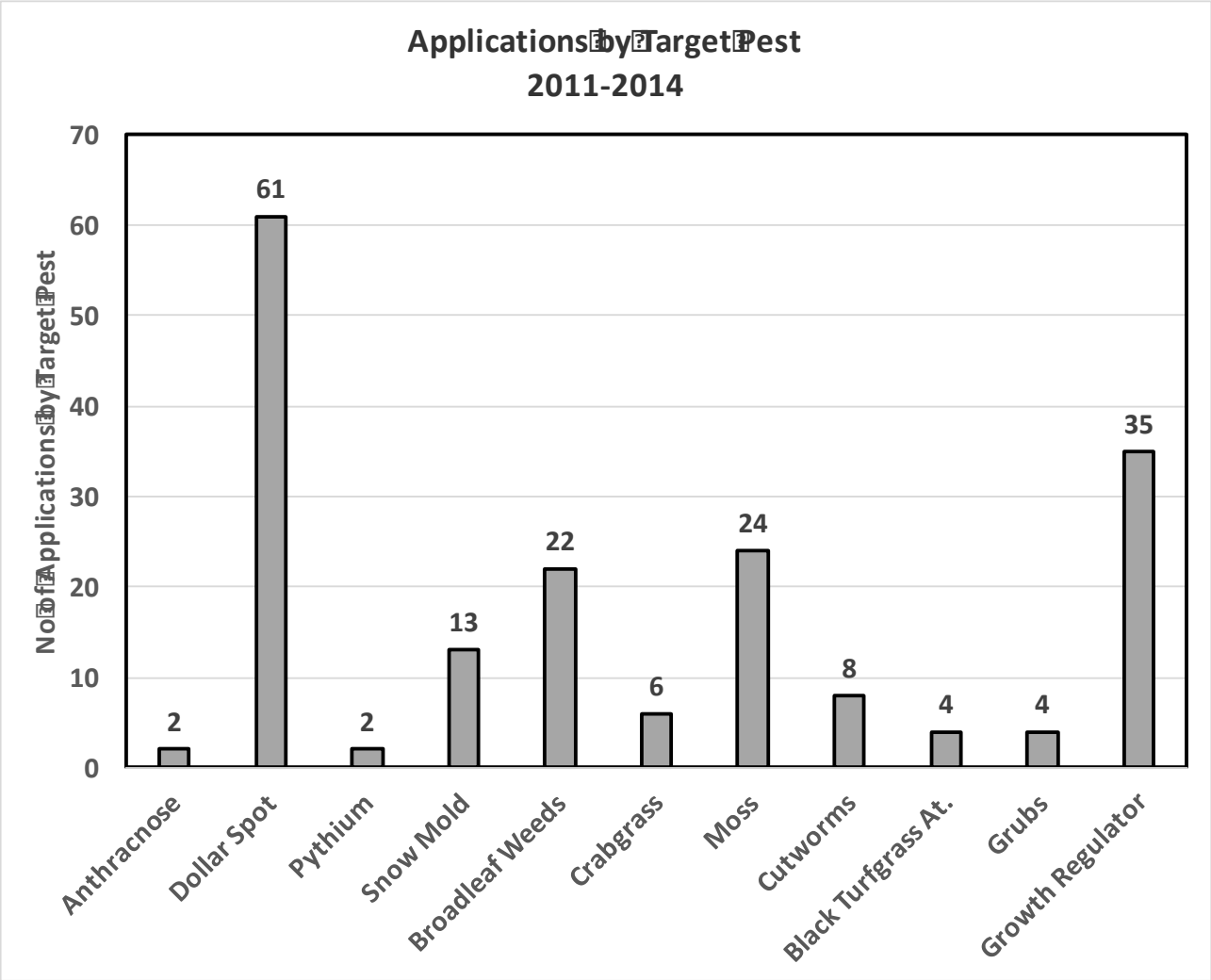

Figure 2.Dollar spot accounts for over 50% of fungicide applications.

Integrated Assessment of Efficacy and Resistance

Research-based reports on the efficacy and FRAC codes of different pesticides used to control dollar spot are available; the University of Kentucky publishes an annual review [1] of all the published studies, grades the studies and their findings, and provides a ranking on the most effective products. Efficacy is ranked using numerical values from 1 (lowest) to 4 (highest). The annual *Cornell Guide for Commercial Turfgrass Management* lists all the fungicides tested and their composite rankings for control of dollar spot.

[1] http://www2.ca.uky.edu/agc/pubs/ppa/ppa1/ppa1.pdf

Environmental Risk

The EIQ model combines multiple environmental and health aspects of pesticides. The EIQ rates chemicals using many factors in terms of health, ecology and the environment (Kovach et al, 1992) (http://www.nysipm.cornell.edu/publications/eiq/default.asp). Note that the EIQ is based on the active ingredient (AI) only. Ideally, all ingredients in a formulation would be included, however, these data are largely unavailable. The evaluation must also consider the percent AI and the rate of application of the product (pounds AI applied per acre). Therefore, the resulting EIQ Field Use Rating is a term expressed as a measure of the environmental risk of a product per acre treated.

EIQ Field Use Rating = EIQ x % Active Ingredient x Rate of Application [2]

The NYSIPM website provides a calculator to calculate the EIQ Field Use Rating of any products (http://www.nysipm.cornell.edu/EIQCalc/input.php). As a general guideline, EIQ Field Use Ratings can be classified as follows:

EIQ Field Use Rating > 100	Very high
EIQ Field Use Rating > 50	High
EIQ Field Use Rating > 25	Moderate
EIQ Field Use Rating < 25	Low

An example is provided below showing how to calculate the EIQ Field Use Rating of chorothalonil, a multi-site, contact pesticide (Table 1) with a high EIQ Field Use rating as compared to an alternative product, Fluazinam. Fluazinam is also a multi-site, contact pesticide with similar efficacy used for preventative treatment (Table 2).

Table 1. Chlorothalonil (EPA Reg. #66222-154)

EIQ Rating	37.42
% AI	54%
UKY Efficacy Rating	3
Low pest pressure application rate	2.12-3.5 fl oz per 1000 square ft
High pest pressure application rate	5.5 fl oz per 1000 square ft
Application Interval	7-14 days

[2] Rates should be standardized to the same units, usually lbs/acre. To convert ounces or fluid ounces per 1000 ft^2, divide the rate by 16 and multiply by 43.56 (lbs/a = [(oz/1000) / 16] x 43.56).

Table 2. Fluazinam (EPA Reg. #71512-20-100)

EIQ rating	11.04
% AI	40%
University of Kentucky efficacy rating	3
Application rate	0.5 fl oz per 1000 square ft
Application interval	14 days

EIQ Field Use Rating Calculations and Comparisons

Calculation: EIQ Field Use Rating = EIQ x % Active Ingredient x Rate of Application

Chlorothalonil, applied at lower pest pressure application rates (3.5 fl oz. per 1000 sq. ft):

= 37.42 x 0.54 x (3.5/16 x 43.56)
= 192

Chlorothalonil, applied at higher pest pressure application rates (5.5 fl oz. per 1000 sq. ft):

= 37.42 x 0.54 x (5.5/16 x 43.56)
= 302

Fluazinam:

= 11.04 x 0.40 x (0.5/16 x 43.56)
= 6

The next step was to measure the FUEIQ-Acres by multiplying the FUEIQ of the pesticide applied with the area treated measured in acres:

FUEIQ-Acres = FUEIQ x Acres Treated

Reducing the number of applications and the area treated, adopting spot treatments versus blanket sprays, and treating areas where scouting has detected a problem that exceeds acceptable thresholds limits the FUEIQ-Acres.

Project Summary

Soaring Eagles quickly adapted the chemical substitutions of lower FUEIQ products with the same or improved efficacies, still considering resistance management. The first year reductions were substantial. They reduced maintenance areas on the course and reallocated that maintenance to playable areas that directly improved customer satisfaction. Strategic equipment investment created opportunity for specific cultural operations that directly reduced pest pressure and improve plant vigor. Five years later, there is a 28 % reduction in the overall FUEIQ –Acres (Figure 3). More significantly, the course has reduced the use of higher FUEIQ-value chemicals by 57%.

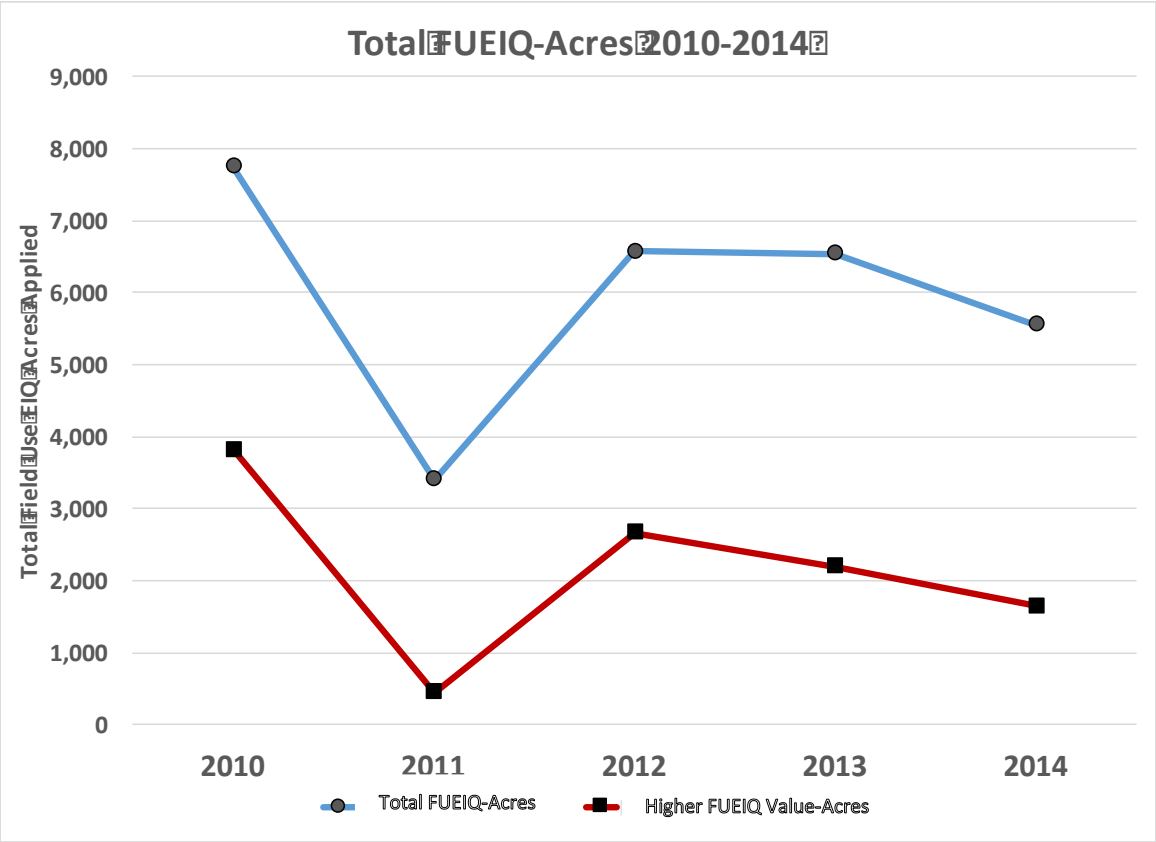

Figure 3. Five years after initiating a progressive IPM program at Soaring Eagles, there is a 28 % reduction in the overall FUEIQ–Acres, without sacrificing efficacy.

Additionally, customers have commented that the recent adjustments and investments in training and equipment have made the course conditions “remarkable”. The putting surfaces in particular have benefited from the reallocation of labor and energy for more specific practices that improve performance (firmness, trueness, and speed).