Golf Course Environmental Profile

Volume III Summary

Nutrient Use and Management on U.S. Golf Courses

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For the full report, visit www.eifg.org.

GCSAA

Environmental Institute for Golf

The Environmental Institute for Golf is the philanthropic organization of the Golf Course Superintendents Association of America.

Summary of Volume III

This report is the result of a systematic process to collect golf course data on a national basis. Volume III covers the third of five surveys, each of which is an important element that will ultimately provide a more complete understanding of environmental management of golf courses. The Golf Course Superintendents Association of America's (GCSAA) Golf Course Environmental Profile will provide reliable information to establish and document a baseline of environmental performance as the means to measure environmental performance. This summary focuses on the Nutrient Use and Management survey. It will build on the first two surveys, concerning the physical characteristics and environmental improvements on golf courses; and water use and conservation. To view the full reports of the first three surveys of GCSAA's Golf Course Environmental Profile, visit The Environmental Institute for Golf's website at **www.eifg.org**.

Project Overview

GCSAA is the professional golf organization for the men and women who manage and maintain golf courses. Through its philanthropic organization, The Environmental Institute for Golf (The Institute), it develops and delivers programs and services focusing on information collection, research, education and outreach that will enhance environmental stewardship on golf courses.

At an Institute strategic planning session in July 2003, representatives from the golf industry and environmental community, as well as regulatory representatives, began to identify projects that could advance the position that golf courses are community assets. Participants noted that the golf industry has been proactive through the efforts of voluntary stewardship programs, as well as through research related to golf course management and golf's relationship with the environment funded by the United States Golf Association (USGA) with support of GCSAA and its chapters. The data supports that golf courses can be compatible with the environment when properly managed.

What is missing, however, is aggregate data on golf courses that could be examined on a regional and national basis to document environmental practices. All parties involved agreed that if golf is to remain viable, there must be more reliable information about its relationship with the environment. GCSAA accepted this challenge and, with assistance from a myriad of individuals and organizations, developed a process to collect the data. Thanks to funding from The Institute and a grant from The Toro Giving Program, the multi-year Golf Course Environmental Profile was launched in October 2005.

"Nutrient use and its impact on water quality is a hot topic across many industries. Those who are familiar with golf course management have long felt the industry has been a good steward when it comes to the management of fertilizers. With this study, we now have a much better picture of nutrient use across all regions of the country and how superintendents make application decisions. The report indicates where improvements can be made, but by and large the information is positive."

Clark Throssell, Ph. D.
GCSAA Director of Research

"With each survey, the picture becomes clearer in regards to the profile of the golf course. We have validated the desire for sustainability and have identified areas to explore for continuous improvement. This transparency speaks volumes for the direction and commitment of the golf industry."

Greg Norman
The Environmental Institute for Golf
Advisory Council Chair

The project, which enlisted the services of the National Golf Foundation, involved a series of five surveys that were sent to GCSAA member and non-member golf course superintendents to collect data focusing on the following:

- Physical characteristics of golf courses and environmental stewardship practices
- Water use and conservation
- Nutrient use and management
- Pesticide use
- Energy use and environmental practices

The entire series of surveys will be replicated at a later date to evaluate change over time. Data from each survey will be published in a scientific journal then presented to other interested parties. The entire project is designed to collect information that will allow golf course superintendents and other facility personnel to become better managers and lead to GCSAA's development of more valuable programs and services for its members, facilities and the industry. The information also will address inquiries from regulators and legislators, the media, environmental advocates and other special interest groups.

This is a study to document nutrient use and management practices on golf courses in the United States conducted by the Golf Course Superintendents Association of America, with funding by The Environmental Institute for Golf, and thanks in part to a grant from The Toro Giving Program.
For the full report, visit www.eifg.org.

Nutrient Use and Management on Golf Courses

Methodology

Golf course superintendents at all golf facilities in the U.S. (16,386) were invited to participate in this survey. A total of 2,561 completed surveys were returned, yielding a 15.6 percent return rate. Data were analyzed and compared for facility type, maintenance budget and across seven agronomic regions – Northeast, North Central, Transition, Southeast, Southwest, Upper West/ Mountain, and Pacific.

The objectives of the nutrient use and management survey were to determine:

- Amount of nutrients applied to golf courses
- Sources of the nutrients applied
- Nutrient application decisions
- Whether superintendents use written nutrient management plans or operate under governmental restrictions
- How fertilizers are stored and how often fertilizer application equipment was calibrated

Nutrient Use

Summed over all golf course components and all golf courses, in 2006 a total of 101,096 tons of nitrogen were applied to 1,311,000 acres (154 pounds of nitrogen per acre); 36,810 tons of phosphate were applied to 1,131,000 acres (65 pounds of phosphate per acre); and 99,005 tons of potash were applied to 1,260,000 acres (157 pounds of potash per acre). These application rates are within the guidelines recommended by university scientists.

One way to put nutrient use on golf courses in context is to compare it with nutrient use by other agricultural crops in rate per acre applied and total amount applied (rate per acre multiplied by the number of acres fertilized). Nutrient use of corn and tomatoes were chosen for comparison with nutrient use on golf course turfgrass. Corn is a widely grown agronomic crop, and tomatoes are a high-value, intensely maintained vegetable crop. When the rate of application of fertilizer applied to turfgrass on golf facilities within the U.S. is compared to corn and tomato production, turfgrass on golf courses is fertilized at a slightly higher rate than corn and at a slightly lower rate than tomatoes. Turfgrass on golf courses is grown on slightly less than 1.5 million acres, and those acres are fertilized with 101,096 tons of nitrogen and 36,810 tons phosphate. Corn, which is one of many crops grown nationwide, is grown on over 76 million acres and is fertilized with 4,690,000 tons of nitrogen and 1,696,000 tons of phosphate. While the total amount of nutrients used at golf facilities is considerably less than corn, golf facilities should incorporate environmental stewardship practices to protect water resources.

Nitrogen Fertilizer Sources

For 18-hole golf facilities nationally, slow-release nitrogen sources accounted for 64 percent of the nitrogen applied, and quick-release nitrogen sources accounted for 36 percent. Organic nutrient sources were applied to 66 percent of 18-hole golf facilities in

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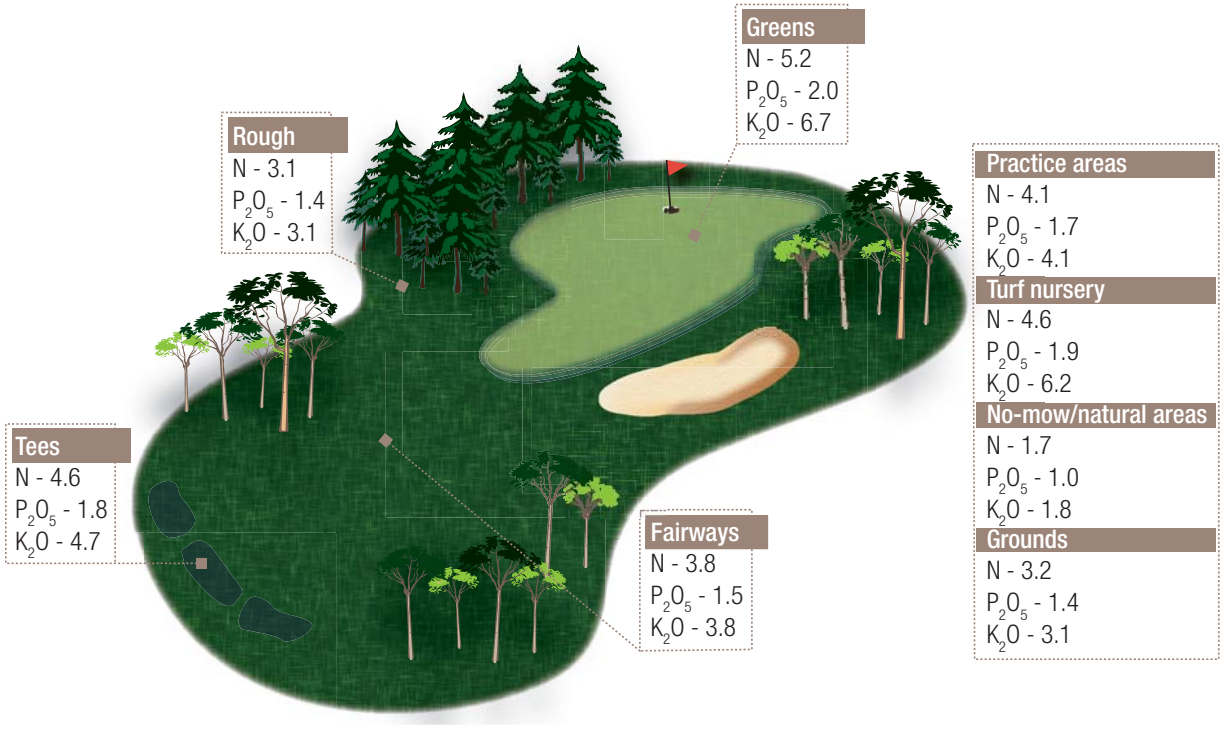
The average annual rate of nitrogen (N), phosphate (P_2O_5) and potash (K_2O), in pounds per 1,000 square feet, applied in 2006 to an average 18-hole golf course in the U.S.



2006. Organic sources of nutrients comprise 24 percent of the total annual amount of nutrients applied on 18-hole golf facilities. For the purposes of this survey, an organic nutrient source was defined as "materials derived from either plant or animal products containing one or more elements (other than carbon, hydrogen, or oxygen) which are essential for plant growth."

Soil Amendments and Turfgrass Supplements

In 2006, 43 percent of 18-hole facilities did not use soil amendments. The highest use of soil amendments was in the Southwest, where it is common for soil and irrigation water to have high sodium content. A much larger percentage of respondents, 74 percent, use a turfgrass supplement such as biostimulants, humates and amino acids/proteins.

Nutrient Management Plans

Of 18-hole golf facilities, 49 percent had a written nutrient management plan or written fertilizer plan in 2006, but only 6 percent of facilities were required by government or tribal authorities to have such a plan.

Fertilizer Restrictions

Nationally, only 9 percent of 18-hole golf facilities reported restrictions on fertilizer applications. Restrictions were most likely in the North Central (16 percent) and Pacific (10 percent) agronomic regions. Sixty-two percent of 18-hole golf facilities in the U.S. with restrictions report restrictions on phosphorus – either the total yearly amount applied or the amount per application.

Nutrient Application Decisions

Superintendents consider multiple factors when making nutrient application decisions. Integrating many variables into their decisions leads to effective applications for turfgrass while protecting the environment. The most common factors superintendents used to make decisions about nutrient applications and the percentage of 18-hole golf facilities using that factor were: visual observations of turfgrass (85 percent), previous product performance (84 percent), soils/soil analysis (84 percent) precipitation/temperature/weather (83 percent), turfgrass species (81 percent) and disease pressure (79 percent).

Soil Testing

From 2002 to 2006, 95 percent of 18-hole golf facilities performed soil testing on greens, 75 percent on tees, 80 percent on fairways and 26 percent on rough.

Fertilizer Storage and Equipment Calibration

On average, superintendents at 18-hole golf facilities calibrated their fertilizer application equipment before 67 percent of applications, thereby improving the accuracy of their fertilizer applications. Nationally, 91percent of 18-hole golf facilities stored fertilizer on site for three consecutive calendar days or more in 2006. Half of those golf facilities used a dedicated storage area.

Recommendations

- GCSAA recommends that all golf facilities use guidelines developed by university scientists to develop written nutrient management plans based on the characteristics and expectations unique to each facility.
- In order to foster sustainability at the golf facility, superintendents should consider the location, climate, and condition of the turfgrass as well as the rate, time of year, and products to be used when making nutrient management decisions.
- GCSAA recommends that superintendents routinely conduct soil tests on the rough, because it receives the greatest total amount of phosphate and potash. Soil testing has the potential to curtail costs and promote fertilizer programs that meet, but do not exceed, the nutritional needs of the turfgrass.
- GCSAA recommends that golf facilities that store fertilizer should use dedicated fertilizer storage areas.

"The data and findings from the Golf Course Environmental Profile have proven to be helpful in communicating the value of golf courses. We are now in a stronger position to advocate for golf.

Mark D. Kuhns, CGCS
2009 GCSAA President

About the Golf Course Superintendents Association of America

GCSAA is a leading golf organization that has as its focus golf course management. Since 1926, GCSAA has been the top professional association for the men and women who manage golf courses in the United States and worldwide. From its headquarters in Lawrence, Kan., the association provides education, information and representation to more than 20,000 members in more than 72 countries. GCSAA's mission is to serve its members, advance their profession and enhance the enjoyment, growth and vitality of the game of golf. Visit GCSAA at www.gcsaa.org.

About The Environmental Institute for Golf

The Environmental Institute for Golf is the philanthropic organization of the Golf Course Superintendents Association of America (GCSAA). It is a collaborative effort of the environmental and golf communities, dedicated to strengthening the compatibility of golf with the natural environment. The Institute concentrates on delivering programs and services involving research, education and outreach that communicate the best management practices of environmental stewardship on the golf course. For more on The Institute, visit www.eifg.org.

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