These greenhouse lysimeters were used to obtain information about pesticide leaching through turfgrass profiles. University of Georgia.

The USGA's Environmental Strategies: What We've Got and What We Need

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EVERYONE who plays golf or is involved in the industry has a stake in the future of the game. Most of us enjoy the game and want to see it prosper as a pleasurable and affordable pastime for nearly 25 million Americans. Many others derive a living from the game and want to do whatever possible to ensure a secure future for the sport.

At the same time, everyone involved in golf is concerned about our environment and wants to make sure that it is preserved for our children and future generations. Thus, it is essential that every person in our industry, first, becomes aware of the environmental issues facing the game of golf and, second, takes action to ensure that our activities not only have the least possible negative effects, but also help enhance the quality of the environment wherever possible.

The Issues

It wasn't until the 1970s that golf courses began to receive attention from people who were concerned about how the game might be affecting the environment. A series of widespread droughts during the late 1970s and early 1980s, highlighted by a severe drought in California and other western states, resulted in extreme restrictions on the use of potable water by homeowners and businesses in hundreds of communities. Golf courses were among the first and most severely restricted operations in many areas, due in part to their visibility in their communities and because they were considered non-essential users of water.

During the golf course construction boom of the 1980s and 1990s, golf courses again

were under attack because of how golf course construction affected natural areas and because of the use of pesticides on existing courses. In many cases, unsubstantiated claims about the negative effects of golf courses were tossed around by anti-development groups in an effort to kill housing developments or commercial real estate development. Some of the environmental questions that people have raised about golf courses are based on sincere concern and deserve investigation and action by the golf industry. These concerns can be summarized as follows:

- The use of scarce water resources for golf course irrigation;
- Potential pollution of our water resources by pesticides, fertilizers, and other materials;
- The loss of natural areas due to golf course construction and associated development;
- Possible effects of golf course activities on people and wildlife.

The USGA's Environmental Strategies

For more than a dozen years, the USGA has made investments in research and educational programs that address the environmental concerns noted above. Although more needs to be done, a significant amount of work has been completed, and a well-balanced strategy has evolved for dealing with golf's environmental issues. The following list summarizes what we've got so far:

- Research results and information;
- Environmental publications;
- The Audubon Cooperative Sanctuary Program for Golf Courses;
- The Nature Links Program;
- Contacts with environmental agencies and organizations;
- Public relations programs.

Research Results and Information

Between 1983 and 1994 the USGA funded 90 research projects at 31 land-grant universities, at a cost to the USGA of more than $11 million. Each of these projects addressed one or more of the environmental issues noted earlier.

The USGA's Turfgrass Research Program has emphasized the development of new grasses for golf that use less water and are resistant to diseases and insects, thereby requiring less pesticide use. Basic information about water use rates of various turfgrasses was developed, and maintenance practices that result in less water use were investigated. Breeding programs for more than a dozen grass species, including several native and non-traditional turf species, were supported. New cultivars with improved characteristics emanate from these efforts, and many more will be introduced during the next five to ten years. The Turfgrass Information File, a comprehensive computerized database of turfgrass literature, was established at Michigan State University to make available the latest scientific information to the turfgrass industry.

The USGA's Environmental Research Program was conducted during the period 1991-1993. Significant data were collected concerning what happens to pesticides and fertilizers when they are applied to golf courses, including pathways such as leaching, runoff, and volatilization. Several studies investigated residues left on the turf surface after pesticide applications, and how golfers might be exposed to these residues. Other studies attempted to find ways to control turfgrass pests without the use of pesticides, including the use of biological controls. The environmental benefits of turfgrasses and golf courses were also investigated, and some initial work was done to characterize the effects of golf course activities on wildlife.

Information about the results of these studies is available from the USGA in the form of research reports and summaries.

Environmental Publications

Since 1990 the USGA has published a number of books, reports, and articles about golf's environmental issues and about the results of its sponsored turfgrass and environmental research work. In 1992, a 1,000-page literature review was published, titled *Golf Course Management & Construction: Environmental Issues*.

In 1993 the USGA published the *Landscape Restoration Handbook*. This book discusses principles for establishing naturalized areas on golf courses, provides lists of native plants on an eco-region basis and gives extensive information about each plant, and lists nurseries where the plants can be obtained. A second edition of this book is being written, and a how-to companion book also is being produced. These will be marketed as a two-volume set.

During 1993, the USGA sponsored a symposium on the use of recycled water for irrigating golf courses. A product of this conference was the book *Wastewater Reuse for Golf Course Irrigation*, published in 1994.

In addition, the USGA annually publishes summary reports about its turfgrass and environmental research. Articles about individual projects and compilations of research results also are published regularly in the *Green Section Record* magazine.

Currently, a series of technical and topical reports is being produced, reflecting the results of the USGA's environmental research conducted from 1991 through 1993.

The Audubon Cooperative Sanctuary Program

In 1990 the USGA and the Audubon Society of New York State teamed up to establish the Audubon Cooperative Sanctuary Program for Golf Courses. Among its objectives is to enhance wildlife habitat on golf courses and encourage active participation in conservation programs by golf course superintendents, course officials, golfers, and the public.

Participation in the program requires the completion of a resource inventory form describing the property and its existing features. New York Audubon then responds with ideas and technical information about what the participating course can do to enhance wildlife habitat and improve the environment. The course develops a plan of action and then acts on its plan. It can become certified in one or more of six categories by completing its plan and submitting documentation of its achievements to New York Audubon Society personnel, who decide if the actions merit certification. Certification can be achieved in the following categories: 1) Environmental Planning, 2) Member/Public Involvement, 3) Wildlife and Habitat Management, 4) Integrated Pest Management, 5) Water Conservation, and 6) Water Quality Management. The course pays a $100 annual fee to participate in the program.

Since its inception nearly five years ago, participation in the program has grown to more than 1,600 courses. The number of courses that have become certified in all six categories has reached 36, and another 66 courses have become certified in at least one category. Most important, many thousands of people involved in golf are being educated about issues related to wildlife and the environment, and are participating in conservation programs that benefit both. In return, participants achieve recognition in their communities for the work they do on behalf of the environment. It's definitely a win-win situation!

The Nature Links Program

From the book *Golf Course Management and Construction: Environmental Issues* it was evident that very little research work has been conducted concerning the issue of wildlife and golf courses. As part of its Environmental Research Program, the USGA sponsored a study of the effects of golf courses activities on wildlife at the Ocean Course at Kiawah Island, S.C., in cooperation with The Institute of Wildlife and Environmental Toxicology (TIWET) at Clemson University. This study marked a beginning, but many more questions need answers.

A key component of the USGA's environmental strategy is to develop new grasses for golf that use less water and require less pesticide use. Buffalograss is being improved for golf course use at the University of Nebraska, one of 13 turfgrass breeding programs funded by the USGA during the past dozen years.

Resistance of buffalograss selections to chinch bugs and sod webworms is investigated as part of the University of Nebraska breeding program.

As part of its ongoing Environmental Research Program, a portion of the USGA's research dollars is being set aside to support wildlife research. This facet of golf's environmental research will be called the Nature Links Program, and will be carried out in cooperation with the National Fish and Wildlife Foundation, a Washington, D.C., organization whose mission is to organize and help fund conservation projects that benefit wildlife and the environment. The NFWF will provide technical expertise to help establish objectives and identify worthwhile research projects concerning wildlife and golf courses.

As part of the program, the NFWF will establish a small advisory panel of experts representing various environmental organizations and other disciplines. The advisory panel will help establish objectives, review proposals, and monitor progress of the researchers. In addition, interested representatives of other environmental agencies and organizations will be kept abreast of the activities of the Nature Links Program and will be queried for suggestions. People tend to support what they help create, and one of the objectives of the Nature Links Program is to enlist the cooperation of people who may have concerns about the effects of golf courses on wildlife and who have expertise to offer in helping golf courses become even better friends to wildlife.

For its part, the USGA will contribute $100,000 annually to the Nature Links Program. It is hoped that other organizations in golf will donate, too, and become partners in the program.

Contacts with Environmental Organizations

When the USGA Executive Committee decided to move forward with the funding of environmental research in 1989, it was recommended that environmental agencies and organizations be contacted with the news. It was hoped that some of these groups would acknowledge the effort and at least lend some moral support to the program. Although dozens of organizations were contacted, the reaction was mostly no reaction.

During the next few years, as books and reports were published, as research work was completed and reported, and as the Audubon Cooperative Sanctuary Program grew, more and more agencies and organizations began to take notice and at least acknowledge the effort. We've learned that the USGA's environmental program has received more interest from environmental groups as the number of *accomplishments* has increased. A key to the modest success achieved with these groups is the balanced approach taken with reports of research results and other publications. It's not hard to understand that literature with an extremely pro-golf slant would not have much credibility with people outside of golf.

More recently, an effort has been made to develop contacts that can lead to collaborative projects with various agencies and groups. If the golf industry can develop proactive programs with environmental organizations, such as that established with the New York Audubon Society, then everyone wins. I believe sincerely that some fundamental changes are occurring in the way golf courses are built and maintained because of the influence of the Audubon Cooperative Sanctuary Program, all to the benefit of wildlife, the environment, *and* the game of golf. There is no reason that building bridges with other organizations can't produce win-win situations, too.

Public Relations Program

One of the most frustrating aspects with our work on environmental issues has been to view the relentless assault of the media, which for the most part characterize golf courses as horrible polluters of our environment. Many of the statements made have absolutely no basis in fact, but the same contentions appear in article after article, on the radio, and in television reports. This is not to say that the golf industry doesn't need to tend to its environmental issues, but I believe that, on the whole, golf is in the process of doing just that.

It also is true that golf has not done a good job of publicizing its environmental successes and the changes it has made. Fortunately, the USGA and other organizations are stepping forward with public relations programs to get the word out to the media and to the non-golfing world about these changes and about the benefits of golf courses. Most of these PR efforts are just getting underway, and it will take time to see measurable results.

To be successful, the message will have to be balanced — acknowledging that changes were needed, and showing how the environment is benefitting from those changes. Given the significant commitment the USGA, GCSAA, and other golf groups have made to research and educational programs, the industry is in a much better position to enter into a public relations program now than it was just a couple of years ago.

What We Need

Looking to the future, as golf addresses the environmental issues that threaten its growth and success, what we need is *more* of what we've got: more research information; greater participation in the Audubon Cooperative Sanctuary Program; industry support for the Nature Links Program; ever higher environmental standards from golf course superintendents, architects, and builders; greater understanding of golf's environmental issues among golfers; more constructive interactions with environmental organizations; and widespread publicity for what golf is doing to benefit wildlife and the environment.

With respect to research needs, the USGA has committed $1.5 millon from 1995 through 1997 to follow up on the results of its previous three-year study. The recently completed work indicated a need for more information about the loss of pesticides due to volatilization and runoff, and these issues will receive greater attention in the forthcoming round of studies. Other investigations will determine best management practices (BMPs) that can be used to protect surface waters from the potential effects of pesticide and fertilizer runoff.

It was clear from previous studies that well-maintained turf, especially the thatch (a layer of stems, roots, and partially decomposed organic material that builds up between the zone of green vegetation and the soil surface), is an excellent filter for adsorbing and degrading pesticides and other potential pollutants. Several new studies will investigate how this occurs and how turf managers can take advantage of this characteristic.

A striking result of the previous investigations was the discrepancy between the runoff and leaching losses of pesticides predicted by commonly used computer models and the actual losses from turfgrass systems under controlled experimental conditions. What this indicates is that current computer models do not take into account the effects of the thatch and roots of turfgrasses in minimizing pesticide losses. An important facet of the USGA's environmental research work during the next three years is to work with the EPA and others to modify the computer models that predict pesticide fate from turfgrass systems. Once that is completed, the next step will be to develop a computer software program for golf course superintendents to help them make better-informed decisions about pesticide applications on their courses.

And last, but not least, the USGA is committed to funding research related to wildlife and their habitats through the implementation of the Nature Links Program.

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We've come a long way in our understanding of how golf course activities affect our environment, but we have a long way to go to convince others outside the game that golf courses can be a positive for the environment.

Each one of us can play an important part in helping to ensure a secure future for the game of golf by doing the following:

1. **Become educated** about the issues and what can be done about them.
2. **Take action** to make sure that our course maintenance practices have the best possible effects on the environment.
3. **Educate others**, including your crew, golfers, course officials, and others outside of golf about the issues and what you are doing as a steward of the environment.

In doing so, you'll be doing your duty as a steward of the game of golf, too.

The use of potable water for golf course irrigation became an issue after a series of droughts in the 1970s and 1980s. Golf courses have responded by using recycled water, building their own water collection systems, and implementing conservation programs.