

III. The Turfgrass Research Program 1983 - 1992

The concept of supporting turfgrass research was not new, since the USGA has been involved in turfgrass research since 1921. The USGA, in cooperation with the GCSAA, decided to support a greatly expanded turfgrass research effort to solve important several problems facing golf courses. The primary purpose of the Turfgrass Research Program was to develop minimal maintenance turfgrasses to meet the future needs of golf through a fifty percent reduction in water use and maintenance costs. Other goals included developing the Turfgrass Information File and encouraging young scientists to become leaders in turfgrass research.

In January 1982, William Bengeyfield, then national director of the Green Section, led the newly formed USGA/GCSAA Turfgrass Research Committee to help direct a plan of action for the next ten years. The plan directed funds toward the development of the Turfgrass Information File, a better understanding of plant stress mechanisms, evaluating cultural practices which improved the ability of golf course turf to tolerate stress, and accelerating plant breeding efforts to develop turfgrasses with better resistance to climatic stress and pest problems. Following is a summary of the specific USGA/GCSAA research objectives for these four areas of interest and the results from the research projects funded during the last ten years.

Turfgrass Information File

The purpose of this project was to provide efficient and effective access to all published and processed materials reporting the results of research affecting turfgrasses and their management. Access to this information would be provided to the research community, golf course superintendents, cooperative extension services, and commercial concerns.

A sizable and rapidly growing body of literature directly related to turfgrass science and culture was widely dispersed, not only in this country, but throughout the world. This created a major problem for researchers, extension specialists and professional turfgrass managers seeking past research data, conclusions and information. In all too many instances, experiments were repeated simply because there was no available single source or record of earlier work.

In 1982, authoritative estimates indicated that approximately 28,000 references existed in this

Statement of Intent

It is the intent of the United States Golf Association (USGA), in cooperation with Golf Course Superintendents Association of American (GCSAA), through the USGA Foundation, to collect and disseminate substantial funding for the support of research to improve turfgrasses which reduce water use and maintenance costs, and further, to encourage young scientists to become leaders in turfgrass research.

It is anticipated that funds for this purpose will be derived in major part from contributions to the USGA Foundation. Additional funds may be derived in the future from royalties attributed to marketable discoveries. The USGA presently intends to return any income received from royalties to the support of turfgrass research. Institutions which accept these research grants will be asked to engage in a free exchange of information with other investigators.

Historically, the sport of golf has maintained a leadership role in the development of improved turfgrasses through the activities of the USGA Green Section. While those developments have helped to provide better playing areas for golf, they have had a far-reaching impact on turfgrass improvement for other uses. Home lawns, parks, school grounds, highway rights of way and all other turfgrass uses have been improved by developments which were pioneered by the USGA.

The USGA expects to support research at numerous institutions. In some cases, several will be involved with the development of grasses and maintenance practices where the research may interact and overlap.

In view of this Statement of Intent, it is expected that recipients of grants will embrace the spirit of cooperation which the USGA and GCSAA is attempting to promote and that they will engage in a free exchange of information with other investigators.

field. Approximately 30 percent of them were in scientific and technical journals or reports. However, the remainder were in semi-scientific or popular publications. In his *Turfgrass Bibliography From 1672 to 1972*, Dr. James B. Beard cited over 16,000 entries. No other known turfgrass index or bibliographic source existed when the USGA/GCSAA Research Program began in 1983.

The Michigan State University (MSU) Library was assigned the task to design and develop the

bibliographic computer data base to provide access to all published turfgrass information. The principal reason for locating TGIF at MSU Library was the existence of the O.J. Noer Memorial Turfgrass collection, including books, journals, research reports, and conference proceedings. Through the cooperative efforts of the USGA, GCSAA, Noer Foundation, and MSU Library, the Turfgrass Information Center (TIC) was created to 1) develop and maintain the collection of literature on turfgrass science and culture, 2) provide access to the bibliographic data of this collection, and 3) deliver documents or copies from the collection to researchers, practitioners, and other appropriate users.

Over 25,000 published materials have been abstracted, recorded, and logged into the data base. Anyone interested in a subject search can either call the center, mail a request, or log on by computer.

If mailing a request, it is important to be specific about the subject. All that is needed is a paragraph or two describing the desired information, and a list of terms, including synonyms, relevant to the request. The ease-of-use for on-line computer searches of the database has been greatly improved since the database went on-line in 1988. Those interested in searching the data base via computer should contact TIC to receive the necessary technical details and registration forms.

Requests, questions or comments concerning TGIF should be addressed to:

Turfgrass Information Center
W-212 Library
Michigan State University
East Lansing, MI 48824-1048
Phone requests:
(517) 353-7209 (800) 446-TGIF

Plant Stress Mechanisms

The purpose of these studies was to identify and quantify basic stress mechanisms for utilization in

long-range breeding programs. This important step would help lead to the efficient development of minimal maintenance and water conserving golf course turfgrasses. Documenting this information established an essential foundation for future turfgrass breeding and improvement work.

The response mechanisms for stress caused by drought, heat, cold, poor water quality and salinity were investigated. Many of the stress response mechanisms were already known; however, the mechanisms were neither summarized well in the turfgrass literature nor fully investigated through well documented scientific research. To develop efficient screening methods for turf breeding programs, better and more complete information about all of these stress problems was considered essential in the development of new stress tolerant turfgrasses.

This research work was done independently by turf physiologists, or as a cooperative effort between turf breeders and physiologists. With this knowledge, breeders have been able to develop rapid screening techniques, identify desirable germplasm, and make appropriate crosses to produce stress tolerant grasses.

Texas A&M University - Dr. James Beard

Water Use and Drought Resistance

The morphological, anatomical, and physiological characteristics of turfgrasses interact and provide the mechanisms which regulate water use and resistance to prolonged periods of drought. Determining which of these mechanisms are the most important for every major turfgrass species was a monumental task. Dr. Beard initiated a research program to compile and delineate the comparative water use rates among the 19 major turfgrass species used throughout the United States, and determine the drought resistance mechanisms which enable some cultivars within a species to perform better than others (Table 10).

Water use rate is the total amount of water required for turfgrass growth plus the quantity transpired from the grass plant and evaporated from associated soil surfaces. It is typically measured as evapotranspiration (ET), and expressed as ET in millimeters per day.

The comparative water use rates of turfgrass species are distinctly different from their relative drought resistances. For example, tall fescue is one of the more drought resistant cool-season turfgrasses, but it has a very high water use rate. If the goal is to reduce water use rates of irrigated