

# THE TURFGRASS WATER MANAGEMENT PROGRAM AT THE UNIVERSITY OF GEORGIA

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**Abstract.** The University of Georgia has been a leading source of scientific information on turfgrass management since 1946 when the first research was started. This program has been responsible for the development of 11 turfgrass cultivars, the first in the Southeastern United States to research turfgrass water-use efficiency, and the first in the country to begin research at the watershed level on turfgrass pesticide and nutrient loading from residential neighborhoods. The transfer of information to the consumer is done through the Cooperative Extension Service by traditional and web-based educational methods.

## INTRODUCTION

The University of Georgia has long been a source of unbiased scientific information on turfgrass management. The rapid population growth and resulting urbanization in Georgia have resulted in a simultaneous increase in demand for accurate information on turfgrass management, including water quantity/quality information. This paper will review relevant research and outreach of the turfgrass program at the University of Georgia.

## BACKGROUND AND RELATED WORK

Turfgrasses and the industries that are associated with their management are an integral part of the quality of life and economy in Georgia (Hubbard et al. 1990). In addition to producing an estimated annual revenue of more than \$ 2 billion (Florkowski, W. and G. Landry 2001), turfgrasses are one of the most effective means of mitigating environmental impact of urbanization. Turfgrasses do consume water. However, turfgrasses also reduce water/wind erosion, enhance rainfall infiltration, cool the environment, provide recreational

areas, and enhance property value.

The "Turfgrass Program" (Landry et al., 2000) in the College of Agriculture and Environmental Sciences is an interdisciplinary effort of 16 scientists working together in extension, research and teaching. The faculty address the needs of all segments of the industry mainly through the departments of Crop and Soil Sciences, Plant Pathology, Entomology, and Biological and Agricultural Engineering, located at three campuses; Athens, Griffin, and Tifton. These scientists are currently involved in 72 major projects.

Since "Environmental Quality" is directly related to turfgrass management, all activities have environmental stewardship implications. Some of the more specific activities include breeding for water use efficiency and stress resistance, evaluating new practices regarding turfgrass cultural management, water management/conservation, pesticide/nutrient fate, and pesticide exposure.

## Turfgrass Breeding

Developing new turfgrasses with improved drought resistance and low water use has been a primary objective for many years. The release of 'Tifway' bermudagrass in 1965 is a good example of the effectiveness of the breeding program. This vegetatively propagated turfgrass has been in the marketplace for more than 35 years and is still the most popular hybrid bermudagrass throughout the world.

Between 1995 and 1997 two more bermudagrasses, 'TifSport' and 'TifEagle', and a centipedegrass, 'TifBlair' were released (Georgia Seed Development Commission). In 1992, the only breeding program in the world involving improved seashore paspalum (*Paspalum vaginatum*) for turf was initiated. In 1999, the first two releases were made: 'Sea Isle 2000' and 'Sea Isle 1'. These grasses can tolerate a wide range of water resources, including potable water to seawater as well as variable quality, recycled (alternative, gray, effluent, nonpotable, wastewater, brackish) water

(Duncan, R.R. and R.N. Carrow, 2000) The grass requires only minimal pesticides and judicious applications of fertilizers. It is very efficient in the uptake and utilization of critical fertilizer nutrients. Thus, seashore paspalum can be easily managed to comply with local, state, federal, and global regulations dealing with environmental concerns on water quality/quantity and environmental stewardship issues.

In 1999 the first Georgia adapted tall fescue cultivar, 'Southeast', was released with seed becoming available in 2001 (Duncan, R.R. and R.N. Carrow, 2000). This cultivar has exceptional drought resistance and persistence, while exhibiting very good shoot density and color. Another project with the Georgia Sod Producers Association, and the Georgia Department of Transportation is evaluating the performance of 10 sodded turfgrasses for erosion control on slopes and roadsides (Landry, G. 1999).

### **Cultural Management**

In 1988, the first work in the Southeastern US on turfgrass water use, drought resistance and rooting patterns was initiated at UGA (Carrow, 1990). This project documented the relative drought resistance of the five main turf species grown in Georgia and throughout the south. The average seasonal ET ranged from 3.23 mm per day for Tifway bermudagrass to 4.13 mm per day for Kentucky 31 tall fescue, a range of 28%. Adjusted crop coefficients for the Penman equation were determined to be 0.60 to 0.80 for warm season grasses and 0.70 to 0.80 for cool season grasses. This information is now being used for determining ET with the Georgia Automated Environmental Monitoring Network (Hoogenboom, 2000).

### **Pesticide and Nutrient Fate**

In a three-year study Ma et al. (1999) reported that three water-soluble phenoxy-type herbicides could laterally move off a simulated sandy clay loam golf course fairway on a 5% slope under high rainfall conditions (one inch per hour). They reported between nine and 15% total runoff loss from four rainfall events. For all chemicals more than 71% of the runoff occurred in the first rainfall event which occurred at the rate of one inch per hour one day after application.

Shuman (1999) reported that between 10 and 11.5% of the P (Phosphorous) added to a golf course fairway with 5% slope and a sandy clay loam topsoil was found in runoff after four rainfall events. He also found that P and N (Nitrogen) was leached through a USGA (United States Golf Association) specification golf green, although the

amount of P decreased dramatically after the establishment year.

Other projects funded in 1999 are examining the impact of chemicals used for turfgrass management on the environment (Armbrust, 2000). These projects are monitoring the contribution of residential neighborhoods to turf pesticide loading in watersheds and developing computer model scenarios for turfgrass to predict off-site chemical movement into aquatic ecosystems. Through a sod producer survey a Crop Profile on turf is being developed for EPA regarding FQPA (Food Quality Protection Act) (Braman et al., 2000).

### **Information Delivery**

The mission of the Cooperative Extension Service is to disseminate useful and practical information to the University's clientele. The primary means of delivery of this information is through the local Cooperative Extension Service office in every county in the state. Current information is developed by an interdisciplinary team of seven scientists through various activities like updating 30 Extension publications and conducting county Extension agent trainings. In an average year, this team writes 15 articles for national or regional industry publications and 25 articles for instate publications. They also speak at 88 meetings, drive more than 75,000 miles, and are involved in 35 field research demonstrations.

The dynamics of the industry today has fostered increasingly diverse audiences with demands for different types of education programs, expanding modes of information delivery and packaging, and an explosion of information. The two fundamental suggestions for developing relevant information are to focus initially on in-depth packages of what is known and provide scientific principles with specific, practical management recommendations; and develop a greater partnership with public and private sectors in order to maintain a balance of science and practice.

Examples of this process include faculty regularly participating in national and international activities such as serving on the Board of Directors of the Sports Turf Managers Association and the International Turfgrass Society, and speaking at conferences in Australia, New Zealand, and Japan.

Education is also an integral part of the College of Agricultural and Environmental Sciences Agricultural and Environmental Services Laboratories. In 1999, 13,318 turfgrass soil samples were analyzed, 1,100 disease samples, and 252 weed/turfgrass samples were identified.

A UGA Turfgrass web page has been developed and is

easily accessed at [www.georgiaturf.com](http://www.georgiaturf.com) or [www.georgiaturf.org](http://www.georgiaturf.org).

Other means of education and professional cooperation include the following: an annual statewide Turfgrass Conference and trade show, which draws more than 2000 attendees; the Georgia Turfgrass Association funds the printing of 5,000 Pest Control Recommendations for Professionals, an annually revised publication that is distributed to industry professionals and county Extension offices; the Georgia Turfgrass Foundation Trust providing funding annually to support research and education projects; countless local educational programs and distribution of information. Other professional associations cooperating with the University include the Georgia Golf Course Superintendents Association (GGCSA), the Metro Atlanta Landscape & Turf Association (MALTA), and the Georgia Sod Producers Association. UGA faculty serve as official Liaisons between all five of these associations and the College of Agriculture and Environmental Sciences.

Because of the severe drought in 2000, UGA faculty has helped an alliance (Georgia Horticulture Trade Alliance, GHTA) of 12 green industry professional associations evaluate options. This industry alliance which includes the turfgrass industry represents 6,604 small businesses with 59,499 employees and \$5.6 billion in annual revenue. Surveys of some industry segments indicate a 20% reduction or \$1.1 billion in lost revenue because of the 2000 drought.

As the state of Georgia struggles with issues related to drought and population growth, good economic and environmental sense mandates that the turfgrass industry and related industries be included as an integral part of the solution. The University of Georgia faculty have long been an important part of this vital and growing industry and intends to remain so by being a source of cutting-edge, unbiased information.

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