

ANNUAL REPORT: TURFGRASS APPROPRIATION 2002-2003

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The turfgrass industry is one of the most important economic sectors in North Carolina. In 2001, the General Assembly of North Carolina established a yearly appropriation of \$600,000 for turfgrass research. The purpose of the research is: 1) to develop new, environmentally sound management approaches for turfgrass systems that will allow the industry to grow and remain economically sound, and 2) to develop and implement advanced outreach programs to inform the turfgrass industry and the public about research results and new management strategies.

The current, continuing appropriations are an extension of support for turfgrass research by the N.C. Legislature. Special appropriations, targeted at resolving environmental issues, have been passed on a yearly basis since 1998. This reflects the growing economic importance of the industry and recognition that management of turfgrasses in home lawns and recreational areas impacts virtually every citizen in the state.

The turfgrass research appropriation is administered by the Center for Turfgrass Environmental Research and Education. The Center establishes research guidelines and solicits proposals from faculty at N.C. State and North Carolina Agricultural and Technical State University. The proposals are reviewed by a Board of Advisors, made up of representatives from six major sectors in the turfgrass industry and from N.C. State and N.C. A&T.

For the 2002-2003 budgetary year, the appropriation amount was reduced to \$569,000 because of budget cuts. Twelve proposals were approved for funding. Release of funds was delayed until November 2002 because of an extended legislative session and state budgetary problems. Nonetheless, substantial progress was made. A brief overview of funding allocations to specific research areas and some highlights are included below.

Additional proposals were accepted in the spring of 2003 for funding during the 2003-2004 fiscal year. The proposals were peer reviewed by scientists at other research universities and by the Board of Advisors. A research symposium was held in April to allow individual research faculty to present their proposed work and answer questions raised by other faculty and the Board. Soon afterward, it was decided by the Board that 13 research projects and two outreach proposals would be funded. The funding allocations and research progress will be detailed in next year's report.

Project Areas and Funding for 2002-2003:

Alternative strategies for pest control. \$171,000. Numerous pesticides currently used in turfgrass management are suspected of being problematic for human health and the environment, and are being phased out by EPA regulation. Several turfgrass research projects are focused on developing alternative methods of insect and disease control that reduce or eliminate chemical applications. Much of the current emphasis is on understanding the ecology of pests and establishing databases for life cycles, from which new biological control approaches can evolve. Current projects are focused on major insect pests and fungal diseases.

A new, exciting project is developing an internet-based system for prediction of turfgrass disease development based on observed and forecasted weather data. The system will lead to lower pesticide applications by targeting fungicide applications during times when conditions favor disease infestations. The interdisciplinary group of scientists includes faculty from the Departments of Plant Pathology and the Marine, Earth, and Atmospheric Sciences.

Fate of Nitrogen and Pesticides in the Environment. \$152,000. Water quality continues to be a major concern in North Carolina. The purpose of these research projects is to determine the extent of surface and groundwater pollution associated with turfgrass systems, and if pollution is occurring, design management approaches to minimize the problem. Studies of nutrient and pesticide fate in turfgrass systems are in place throughout the state. The first phase of the research examined the fate of nitrogen applied to golf courses in the Neuse and Cape Fear River basins in eastern North Carolina. Using exacting methodologies, an interdisciplinary research group found conclusive evidence that well-managed turfgrass systems do not lead to contamination of water supplies.

Additional experiments being conducted by research faculty from Crop and Soil Sciences and Toxicology are examining pesticide run-off and downward movement in soil profiles using radio-isotope tracer and advanced residue detection techniques. The results indicate that herbicide breakdown is much more rapid beneath established turfgrasses than in agronomic conditions, evidently due to extremely high microbial activity in the root zone. New research is examining microbial ecology, factors governing rates of reactions, and interactions with climate variables.

Adapted Varieties. \$116,000. It has been recognized for many years that development of improved, adapted varieties of turfgrass is a key strategy to increase stress and disease tolerance and to reduce the need for pesticides and nutrients. Several projects are underway in this important area. Field experiments are in place at six research field stations and several off-site locations in different parts of the state to evaluate performance of a large number of cool and warm season grass varieties. The project is ongoing, with new varieties added each year as they are being generated by plant breeders. Similar trials are being conducted at other universities in the U.S. Results are combined in large data bases to allow regional comparisons.

A second approach is to develop new, improved turfgrass varieties using molecular biology techniques. The goal is to genetically engineer turfgrasses with increased drought and disease tolerance. Important genes have been isolated and are being tested in greenhouse and field studies. In pursuit of alternative environmental roles for turfgrasses, a new project will clone the gene for a novel plant enzyme that can degrade organic pollutants for environmental remediation.

Outreach. \$40,000. Along with the original turfgrass funding to the Center, the General Assembly passed a separate \$100,000 appropriation directed to the North Carolina Department of Agriculture (NCDA) to support the turfgrass outreach programs. During 2002, proposals for

several outreach projects were forwarded from the Center to NCDA and approved by them for funding. Unfortunately, when budget cuts were requested from each state agency in Fall 2002, NCDA chose to relinquish the turfgrass appropriation. Since outreach to the public and industry is a critical part of the mission of N.C. State and the Turfgrass Center, it was decided to fund critical outreach projects in the 2003-2004 budget (\$94,000) and fill the void created by NCDA.

Extension faculty from N.C. State and N.C. A&T are developing state of the art, electronic communication systems for disseminating educational material on best management practices and the latest research results on environmentally sound management strategies. A key project is developing a web site to aid in turfgrass management decisions. Through interactive programs, industry professionals and the public will have real-time access to information on cultivar selection for particular sites, identification of turfgrass diseases, insects, and weeds, along with appropriate pest management solutions. A decision aid model will allow cost comparisons within environmentally acceptable management options.

New Environmental Research Site. \$90,000. On location, field experiments are required for understanding large-scale turfgrass/environment interactions. Many important questions, however, can only be answered in more controlled settings, where defined management treatments are sustained over many years and permanent sampling equipment can be utilized. A new turfgrass field laboratory is being established at N. S. University for long-term environmental studies. Appropriated funds are being used for construction of experimental plots with specialized instrumentation that will provide a state of the art infrastructure for research in the years ahead.

Research projects at the turfgrass field site include key studies on nutrient and pesticide leaching and pesticide degradation patterns. In-ground lysimeters were installed for direct, continuous sampling of soil solution at various profile depths. A computer controlled irrigation system will allow establishment of drought treatments, and an extensive network of soil moisture probes will allow monitoring of plant water availability during periods of soil drying, and assessment of water uptake efficiencies in different soil zones by different turfgrass species. Such information is essential for identifying grasses that can withstand the drought conditions currently plaguing the South.

The new research field laboratory will be an important part of the turfgrass teaching and outreach programs. Graduate student projects will be located there, and the laboratory will allow undergraduate students to be exposed to advanced turfgrass research projects. As the primary site for field days and workshops, the laboratory also will showcase research projects to the turfgrass industry and the public.