1999 TURFGRASS PHYSIOLOGY UPDATE

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Introduction

In 1999, the Baird team conducted more than 30 experiments in the areas of turfgrass physiology, growth regulation and weed management. Below are highlights of the Hancock Turfgrass Research Center (HTRC) activities and our major research projects.

Hancock Turfgrass Research Center

The renovation to the turf center building is, for the most part, completed. Renovation of the Robert W. Hancock Building began in the summer of 1998. The building now contains two meeting rooms, office space for the technical staff, a plant and soil processing room, a graduate student resource room, lunchroom, and an additional bathroom that will better meet the needs of the turfgrass team.

Nine acres of the irrigation system at the HTRC was overhauled in 1999 thanks to the support of Toro, Spartan Distributors, Rainbird, Valley Turf, FloTronix PSI, Century Rain Aid, Nelson Irrigation, and Spears Manufacturing. We would also like to acknowledge Carol Colein & Associates for designing the new system, Spartan Services, Marc Dutton Irrigation, and volunteers from the MTF who assisted with the installation.

The HTRC hosted several special events in 1999 including the North-Central Region meeting of turfgrass researchers and the Turf Producers International summer convention and field days in July. Both of these events were very successful. It would have been impossible to host these events without tremendous planning and effort put forth by Mark Collins and the entire turf center staff.

Shade Physiology and Management

Thanks to the support of the MTF, we have made a long-term commitment to determine better ways to grow turfgrass under reduced light. In 1998, two artificial shade structures were erected on a creeping bentgrass putting green at the HTRC. A preliminary experiment was conducted to determine the influence of nitrogen fertilization and trinexapac-ethyl (Primo) applications on the performance of creeping bentgrass putting greens managed under shaded conditions. In 1999, two additional structures were erected directly adjacent to the existing plots. Data has suggested that repeat applications of the plant growth regulator Primo can help to maintain turfgrass quality in reduced light situations.

Plans for future shade research involve the newly constructed natural shade green at the HTRC. In April 1998, the southeast corner of the HTRC was graded and excavated to make room for a 25,000 ft^2 natural shade area. Shortly thereafter, twenty maple trees (8-inch caliper) were transplanted onto the site to serve as the boundaries for six research greens. Drainage was installed and twelve inches of sand/peat were brought in to build the root zone. Marc Dutton Irrigation installed the irrigation system in September. Each of the six greens was divided into four plots and planted with A-4, G-2, L-93, and Penncross creeping bentgrass. The research area will be used to study the effects of temporal shade (e.g., morning vs. afternoon shade) and other cultural practices on putting green performance under shade.

Drought and Salinity Tolerance of Transgenic Creeping Bentgrass

Creeping bentgrass has been genetically engineered in Dr. Mariam Sticklen's laboratory by incorporation of the mannitol-1-phosphate-dehydrogenase [mtlD] gene. The mtlD gene has been documented to provide stress tolerance under drought and high salinity conditions in several plant species. The goals of this project are to determine the amount of stress tolerance imparted to creeping bentgrass clones by the mtlD gene and to incorporate these clones into our turfgrass breeding program in order to develop creeping bentgrass cultivars with improved drought and salinity tolerance as well as improved turf quality characteristics.

Site-Specific Management

Toro continues to sponsor research aimed at developing sensing technology that will tell us what is right or wrong about our turf. Currently, we are evaluating turf health using a spectrometer that measures energy reflected from the turf canopy. We are looking for unique spectral signatures that will tell us about the water, nutrient, or disease status of the plant. Sensors are just one part of site-specific management that, in combination with global positioning satellites (GPS), geographic information systems (GIS), and variable rate technology (VRT), will enable turf managers to better manage the variability that exists on their site.

Preemergence Crabgrass Control

Preemergence control of crabgrass and other summer annual grasses is a standard component of many turfgrass management programs. There are many preemergence herbicides and herbicide-fertilizer combinations available. Most of these products provide adequate season-long control in Michigan. A very warm spring led to an early crop of crabgrass in 1999. Traditional mid-April preemergence applications likely missed the main germination window and led to severe outbreaks later in the year, On the whole, crabgrass pressure in 1999 was heavy. All of the preemergence products included in our 1999 trial showed lower control than would normally be expected.

Postemergence Crabgrass Control

Traditional postemergence controls for crabgrass such as the arsenicals are no longer recommended due to turf safety issues and environmental baggage. Dithiopyr (Dimension) can be applied postemergence to crabgrass and offers excellent turf safety. Dimension will control young crabgrass plants (1-3 leaf) and provides a preemergence barrier to prevent any further infestation. Fenoxaprop (Acclaim Extra) is a single isomer formulation of Acclaim. Acclaim Extra offers improved turf safety over Acclaim and will effectively control 2-3 tillered crabgrass. Quinclorac (Drive) was registered in 1999. Drive is safe on cool-season species and has excellent activity on crabgrass, even at mature stages. Drive will be an excellent addition to our postemergence crabgrass arsenal.

Chipco Proxy: A New Growth Regulator for Turf

Ethephon (Chipco Proxy) was registered in 1999 by Rhone-Poulenc Ag Company (now Aventis). Proxy regulates vertical leaf growth by the production of ethylene, a plant hormone that produces largely inhibitory responses in the plant. Thus, Proxy has an entirely different mode of action compared to trinexapac-ethyl (Primo) and paclobutrazol (Turf Enhancer) which inhibit gibberellic acid synthesis or mefluidide (Embark) which disrupts cell division and elongation. Proxy provides up to seven weeks of growth regulation on both Kentucky bluegrass and perennial ryegrass and up to four weeks on tall and fine fescue and creeping bentgrass. Proxy is labeled for use on commercial turf only and is not labeled for bentgrass greens. The advantages of using Proxy include less or no initial turf injury following application, a longer window of growth regulation on perennial ryegrass and Kentucky bluegrass, improved turf quality, and some seedhead suppression. Its disadvantages include promotion of a lighter green turf color with some species and stem elongation that resulted in scalping has been observed with multiple applications on creeping bentgrass.

Best Management Practices for Home Lawns

We continually make recommendations to lawn care operators and homeowners about the management of weeds in their lawns. The most effective way to eliminate weeds is with a well-timed fall-applied herbicide application. However, when weeds infest a lawn it is typically an indication of some other problem (fertility, irrigation, mowing height, etc.). Unless these issues are corrected, the weeds will quickly return. Adequate fertility and raising the mowing height will help maintain a healthy green, weed-free lawn. To help demonstrate the importance of the basic lawn needs we have established plots at the HTRC that include various combinations of mowing heights and nitrogen fertility. The primary objective

of this study is to determine if fertility and mowing height can be used effectively for long-term control of broadleaf weeds after a post-emergent herbicide treatment. Initial weed counts were taken before the plots were treated with either Trimec Classic or Confront in the fall of 1998. As expected, we have seen a reduction of weeds in the herbicide-treated plots this spring. This season, herbicide-applied plots maintained at four inches have contained fewer weeds than those mowed at 2 inches. We will continue to monitor the weed populations in these plots during Fall 1999 and 2000.