The Influence of Plant Growth Regulators on Creeping Bentgrass Fairway Turf

Natural resource conservation is becoming an important issue facing many turfgrass managers. Resources such as water for irrigation and fuel used in many maintenance operations are two prime examples. In the Northeast, we have not taken water conservation as seriously as the West has, where the cost of water for irrigation can be the single most costly expenditure after labor.

Plant growth regulators (PGRs) have been used by turfgrass managers for decades, generally on low value but difficult to mow sites like steep embankments, along fences, near trees and other structures. PGRs have had limited use on high value areas like golf courses except as part of an annual bluegrass reduction program or for annual bluegrass seedhead suppression.

The older classes of PGRs generally caused unacceptable visually quality if applied at rates to give plant growth suppression, especially in summer months. Thus, they were not widely used on higher value turf. Recently released PGRs, however, appear to not affect visual quality, while suppressing the shoot growth rate. Trinexapac-ethyl (Primo™) is one of the new PGRs that inhibits gibberellic acid synthesis. This inhibition results in a decrease in cell elongation and internode length, thus producing shorter plants requiring less mowing.

The primary objective of this research study was to determine the impact of the PGR trinexapac-ethyl on the water use, shoot growth and turf stress of creeping bentgrass fairway turf.

Experimental Procedures:

The site for the study was the free draining lysimeter plots in the rainout shelter facility known as the ARESTS Facility, located at the Cornell University Turfgrass Field Research Laboratory in Ithaca. The lysimeters are 12' X 12', containing 17" of soil, with individually controlled irrigation and drainage collection systems. All natural rainfall was excluded from the plots by the rainout shelter (moveable greenhouse). The site was established in 1987, reseeded with Penncross creeping bentgrass in May of 1991 and maintained as a typical moderate maintenance fairway: mowed at 0.5" with a reel mower and clippings collected, fertilized 3 times per year with a 32-3-10 methylene urea fertilizer (3 lbs. N/1000 sq. ft./yr), and pest control periodically applied (mostly fungicides). For this study, lysimeters containing sand were used.

The study was conducted for two years. In 1995, treatments included trinexapac-ethyl applied at a rate of 0.75 oz./1000 sq. ft., mefludide (Embark™) at 1.32 oz./1000 sq. ft. and a non-treated control. In 1996, trinexapac-ethyl was also applied at a lower rate (0.25 oz./1000 sq. ft.) and mefludide was not applied due to severe damage noted in 1995. Treatments were applied monthly from July through September, with a small hand held sprayer.

Data collected included daily water use rate, clipping yields and canopy temperatures as a measure of turfgrass stress for August into October.

Results:

As seen in Table 1, the applications of PGRs had a variable effect on water use with always a reduction in the amount of clippings produced. In 1995, a year that was hot and dry, the PGRs substantially reduced the amount of water used by the creeping bentgrass turf. This would translate into a water savings of at least 26%. The amount of clippings produced was also reduced by at least 55%, which would result in a significant fuel savings by either reducing the number of mowings, the fuel used to mow or the fuel used in the clipping disposal process. Repeated

continued on page 8

Table 1. Impact of trinexapac-ethyl and mefludide on clipping yields and water use of creeping bentgrass.

PGR Treatment	Rate of Application	Clipping Yield		Water Use	
		1995	1996	1995	1996
	oz./1000 sq. ft.	% of control amount			
Control	—	100	100	100	100
trinexapac	0.25	—	65	—	119
	0.75	45	56	74	164
mefludide	1.32	9	—	62	—

Research Update

The primary objective of this study was to determine the impact of the PGR trinexapac-ethyl on the water use, shoot growth and turf stress of creeping bentgrass fairway turf.

Results suggest that trinexapac-ethyl can reduce the need for irrigation during dry years, while apparently not putting the turf under stress.

Management: More Than Turf

Human Resource Update

Why we <u>think</u> a turf organization has high employee turnover:

- ***good employees are not available***
- ***employees do not like horticultural work***
- ***people just do not work like they used to***
- ***turf cannot compete with other businesses***

The turf season is slowly coming to an end. Leaves are beginning to cover the grass. Does this mean the turf manager can look forward to having nothing to do?

The answer, of course, is **no.** Why? Because the turf manager is a manager of more than grass, a golf course, a landscape, a park, or an athletic field. To help you, the turf manager, function better as a manager, we will look more closely at management, and we will analyze problem identification and diagnosis, important tools for the manager.

Management is the Success Key

Management is the key to the successful operation of any organization. In turf-oriented facilities we have viewed management as a generic term describing essentially anything dealing with successful operation of an organization involved with turf and have failed to give the term definition and rigor. The result is that management has become an almost mystical term that we apply to turf organizations with high productivity and/or profitability. To provide more rigor, management is defined as: *Determining what must be done and achieving results through the efforts of oneself and other people. Management is planning, organizing, staffing, directing, and controlling the business resources toward the accomplishment of established objectives and goals.*

Note that management is defined in terms of people. Management deals with people, including oneself, who then work with turf, fertilization, etc. This can be illustrated by an example of analyzing why a turf organization has high employee turnover. The usual answers — good employees are not available, employees do not like horticultural work, people just do not work like they used to, turf cannot compete with other businesses — are technical and external to the turf organization. If one continues to ask "why", answers relating to management are detected:

- No one plans employee tasks so the employees are unproductive and/or unmotivated.
- No one is monitoring how employees are performing and feeling.
- It is unclear who the employees supervisor is.
- The skills of the individuals hired is not appropriate for the job they are performing.
- The manager is not providing leadership.

These management answers are people oriented and are more amenable to a long lasting solution.

A management definition of a problem always involves one of the five functions listed in the definition. The management solutions delineated above involve planning, controlling, organizing, staffing, and directing respectively. These functions can serve as a job description for the turf manager.

Plant Growth Regulators

continued from page 7

mefludide applications resulted in very poor turfgrass quality by the end of the first year and were not used in 1996.

In 1996, a cooler and wetter year, trinexapac-ethyl reduced clipping production similar to the first year but with no reduction in water use. In fact, more water was used by the creeping bentgrass sites treated with trinexapac-ethyl. Thus, at times when plant water use is high, we would expect trinexapac-ethyl to reduce the need for irrigation, while at times of low irrigation need, no water saving would be realized.

One of the primary reasons plants take up and transpire water is to keep the turfgrass plants cool during high temperatures. If a plant uses less water, then the plants may be under more stress (as a higher temperature in the plant canopy would indicate). We measured canopy temperatures in 1995 and found no difference in canopy temperatures between plots treated with trinexapac-ethyl and the untreated control plots indicating no stress. We believe this is a result of the fact that trinexapac-ethyl reduced the shoot growth rate while transpiring less water thus having no effect on the level of stress (temperature related). Or in other words the trinexapac-ethyl treated turf maintained a transpiration rate necessary to keep itself cool.

These results suggest that the PGR trinexapac-ethyl can be used to reduce the mowing cost on the greatest high maintenance turfed area on golf courses (fairways) while also cutting down on the need for irrigation on the largest irrigated part of a golf course, while apparently not putting the turf under stress.

MARTY PETROVIC AND BILL BARRETT
CORNELL UNIVERSITY TURFGRASS TEAM