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Plant Growth Regulators, My Favorite Topic

Spring is here, and turf manager's thoughts turn to – well, what else, grass. Particularly, at this time of year, many turf managers are contemplating management programs. Plant growth regulators (PGRs) have gone from a novel concept to an integral part of a turf management program. In this article, I'd like continue to share some of what we learned about the use of these important tools.

Fine Tuning PGR Programs

I am asked many questions about PGR usage by golf turf managers. Most of them, I can't answer. Many times I have an idea of what the answer should be, but when you do research, you expect to be able to answer the question from your work. One question I am frequently asked is about tank-mixing PGRs. Does this practice make sense, and what would be the advantages? Most every tank-mix question relates to the mixing of Primo Maxx with either Trimmit or Cutless. Much of the rationale for tank mixing is addressed in research that we conducted using funding from the Illinois Turfgrass Foundation (ITF), which many MAGCS members support. This was some of the most practical research we conducted, and as ITF members would want, I tried to get this research funded by other organizations as well. It still rankles me that the GCSAA refused to fund our PGR research! Now that I've gotten that out of my system, what was the research that helps explain tank mixing?

Jeff Beasley, now an assistant professor at Louisiana State University, studied the impact of temperature on PGR degradation. He found that both PGRs studied — Primo and Trimmit —break down more rapidly within turfgrass plants when temperatures are warmer (full details can be found in a summer 2007 issue of *Golf Course Management)*. For example, the half-life of Primo in bentgrass in the summer is only about 3 days. That means that in less than a week, over 75% of the Primo absorbed by the plant is gone! Primo is a great growth regulator with many positive impacts on turfgrass quality, but the period of regulation in the summer is very short, and many superintendents have seen this through experience. In the spring, the half- life of Primo in plants is about twice as long as in the summer, and, consequently, growth regulation in the spring from Primo lasts longer with better results.

But there is an additional reason why tank-mixing Primo and either Cutless or Trimmit can be valuable. Both Trimmit and Cutless are absorbed by the root system of the plants, whereas Primo is absorbed by the foliage.

The idea of tank mixing comes from the reduced activity of Primo in the summer. Why not mix Primo with a PGR that provides a longer period of growth regulation in the summer than Primo, thus reducing the need to apply the PGRs as often as weekly? That is precisely why tank mixing makes sense. But there is an additional reason why tank-mixing Primo and either Cutless or Trimmit can be valuable. Both Trimmit and Cutless are absorbed by the root system of the plants, whereas Primo is absorbed by the foliage. This difference often means that regulation will kick in more quickly for Primo than for Trimmit or Cutless. Why is this? Since Trimmit and Cutless are root absorbed, an application has to be watered into the soil, the PGRs must enter the soil solution, and then be absorbed through the roots into the plant. This takes time, and the process continues over several days. That is, root absorbed materials tend to build their concentration in the plant over a period of several days because uptake occurs as long as transpiration is occurring and the PGR remains in the soil. Our research showed that the concentration of Trimmit in

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bentgrass plants continued to increase for several days following application. Conversely, Primo concentrations were highest immediately following application.

Thus, the value of tank mixing Primo with either Cutless or Trimmit is two-fold. The regulation from Primo will kick in more quickly than the other products giving a more rapid reduction in growth than from Cutless or Trimmit alone, but by adding either Cutless or Trimmit, the period of regulation will be lengthened. Each tank mix component complements the other.

Cutless vs. Trimmit

Another question I am frequently asked is about the differences between Trimmit and Cutless. These PGRs have the same site of action and similar use characteristics, how are they different? In many respects, I don't see a lot of differences. However, when comparing these products, users must understand that Trimmit is twice as active as Cutless on an active ingredient basis. That is, applying a 0.25 lb ai/A of Trimmit will give about the same regulation as a 0.5 lb ai/A application of Cutless. By a quirk of formulations, when rates of these products are expressed in ounces of product per acre, not pounds of active ingredient per acre, they give essentially equivalent growth regulation. In other words, when you apply 16 oz of Trimmit (2S formulation)/A (or 0.25 lbs ai/A) you should expect the same growth regulation as when you apply 16 oz of Cutless (50 WP formulation)/A (or 0.5 lbs ai/A). I'm sure there are subtle differences between these products, for example, both are weak fungicides but Trimmit provides slightly more dollar spot suppression than does Cutless (Calhoun, R. M.S. Thesis, Michigan State University). Both PGRs tend to increase the leaf blade width of treated grasses, particularly bentgrass, and this is an undesirable side effect of these products.

But in terms of growth regulation, these two products are very similar. Both regulate creeping bentgrass to about the same degree when applied at equal product rates (Figure 1). While I want to stress that this is only one year of data, we saw that in 2005 Cutless and Trimmit provided equal growth regulation of creeping bentgrass. Trimmit, however, provided more growth suppression of annual bluegrass than did Cutless at the two highest rates tested, 16 and 24 oz product/A (0.25 and 0.375 lbs ai/A of Trimmit and 0.5 and 0.75 lbs ai/A of Cutless). I would conclude from this data that both products are equally effective on bentgrass, but in a bentgrass conversion program, Trimmit may give better conversion when rates are increased above 8 oz product/A.

Regardless of which PGR you choose, the use of PGRs has become a fairly standard practice in the golf course industry. Regulation can provide other benefits besides a reduction in mowing. Information on other aspects of PGR use will be covered in another article.

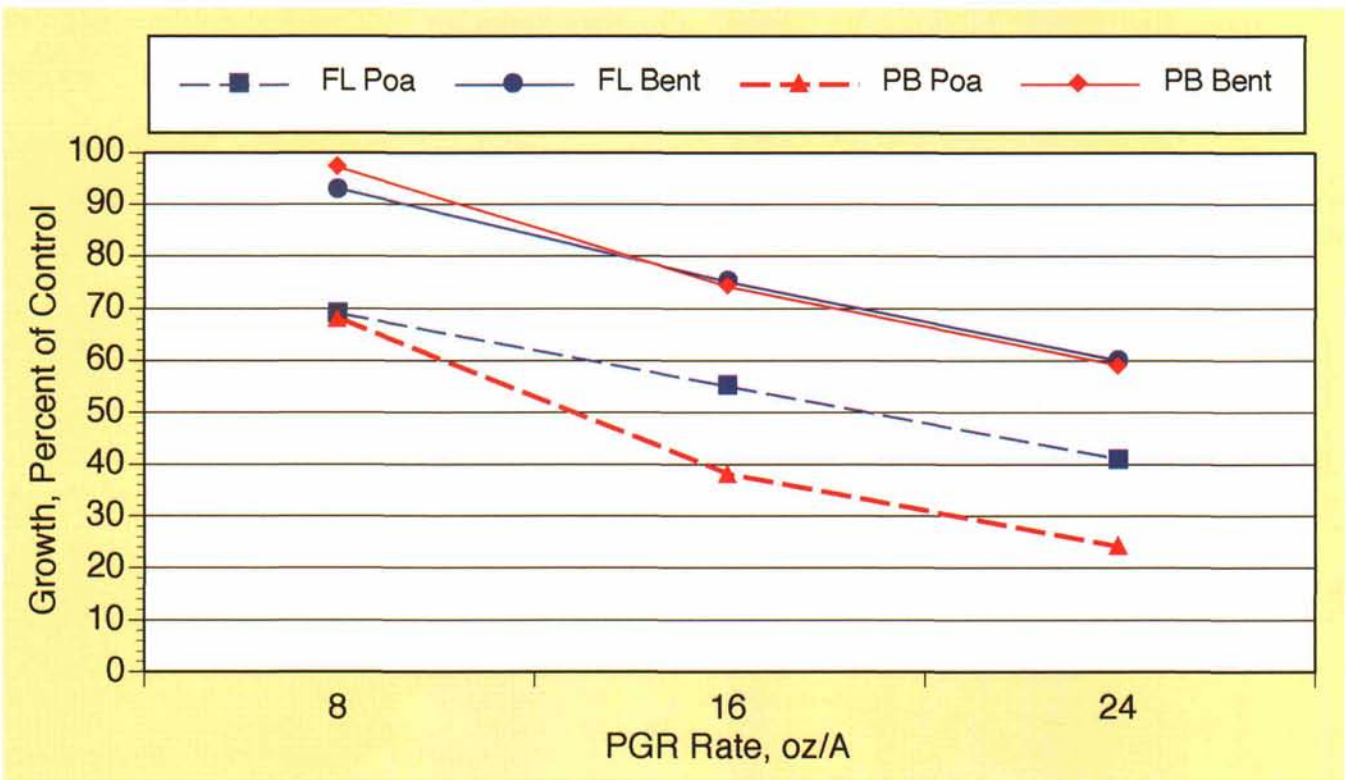

Figure 1. Regulation of creeping bentgrass (solid lines) or annual bluegrass (dashed lines) by three different rates of Cutless (blue lines) or Trimmit (red lines). Data are presented as clipping production as a percent of the control, i.e. untreated, turf. PGR applications were made every three weeks from May until September of 2005. These points are the average of twice-weekly clipping collections over the entire period of growth regulation.