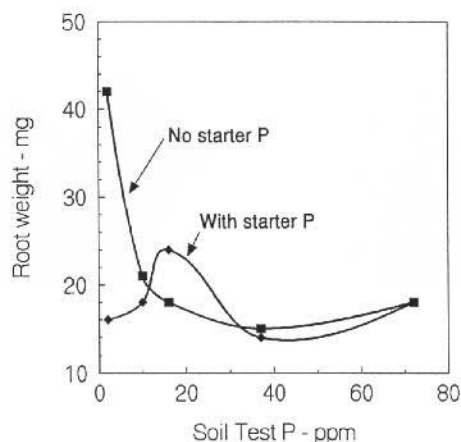
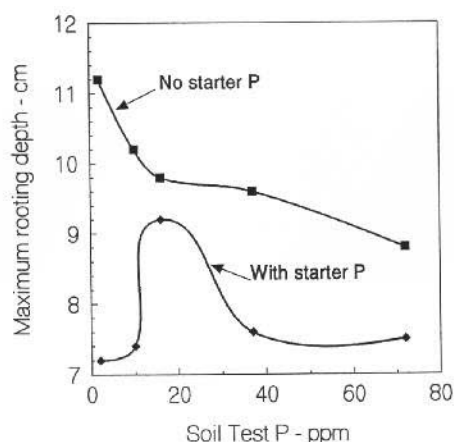


FIGURE 5.



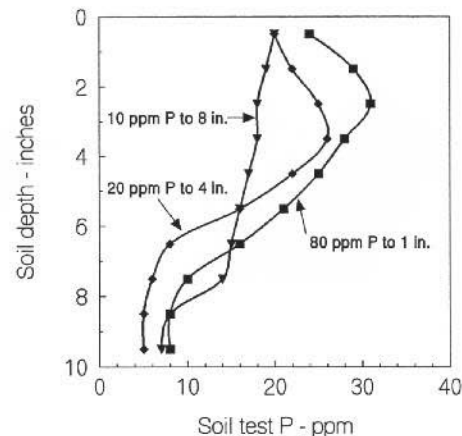
Effects of rootzone mix and starter fertilizer P on the root growth of creeping bentgrass at 28 days after seeding.

FIGURE 6.



Effects of rootzone mix and starter fertilizer P on the maximum depth of rooting of creeping bentgrass 28 days after seeding.

FIGURE 7.



Soil test (Bray-1) P levels at different rootzone mix depths 30 days after incorporation of different concentrations of P to different depths.

incorporated increased and the concentration of incorporated P decreased. While the clipping weight differences were not significant, this may not have been the case if the study had included more than two replicates of each treatment. The effect of concentrating fertilizer P near the soil surface rather than incorporating it to some depth merits further investigation.

Soil test P levels measured at different soil depths 30 days after initiation of the study provide strong evidence that fertilizer P was remarkably mobile in the rootzone mix (Fig. 7). Consider, for example, the case where mix containing 72 ppm soil test P was placed in the top inch of the column. With the addition of starter P as well, if no P migration had occurred, the final soil test P level should have been well above 72 ppm. The fact was that after 30 days, the soil test P level in the top inch of mix in this treatment was only 22 ppm. At a depth of 2 to 3 inches, the soil test P concentration had increased from 2 to 31 ppm. Thus, a substantial amount of P movement occurred in this short period of time. A small amount of P appeared to have migrated 10 inches or more.

The rate at which the fertilizer P migrated downward depended on the amount of P in the rootzone mix. This is understandable from the perspective that as soil test P levels increase, so do solution concentrations of the nutrient.

SUMMARY

The results of this study confirm that the optimum soil test levels of P for bentgrass establishment are approximately twice those for maintenance of the established turf. Therefore, fertilization to meet the P requirement for establishment automatically assures adequate P supply thereafter. An environmentally responsible management practice would be to allow soil P levels to decline to post-establishment optimum levels and then fertilize to maintain those levels.

For the 90:10 sand-Dakota reed sedge rootzone mix used in this study, the optimum soil test P for creeping bentgrass establishment was about 40 ppm Bray-1 P, or approximately 100 lb P/acre. Within three weeks after seeding the optimum soil test P was 16 ppm or about 50 lb P/acre. Both of these optimum P levels are considerably less than what is currently recommended by many soil testing laboratories.

Fertilizer P proved to be very mobile in the sand-reed sedge peat rootzone mix. For example, the soil test P in the top inch of the mix declined from more than 72 ppm to 22 ppm during 30 days in which water was such that very little drainage occurred from the miniature putting greens used. This suggests that there is no compelling reason to blend fertilizer P into the rootzone mix prior to green construction. Incorporation of 2.5 to 3.0 lb P₂O₅/M into

the top inch or so of the green should ensure that in a short period of time there will be adequate P throughout the bentgrass rootzone.

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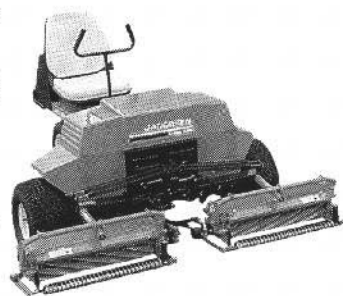
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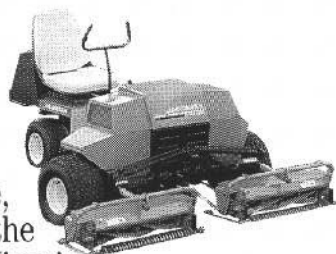
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SOME QUESTIONS I'D LIKE ANSWERS TO . . .

By Monroe S. Miller

Every so often I look at something on the golf course and wonder "why in the world . . .?" Even more frequently, as I am thinking about grass management and deliberating a course of action, I think to myself, "I wonder why . . .?"

So, over the course of an average day, I came up with the questions noted below. If you have the answers to any one (or two or three or all) of them, drop me a line with that answer. The responses will be in the next issue of *THE GRASS ROOTS*.

1. What's happening to the ash trees in our urban environment, especially the green ash?

2. Is there a thornless honeylocust anywhere in Wisconsin that has value as anything other than a weed?

3. Put #2 another way: is there a thornless honeylocust worth spraying to save it from its susceptibility to insect damage?

4. Does a severe winter line 1992-1993 with thick ice cover over turf areas for an extended time affect the viability of the bank of *Poa annua* seed in the soil?

5. Why were the ants out so early this spring and why in places they've never been before?

6. Why was it so difficult to find a Democrat to sponsor the pre-emption bill into the state legislature?

7. Who writes the labels for fertilizer products, anyway? Some are so extensive they are rendered meaningless to an agronomist unless an attorney is available for interpretation. On the other hand, we had material manufactured specifically for turfgrasses delivered this year with no information other than the analysis. What gives?

8. Why aren't reels and bedknives made out of a harder steel than they are now?

9. Will this be the worst year for mosquitos in Wisconsin's long and storied history?

10. When will we know what we are supposed to comply with concerning mixing/loading sites?

11. When will we know about specific rinse pad requirements?

12. Why can't some sharp packaging engineer design a fertilizer bag that is both a.) easy to open, and b.) sealed well enough to keep the contents from turning into a sack of rocks?

13. When will all manufacturers of agricultural chemicals used on a golf course recognize that the smell of their prod-

ucts has become an important consideration in selection? I mean, some smell so bad they even scare me.

14. Why was *Poa annua* seeding close to non-existent this spring? (At least it was in our town).

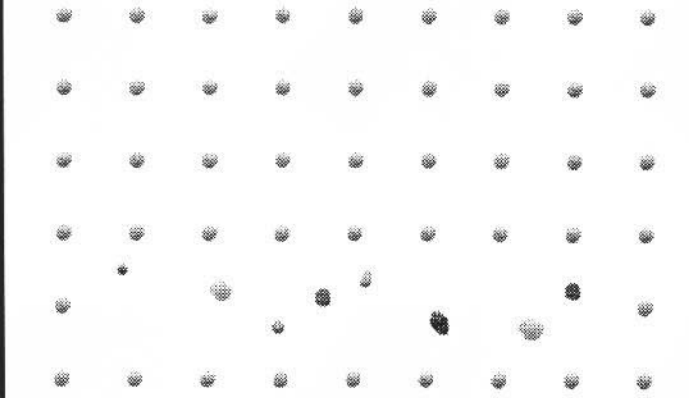
15. Why, all of a sudden, can't I find anyone who voted for Slick Willie (or who will admit to it)?

16. How long would it take a one-legged frog to kick the seeds out of a dill pickle?

17. We aren't going to have to go through the long process of hiring a manager for the Noer Research Facility again for a long time, are we?

18. Have the dire predictions by some that, once the pesticide posting signs were in place, golfers would stay away in hordes, come true?

(Continued on page 25)




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(Continued from page 23)

19. Every WGCSA member will be at the WTA Field Day, right?

20. Where did some golfers learn so much about winter kill and winter injury (which is amazing since so little is known) and where did those same players get their expertise about recovery? Or, did golf course superintendents and university faculty and USGA Green Section agronomists around the world miss a course in low temperature plant physiology?

21. Has anyone made the mistake of spending that middle class tax cut we were all promised by the current occupant of the White House?

22. Was there a need to apply a pre-emergence grassy weed herbicide this year?

23. What do you think about the new concept used in some golf course architect shops that incorporates creeping bentgrass into golf green surrounds?

24. Is anyone making a guess on what the GCSAA pesticide exposure study will show about our health?

25. If you had to wish for one thing for the golf course management business in Wisconsin—a new machine, a new product, a different attitude, a new law, weather or whatever—what would it be?

26. How many greens rollers are at work in Wisconsin and how are they working?

27. Is deep tine aerification a passing fad in our business or is it here to stay?

28. Who is making the best drop spreader (30" - 36") on the market these days?

29. Is the summer meeting format—no speaker and no dinner—receiving favorable response?

30. In terms of golf course plants, might 1993 go into the books as 'The Year of the Tree'?

31. Does anyone have a range tee/practice tee that is actually large enough? If so, how big is it?

32. I haven't heard a whole lot about the Pestcaster from golf course superintendent users in Wisconsin; how are they working?

33. Is the BTA grub a problem for anyone anymore, like it was a few years ago?

34. How is the bulk delivery system available for some products (like Banner) working for everybody?

35. Have you personally thanked Rod Johnson for his efforts to raise \$10,000 to put toward a study about your workplace and its impact on your health?

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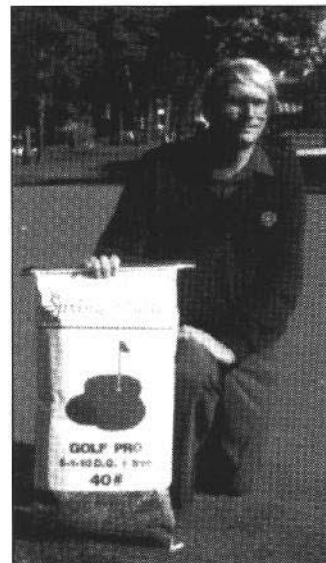


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JOHNSON HONORED BY GCSAA

By Monroe S. Miller

Rod Johnson naturally assumed that Bill Roberts was travelling from Michigan to Rock River Country Club to play golf with his Wisconsin friends, to attend a WGCSA meeting and to accept a check from the WGCSA in the sum of \$10,000 for the GCSAA S&R fund.

Rodney was right on all counts. Bill was here for those things plus one more. He made the trip across Lake Michigan to present his good friend recognition from the GCSAA for the successful creation and implementation of a project that raised that money for the ultimate good cause for his colleagues—the GCSAA Pesticide Exposure Study.

Rod was surprised when he was called before the group attending the May meeting to receive a plaque from the national association of golf course superintendents.

It was a singular honor for a guy who deserved it, although I know he never once wondered, "what shall I gain from this?"

What he gained, of course, is what all people involved in public service gain from their efforts—satisfaction.

Rodney has also gained from those he most respects generous portions of professional respect. Somehow, we kind of expect such things of him.

And he never disappoints. But this latest effort is sterling. And GCSAA recognizes that. Wisconsin will now wear that proud symbol of the Platinum Tee Club,

Look for it in each issue of *THE GRASS ROOTS*. Be sure to thank Rodney for it the next time you see him.



Bill Roberts presented Rod Johnson with recognition from the GCSAA.

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What is it with Plant Growth Regulators?

By Dr. Frank S. Rossi
Department of Horticulture
University of Wisconsin-Madison

It may seem to you like an odd title for an article, but, during my travels on the golf courses in Wisconsin, it is one of the most widely asked questions.

Many superintendents do not understand this technology. It is not because we are not intelligent, not because we don't understand the concept, rather it is simply a case where technology arrives and we are not prepared to integrate it into our management schemes.

Do I use it for clipping reduction? Do I use it for *Poa* conversion? Do I use it to enhance green speed? Or do I use it because my green chairperson or owner or salesman said I should?

I would like to address these topics in a two-part article; first, I want to review some basic concepts in plant growth regulation, and second, I will discuss their implication in golf turf management and inform you about some of our research in this area.

Let's start at the very basics of growth. Plants in general create biomass (leaves, stems, roots, flowers) by producing new cells from existing cells which divide (cell division). Cell division increases the number of cells. Once the plant has new cells, these cells must stretch or elongate to make new organs (leaves, roots, flowers) by a process called cell elongation. These processes are indirectly regulated by a plant hormone, gibberillic acid (GA), much like our hormones regulate hair growth and the female reproductive cycle. As GA levels increase, growth (division & elongation) occurs and the plant creates new biomass.

Turfgrass growth regulation began as an idea some 50 years ago, probably by some disgruntled homeowner who was tired of mowing. One of the first products used successfully in turf was maleic hydrazide (MH). MH suppressed foliar growth and seedhead formation of roadside vegetation. More recently, Mefluidide (*Embark & Embark Lite*) has been used primarily for *Poa annua* seedhead suppression on golf courses. Mefluidide is absorbed by the leaves, most effectively at the base of the leaves, and does not move through


the plant; this makes thorough spray coverage essential. Once it penetrates the leaf it begins to affect both cell division and cell elongation. Consequently, when it contacts a flowering stem (*Poa* seedhead) during formation (this fact makes timing essential) it causes it to distort and prevents seedhead emergence from the leaf sheath. Products which exhibit this type of activity are classified as **Type I Growth Regulators**, of which Mefluidide is the most common.

The other popular class of PGRs are the materials which also act by inhibiting GA synthesis, but, apparently to a lesser degree than Mefluidide. This is evidenced by the suppression of cell elongation but not cell division. Products which exhibit this type of activity are classified as **Type II Growth Regulators**. Products in this class include Flurprimidol (*Cutless*), Paclobutrazol (*Turf Enhancer & TGR* active ingredient), and a new material—Cinmectacarb (*Primo*). Because these products primarily affect cell elongation and not division, the number of new cells is only slightly reduced while their ability to elongate is significantly altered. So, you get more small cells. This explains the altered morphology of the turf leaves (wider leaf blades) and the short stumpy appearance of the plants (reduced internode length—the distance between new leaves). There is also some experimental evidence that indi-

cates stolons of treated plants become more prostrate and rosette-like (like a witches broom). *Cutless* and *Turf Enhancer* are both primarily root absorbed while *Primo* is being advertised as primarily foliar absorbed. This could be a significant strategic use aspect in terms of the length and flexibility of regulation (more on this in my next article). The other significant factor in the use of PGRs is that they exhibit different degrees of regulation depending on the turf species. This is kind of a hassle for landscapers who want to regulate the growth of the entire mixed species home lawn; however, for the golf course superintendent it couldn't be a better deal. We thought.

The concept of regulating turfgrass growth goes right to the heart of what makes grass such a unique biological system. Grasses are constantly creating new biomass to replace mown or damaged biomass. Therefore, when using these products a manager must understand that there are trade-offs in quality and vigor which, if not compensated for, can make for some unhappy golfers. Be clear as to why you are using them. As I mentioned in the opening paragraph, there are various reasons for using them. Some are theoretically sound, others not so sound.

In my next article I will discuss the management aspects of using PGRs for clipping reduction, green speed enhancement, and *Poa* conversion programs. ♣



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The research-on-tour will include: the turfgrass run-off study, various pest control trials including diseases and weeds, plant growth regulator evaluations, and turfgrass species and variety trials. In addition, the entire UW-Turfgrass Group will be on hand to discuss the research demonstration areas, and to answer any questions you may have.

The Trade Show will display the finest and latest technologies in turfgrass and landscape management. Equipment demonstrations of mowers, sprayers, cultivators and much more will be highlighted. Also, turfgrass supplies such as irrigation equipment, fertilizers, turf chemicals, and seed will be on display.

The day will be capped off with the First Annual Fund-Raising Equipment and Supplies Auction. New and used supplies and equipment such as seed, landscape rakes, golf flag sticks, etc.—donated by vendors and other turf industry persons—will be auctioned off to benefit the WTA in support of turfgrass research and education. If you are interested in making a donation for the auction, contact Tom Schwab.

It should be a fun time!

Advanced registration is \$15.00 and includes lunch and a field tour book. On-site registration is \$20.00. For more information, contact Dr. Frank Rossi at (608) 262-1490.

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9:00	TRADE SHOW
9:15	Gathering for Research Tour
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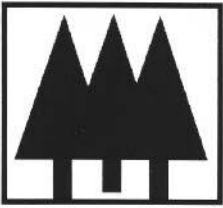
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Fawn-tastic Golf Courses

By Dean Musbach

Golf is an excellent game that one can play for a life time. It is a game that, when approached with the proper attitude, can be relaxing. It is a game of honor that builds character while also allowing the player to enjoy the outdoors.

Recently, golf courses have been criticized for using fertilizers and pesticides. Extremists and media continue to bash this industry with unsubstantiated and exaggerated claims of negative impact to wildlife.

The USGA has taken bold steps to counteract the negative press. By teaming up with the New York State Audubon Society, the USGA is proving that golf courses are excellent wildlife sanctuaries, especially in urban areas. This is a program that all golf courses should consider because it is an excellent tool that can improve our public image.

In the northwoods, there is an abundance of wildlife. Does this mean that golf courses here need not explore the Audubon Program? Absolutely not. Northern Wisconsin is an area where the natural resource is its livelihood, and it is important that we help create and protect habitat for wildlife. The Audubon program is a means to certify to the public and to the critics that golf courses are committed to preserving and enhancing wildlife.

Over the past five years at TRCC, I have seen many beautiful creatures.

My favorite encounter happens every May when the deer have their fawns. About three years ago, I came upon a fawn sunning himself between the 2nd and 3rd holes. I quickly went home and picked up a camera and my kids, (I had only two kids back then) and took them back to see the fawn. What a photo opportunity! I calmly positioned my kids and took a quick picture. I didn't want to alarm the fawn's nervous mother who was gazing at us from the woods 70 yards away. Believe me, I've learned from experience, it is best not to alarm the mother because she might charge you.

The first couple years we lived in the northwoods, my kids would scream if they saw a deer. But now they don't get excited because they see deer so frequently. On the other hand, if they see a cow on the way to Milwaukee, watch out. They go nuts!

Last fall, I had to listen to deer hunters crying the blues about their hunting woes. I made hunters sick when I told them that on any given night I can find 50 to 100 deer around Timber Ridge. Hunting is not allowed in Timber Ridge and the deer know it.

Does the course receive damage? Yes, the course does get damaged. But the damage is isolated. The most common form of damage occurs in the spring and fall when deer track across greens on frosty nights. This damage is

relatively minor because they just cross the green; they don't graze there.

I have a theory about why deer don't graze too much on the greens. I tank mix thiriam as part of my snow mold recipe. Incidentally, thiriam is used by nurserymen as a deer repellent. Although turf application rates are much lower than nursery rates, I think it irritates the deer enough to keep them away from greens. Anyone who has gotten thiriam in the eyes or nose will certainly know why the deer avoid it.

The most severe deer damage has occurred in the clubhouse landscape. The 200-foot arborvitae hedge was defoliated from the ground up to six feet. To prevent this, I run 600 feet of eight-foot fence around the area. A member once told me that he couldn't believe that the rabbits could cause such terrible damage. He didn't believe me when I explained that it was deer doing the damage, not rabbits. He was persistent in his belief. My final comment to him was "if it wasn't deer, then we have some pretty big rabbits around here." Nonetheless, the fence does an excellent job protecting the landscape.

There are many forms of wildlife to enjoy on a golf course. I could write a book about the different wildlife encounters that I've had at Timber Ridge. The fawn encounters are still my favorites.

To sum things up: golf is a game that allows people to enjoy the outdoors. Incorporating wildlife in the course really enhances the golfing experience. Yes, the wildlife can damage the course, but most problems can be resolved through creative thinking. Also, check out the Audubon program. This is a great way to enhance your golf course while promoting our industry's image. ♣





TURF'S UP.

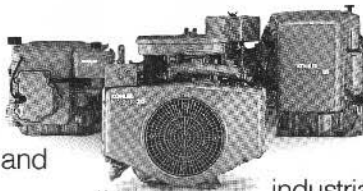
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