

## THE SUMMER OF 1995; CAUGHT IN THE TURFGRASS TECHNOLOGY TRAP

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*Good grass is conditioned by two factors--climate and soil . . . the latter can be modified, while the former must be accepted. (Turf for Golf Courses, by Piper and Oakley. 1923)*

**Perspective.** Our editor has defined perspective as, “a high point or crest in time where we can look back to measure progress and look forward with optimism.” The quotation from Piper and Oakley is an example of looking back to measure progress based on a fundamental philosophy of the early 1920's. Seventy years later, the American Society of Agronomy in 1992, published the Turfgrass monograph summarizing the latest research and philosophy of modern turf management. The first line of the book quotes the poet Goethe;

*One must obey nature's laws even while he denies them; he is forced to produce with her aid, even when he imagines he is able to work against her.*

It seems that the more things change, the more they remain the same. The ironic connection between the quoted philosophies is that while the demand for high quality turf has increased and the number of tools (technologies) has increased, we are still subject to the laws of nature. Once again our editor has warned that; “without perspective our past becomes a broken record of steps forward and back, repeating the same mistakes, telling the same tale.” What have we learned from the Summer of 1995?

If you were responsible for providing a high quality turf this year, you could not avoid feeling helpless at times as the weather shattered records held for 100 years. In my mind, we were clearly able to see the limits of our influence, i.e., the limits of technology. Therefore, when we rely on technology to overcome our limitations, we are caught in the trap.

**Technology in Our Lives.** It is impossible to deny the role that technology has played in the advancement of turf management. The conditions we are able to provide today would not be attainable without technological advances. Yet, I believe we have paid a price. I believe we've been trapped!

Let me use an example from our daily lives. I remember when I was a child, I had a bank account for the money I earned mowing lawns. I had a bank book that I could only use at the bank that had my money. If I wanted to withdraw money, I had to have my bank book, know the hours the bank was open, figure out how I would get there, remember my identification, make sure I had enough money in my account, etc. These days it would be even more complicated with having to coordinate schedules with my wife and children to allow me to get to the bank before I went on a trip. Withdrawing money would be burdensome. However, the development of technology in the form of automatic teller machines (ATM) has alleviated the burden of having to know all the above information (Heck. I don't even have to have enough money in my account to withdraw some).

**Technology vs. Knowledge?** Applying the ATM example to turf; for years superintendents have relied on pesticides to eliminate pest problems. If we had a problem with a disease or insect, we didn't concern ourselves with the biology or ecology of the organism, we sprayed it! We use technology to make our lives easier. Once again, I believe we have been trapped.

I fear that technology has alleviated the burden of understanding the dynamic nature and ecology of our biological systems. Our management systems are increasingly technology based rather than being knowledge based--energy intensive instead of knowledge intensive!

**Margin of Error.** While we have become accustomed to managing our golf courses with a multitude of technology available from new bentgrasses, to new pesticides to new equipment, very little could help this past summer. No matter how much energy was exerted, the grass still suffered. Still, many superintendents were able to sustain adequate quality through the season. Having reflected on the season, my gut reaction is that there were critical periods where decisions were made to force the turf to produce high functional quality, particularly with regard to ball roll, that stressed the turf beyond recovery.

The decision I am referring to in many cases centered around lowering the height of cut and aggressive topdressing on mixed annual bluegrass and bentgrass greens. During any other season, the turf would have recovered from a few days of this type of stress, in other words it would have forgiven you. But this year the stress was outside of the allowable margin of error and the result was severe turf loss. From then on, no amount of technology (sophisticated irrigation systems, pesticides, equipment, etc.) seemed to help. Simply, the margin of error was narrowed under the extreme weather conditions.

Let me be clear, each superintendent has a different margin or error based on several factors including root zone material, amount of annual bluegrass, traffic, irrigation system, labor, etc. Specifically, I believe that what we experienced for the most part was the result of severe and irreversible heat stress, especially to the annual bluegrass. The operative word is irreversible. By that I mean, research has indicated that biotypes of annual bluegrass when stressed to a certain point will not recover.

**Forgetting Piper and Oakley.** The most blatant example of forcing technology to solve our problems in turf is the continued attempt to grow bentgrass in the southeastern US during the summer. As a matter of fact, we have several golf courses in Wisconsin, that have been designed in such a way that micro environmental conditions are similar to those in the southeast. We even have a new term for it--Dead Air Greens!

It is interesting to observe the unending pursuit of turf managers to work against the idea that climate will ultimately determine adaptation. For example, a fungicide combination was reported on at the GCSAA conference as a means of reducing the problems associated with summer bentgrass decline. The Alliette + Fore combination when applied every 14 days resulted in improved turf quality in an experiment conducted over a growing season. While it was suspected that this combination had an effect on the pathogens that were loosely associated with the decline, it wasn't until the second year that the fungicide combination was shown to not have an effect on the pathogens. Of course by the time this information was reported, the testimonials had been released, other researchers reported enhanced quality and now we've got Alliette + Fore brochures, hats and jackets. Technology is amazing, especially when we don't have a clue why it works! Could it be that we are no longer going to be forced to accept climate as a limiting factor?

**What's Next?** Technological advances are not restricted to chemicals, there have been biological advances with the development of improved bentgrass cultivars for use on golf courses. The latest and most impressive of these have been selections from the Penn State breeding program known as the A and G series. Specifically A-4, is without question the most upright, dense and fine-leafed cultivar I have ever seen. In our trials at the Noer Facility, it has scored at the top in color and aesthetic quality.

Having said this, I was no less amazed to see the advertising begin. The inside front cover of the latest of Golf Course Management was promoting bentgrass selections from the Tee-2-Green company with the note that new bentgrasses would be available soon that should "be mowed at an eighth of an inch or less." I suspect this recommendation might be related to the aggressiveness and high shoot density that might result in a puffy surface if allowed to elongate. Still, who has a mower that can mow consistently below an eighth of an inch. I've heard superintendents complain that they can't get perfectly round rollers, which of course would influence mowing quality at heights below an eighth inch. What about bed knife thickness?

I guess we will need even more new technology to deal with the technology that is developed. I guess some would call this progress.

**Research is Partly to Blame.** As a former colleague of the esteemed turfgrass pathologist at Michigan State University, Dr. Joe Vargas, I am beginning to realize what Joe preached about folklore. However, while I know he meant testimonials and anecdotal information professed by the masses, sometimes I wonder if all of us as researchers shouldn't share some of the blame for promoting the technology trap.

I know I have conducted many weed control and plant growth regulator studies and have made recommendations based on limited data. It is clear now that the summer bentgrass decline debacle is a result of recommendations made before more data was available.

As researchers, we often evaluate the technology for its ability to kill the weed, control the disease, regulate growth and then it is added to the technology toolbox available to turf managers. The problem with single factor research where all factors are held constant, except for one, and we measure turf quality, we might be enhancing quality but worsening another factor.

The above concern makes our Putting Green Management System study, funded by the WGCSA and WTA so valuable. We are looking at a combination of several factors that can provide a desired outcome--ball roll. We then evaluate those factors as a system for their influence on things such as rooting, leaching, canopy density, diseases, etc. This type of research conducted over 3 to 5 to 10 years will help us avoid the trap.

**Avoiding the Trap.** The question remains in my mind regarding whether we need more technology (tools) or whether we must do a better job of determining how to integrate these technologies? How many hammers do you need? Shouldn't a good toolbox have a screwdriver, ruler, saw, crowbar, knife, etc.? In essence, could we avoid being trapped by technology by knowing more about our tools and their impact on our growing systems?

Avoiding the trap will require open-mindedness with a skepticism that seems to be prevalent amongst our superintendents in Wisconsin--keep it up! Also, commitment to continuing education and supporting long-term research will help us to integrate technologies, not just diversify. It is my firm belief that the only way we will reduce our reliance on energy intensive technology is by increasing our amount of biological information. If the summer of 1995 taught us anything, we need a more knowledge intensive and less technology intensive system of turf management to avoid the trap.