REFLECTING ON TURFGRASS RESEARCH–1994

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Perspective

Each year for one week in November, turfgrass researchers from around the world (mostly from the US) gather at the American Society of Agronomy meetings. This year they were held in the wonderful *and wet* Emerald City of Seattle, WA. Our host turf person was Dr. Gwen Stahnke (of the other UW), who to my surprise is from the Midwest, and actually worked in Lawn Care in Wisconsin in the early 1980's.

As an interesting aside, there are a number of young turfgrass researchers from Wisconsin; Dr. Bridget Ruemmle of the University of Rhode Island is from Hudson, WI; Dr. Tom Fermanian of the University of Illinois is from Brookfield, WI; Dr. Milt Englke (oops I said young) of Texas A&M is from Platteville, WI. There might be others whom I have yet to uncover.

The turfgrass division of the society is considered one of the most active with regard to number of scientific papers submitted when compared to divisions that include agronomic crops, soil physics, resident education and crop physiology, to name a few. The last several years there have been consistently over 100 papers presented in turf alone! Contrastingly, in several discussions with my colleagues there was some concern that the quantity of papers does not always include quality.

The dual function of my work requires the generation of information through practical experiments and dissemination of the information through publications (like this one), conferences, seminars and field days. As an extension scientist I view my attendance at the meetings as a *sponge absorbing information like water.* Access to information in this forum is vital because many of these studies, for whatever reason, never make it to publication. As I Gaze this month, I will interpret the work from my perspective. Please keep in mind that sometimes the intricacies of the work can be lost during interpretation, but, the essence of the work should remain.

The USGA Environmental Research Symposium

Several projects funded through the USGA Environmental Research Program were presented. This work was designed and funded to generate a database of information regarding the fate of nutrients and pesticides applied to golf turf. The studies were conducted in various regions of the country including Washington, Georgia, Florida, Michigan, Massachusetts, Pennsylvania and New York. A variety of experimental approaches were taken to investigate volatilization (gaseous loss of pesticides), dislodgeable residues after application, runoff and leaching. A large portion of the data suggests that the biological activity in the turfgrass system is a significant factor in minimizing off site nutrient and pesticide movement. And management factors, especially irrigation, can influence the risk of exposure and leaching.

Volatility Study

If we start at the surface immediately after application, data from Dr. Rich Cooper investigating volatilization indicates that insecticides such as Dylox, Proxol and Triumph can volatilize up to 13% of applied material. Only 1% of the herbicide MCPP volatilized. All levels of volatility were significantly reduced when irrigation followed pesticide application. When the label says water the pesticide in—do it!

Human Exposure

One of the more innovative studies was conducted in Florida by Drs. George Snyder and John Cisar. This work was published previously in a recent USGA Green Section Record. The researchers simulated an 18 hole round of golf immediately after a pesticide application. To simulate potential exposure they knelt on the green to align the putt, cleaned their spikes after the round, handled golf grips that had been laid on the green and analyzed a ball that was putted 36 times over a 12 foot distance to assess the risk of licking a golf ball. To assess the total risk of this activity they assumed a person was exposed this way everyday for 70 years and compared the exposure to the Chronic Reference Dose (RfD). The RfD is the highest dose of a chemical that causes no effects to the most sensitive lab test subjects. Further, the researchers lowered the RfD and increased the potential sensitivity of the study to account for unusually sensitive individuals.

The results of the exposure work, in this worst case scenario of playing everyday for 70 years on recently treated turf, were fascinating. Simply, the calculated exposure was one-third of the RfD exposure limit. A golfer is more likely to be hit by a ball than be affected by pesticides.

Science Predicts Disaster

Another aspect of the same study was more sobering. The researchers in Florida investigated the leaching of herbicides, insecticides and a nematicide. As expected with many of the pesticides, upwards of 90% was retained in thatch layer. Now while this may suggest minimized risk, consider the actual thatch layer found on putting surfaces.

The nematicide used in the study was monitored somewhat differently than the other materials. The scientists analyzed for the highly water soluble active ingredient as well as a soluble metabolite. A metabolite would be found following the breakdown of the

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active compound. In the case of this nematicide, the metabolite was extremely toxic to fish.

What was considered to be a significant amount of metabolite of the nematicide leached through the soil into the water detection area. Less than 1 year after the research was completed, a golf course was fined for a large fish kill. It was determined that the nematicide was applied, as was typical, from fence post to fence post one week prior to the kill followed by a significant rainfall. While this rainfall was substantial it was not considered uncharacteristic for that part of the country. Ironically, the data existed that could have prevented the environmental damage and now these fence post to fence post applications of nematicides are restricted in Florida.

Fortunately in Wisconsin there is no use of nematicides in turf situations. Still, I wonder how many other metabolites could be found if they were analyzed for?

Nitrogen Movement

One of the most fascinating bits of information that I retained from this symposium was from my friends Drs. Bruce Branham (Michigan State University) and Eric Miltner (now at Utah State University). The study of interest was conducted in large cores of undisturbed soil. The construction of these core was presented at the GCSAA meeting last year. Basically they drove a 3-foot diameter steel pipe into the ground and capped off the bottom to collect leachate. They applied N15, a form of nitrogen that is easily detectable. The objective of the study was to monitor the fate of a single nitrogen application over a two year period. The nitrogen was applied as a dormant feed or in the early spring.

Results indicate that while slightly more N was found from the dormant feed, the amounts from either application were considered negligible. Interestingly, two years after the applications the N15 is still being collected on the order of 0.20% of applied. Looking at the data, the numbers are just beginning to come in. The relative amounts being collected are slightly increasing, two years after application!

Preferential Flow

Several pesticides were applied in the study conducted by Branham and Miltner. The materials represented a range of solubility, from highly soluble (high potential for leaching) to insoluble (low potential for leaching). Triadimefon (Bayleton) is considered to have a relatively low potential for leaching. However, it was detected on multiple occasions two to six months after application. The researchers concluded that the chemical moved downward by preferential flow.

Preferential flow is the movement of water through macropores (large pores) where water moves essentially by the force of gravity. This situation might be expected in a coarse sand substrate, but was somewhat surprising in the native soil. It suggests that earthworm activity could have created channels for the materials to move further than would otherwise be expected.

A study conducted by Dr. Marty Petrovic from Cornell University (an EXPO-95 speaker), investigated this phenomenon in sand based greens. In conversation with Marty, his work demonstrates that when sands are allowed to dry, finger-like channels are created that could provide an opportunity for pesticides and nutrients to leach. This would be substantially influenced by irrigation rate and frequency.

Anthracnose on Annual Bluegrass

Several other studies were presented that were equally as interesting and important as the above work. Dr. Peter Landschoot from Penn State demonstrated predisposition of annual bluegrass to anthracnose by wounding the crown. He either punctured the crown or abraded it. In either case symptoms were more severe when the crown was wounded. It was speculated that topdressing and core cultivation could increase anthracnose symptoms on putting greens.

Fans

A study conducted in North Carolina investigated the influence of wind velocity on several plant and soil factors. Wind velocity was simulated by fans that are widely used on golf courses throughout the south where bentgrass is grown. The greatest influence of the fans was found on the moisture in the leaves as well as soil moisture potential. In other word, fans dry the area. However, before buying a fan, take a look at the methods used in the study.

The fans were positioned within 5 feet of the putting surface. Therefore, the lowest velocity measured away from the fans would still be more than that measured from where fans are normally positioned (off to the side some, 15 to 20 feet from the putting surface).

The graduate student presenting the information made a comment that the fan selected had a habit of throwing more wind from the right side than the left. He overcame this variability by installing baffles to direct the wind. My impression was that the use of fans is still a questionable practice, even in North Carolina.

The Search Continues...

As a scientist I am constantly amazed at the ability humans have to uncover new information. The volumes of scientific information, just in turf, is overwhelming! And more overwhelming is that what may be a truth today, might be found differently with new technology tomorrow.

As a turfgrass manager, the single most important use of this information lies in the decision-making process you go through each day you manage the course. The dynamics of biology are out there, science tries to simplify it, and hold factors constant, to isolate an effect. Ultimately it is up to you to interpret the information for your own benefit. I feel my job is to continue the search for new information and help your decision-making process be a little easier.