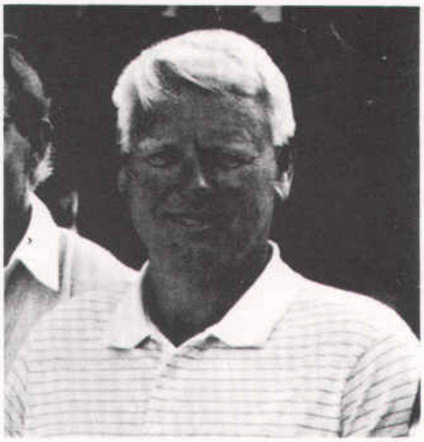


A Player's Perspective

Fast Greens; A Reply to Your Editor

By Dr. David Cookson

Your editor requests my comment on his editorial in the last issue of this magazine relating to fast greens. His argument, projected in flowery prose and excited hyperbole, was basically that the desire to increase green speed carried to extremes may result in turf damage, and that the gains in achieving a high stimpmeter reading do not justify the time and effort involved.

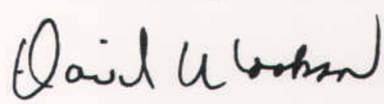
My first thought on reading Mr. Miller's essay is that he is not talking about any place that I have been lately, and is in effect creating a bogey man where really none exists. I counted up the number of different golf courses I personally played on last year throughout the country, reaching a count of fifty. Not one of these courses approached the kind of greens my editor is lambasting; in fact, my most common experience was greens far too slow to create the most enjoyable playing conditions. Yes, we all read about "lightning fast greens," but I don't see them in ordinary play anywhere—maybe occasionally in major tournaments (Oakmont, Augusta National sometimes), and even twice recently in our own state events—but these are rare exceptions to a general rule of greens too slow to be fun to play on.

It is an inborn genetic trait of green superintendents to worry excessively about potential problems before they occur, and Mr. Miller's overblown concern about the myriad of diseases that **might** happen to fast greens is one example. The above mentioned Oakmont greens—"lightning fast" for over fifty years, still exhibit a healthy turf; and you can't tell me that fast greens have shown any more disease than those excessively thatched, over watered, over fertilized greens most of our golf courses have exhibited for the past decades, and about which tomes have been written concerning diseases known to propagate all the time in such a setting.

Yes, Monroe; it does take a little extra effort to increase green speed. But isn't the green superintendent's job to get his golf course, including greens, in the best playable condition possible—and if it takes extra effort the top green superintendent will do it. I submit that green speed sufficient to allow the ball to roll naturally without abruptly stopping as it begins to slow is the mark of an excellent playing surface giving maximal enjoyment to all players, and **does** mean increased quality. I decry my editor's dismissal of this concept as "macho" or "false bravado."

This year I have again become green chairman at my club after several years hiatus. We strive for fast (and fair) greens, and early this season, before growth had begun, they were too fast for a brief period. Nobody complained; but lately the speed has become slower, and I am besieged with comments from members about our too slow (stimpmeter 8'6") greens, even from 20 to 30 handicappers. The moral of the story is not, as Monroe suggests, that members are "disgusted and frustrated" by fast greens, but that once used to greens of proper speed, they vociferously object to a lessening of green surface quality.

I can agree with Mr. Miller on one thing, sloping greens with severe undulations can become too fast— and a stimpmeter reading of 10'6" on a flat green may be fair while 9' may be too fast for sloping greens on another course. Common sense, not a stimpmeter reading, suggests the proper criterion for green speed on a slope; if the ball putted from below the hole to the cup starts to roll back down the hill after it stops its forward motion, then the green is too fast and unfair. I agree in rare tournament situations this simple truism has been ignored, and it should not have been. Still, the greater problem in Wisconsin and indeed all over, is not excessive green speed, but greens that are too slow; and I am concerned that the recent flurry of articles similar to Mr. Miller's in various trade publications will lead to a backward move and slow the welcome recent trend to better and quicker green surfaces. I think that would be a tragic mistake.



An Architect's Opinion

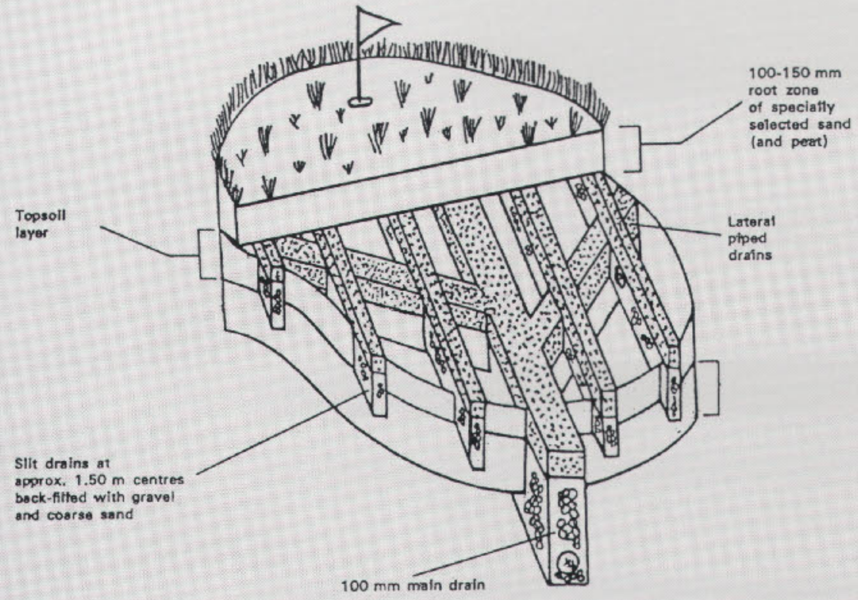
IRELAND GOLF — A LEARNING EXPERIENCE

By Bob Lohmann

Having visited Scotland before, I had some knowledge of British golf courses. On the first trip, my time was spent viewing the magnificent countryside and golf courses, and visiting the historical sites of the country. But on this trip, I was prepared to evaluate the golf courses.

An advantage was having the opportunity to play the golf courses with other architects, some of whom are familiar with British golf and the style of play. During the round, we would discuss the design and how it differed from American golf courses. It is easy to critique any design after it is completed, but our criticisms were based on the site, climate, budget, and the way the game was played in Ireland. Being the only golfers on the course, we had extra time to complete our design evaluations. British architects and contractors and greenskeepers made presentations and were avilable throughout the trip to answer questions and participate in our discussions.

Similar to the United States, the putting greens are considered the most important part of the golf course. A construction technique was developed that provides intensive drainage and a highly permeable growing medium. This technique, which has similarities of the USGA green, was developed in Ireland primarily for soccer and rugby fields.



One notable aspect of the golf courses that I visited was the spectacular sites. To describe the settings of Killarney, Bullybunion, Lahinch, and Royal County Down would exhaust superlatives. The breathtaking backdrops of mountains, the cliffs and beaches of the seaside golf holes, and the massive plantings of yellow gorse stress the point that nature is the real golf course architect. But the flat boring greens at Royal County Down, the hidden water at Killarney, and the blind pot bunkers in the landing areas at Portmarnock could have used some design assistance.

It can be frustrating when you make a smooth swing, have good contact with the ball, watch it travel toward your target, and then end up with your next shot coming out of a 6 ft. deep sand bunker with a vertical face. The consoling comment, "that's a pity," from your caddie doesn't quite make up for it. It is impossible to set up a strategy for playing the golf hole when everything is blind. Night golf has never been too popular. Playing a shot to one side of the fairway to have an open approach shot to the green, or cutting off a portion of a hazard to gain yardage and better position, cannot be accomplished if neither the fairway nor the hazards are visible.

The long grassed roughs, steep banked berms, and deep sand bunkers provide character and a uniqueness rarely found in American golf courses. Unless you are an avid golfer with good control of your game, or you enjoy "tortue on the golf links," the game is not pleasurable! But negotiating successful golf shots to these targets is a satisfying feeling, and the golf round is never monotonous. For the average or novice golfer, however, these areas are practically impossible to play. Some of these features should be included in the American golf course designs. Proper planning would limit the frequency yet maximize the effect.

One striking difference in these golf courses was the absence of trees. The use of high berms, long grasses, and heavy gorse provided the direction, definition, framework, and background that is needed for the golfer. The trees are not missed and the superintendent never has to worry about shade, roots, or lack of air movement.

It also was pleasant not hearing golf carts or seeing cart paths and worn-out areas throughout the golf course. Due to the rugged terrain, carts could not be used even if they were available. In some cases, a pull cart, known as a trolley, was hard to negotiate on the narrow paths up and down the steep banked sand dunes. It was amazing how the spectacular sites kept my mind off all the walking and climbing I had to do.

This trip was no doubt the best golfing experience I have ever had. The company of other architects, along with the chance to play the best golf courses was a dream come true for any golf purist like myself. As with any experience, there were both good and bad points, but, most importantly, I learned more about golf course architecture than anybody could possible teach me.

From the Director's Desk

TURF STRESS — WARM AND HOT CONDITIONS

By James M. Latham, Director
USGA Green Section,
Great Lakes Region

This discussion involves a few of the known factors of stress on cool season grasses during hot weather. We are all familiar with the various occurrences, but a review of them can help us to better understand them and thereby reduce the hazard to turf during the coming season.

It is well known that roots of cool season grasses become shallow during hot weather. Wilt is familiar to all — both under moist and dry conditions. Just what this relationship involves has prompted the research to be reviewed.

Brown's work in Missouri examined loss of roots in the summer. He reported that Kentucky bluegrass grew best north of the 60° Fahrenheit isotherm. It showed little vigor in July and August, whereas Canada bluegrass was less affected by heat.

Brown noted good Kentucky bluegrass regrowth after defoliation at a temperature of 60°F. At 80°F. regrowth was poorer and at 100°F. many plants died within six weeks. Other workers were quoted that little growth occurred when soil temperatures were below 42°F. Rapid growth occurred between 42° and 47° when adequate nitrogen was present. Above 47° good growth was seen regardless of the nitrogen level.

Carbohydrate storage is reduced as temperatures rise. This is due to continuation of respiration at temperatures too high for photosynthesis to take place. Brown found that the best temperature for top growth was between 80° and 90°F. The best rhizome development occurred at 60°F. Chlorophyll in leaves was lost between 40° and 50°F.After a week at 100°F., growth stopped. Roots made maximum growth at 60°, declining at lower and higher temperatures. But when air temperature was 100° and soil temperature was kept at 70°, the plants produced good top growth.

Stuckey, working with Colonial bentgrass, made several references to various plants that made good growth at high air temperatures, provided the roots were kept cool. She reported that at high soil temperatures, roots matured more rapidly. Her conclusion was that at lower temperatures plant roots matured more slowly and hence remained more vigorous for a longer period of time. Plant death at high temperatures was due to maturity and death of the root system and the consequent stress on plant tops.

Brown reported also that maximum Kentucky bluegrass root growth occurred in April. In the fall, the most rapid growth began in September. After mid-June, few new roots formed and there was no appreciable growth of existing roots until October.

Without irrigation, bluegrass root growth reduction is soon followed by a reduction in top growth. Irrigation in mid-summer did not influence root growth but did accelerate decomposition of older roots. This seemed to exert a beneficial effect, since these plots produced more herbage — even during the spring and fall when moisture was abundant in all plots. Summer irrigation, naturally, produced more clover and weed growth than in the non-irrigated plots.

He states that where summer drought is short and not too severe, bluegrass plants were probably protected from excessive depletion of stored food reserves. Fall droughts were said to be altogether harmful, because they inhibited root and rhizome growth as well as food storage during periods otherwise favorable for such development. Stored carbohydrate was decreased when turf was irrigated during summer.

Mowing at reasonable height had little effect on carbohydrate storage. Storage of starch and sugar proceeded almost as rapidly during the autumn in the rhizomes of closely (1") mowed grass as in that which was not cut at all from May until November. He summarized that storage of organic food reserves in perennial grasses is essential to their normal functioning. Excessive carbohydrate production in the spring and fall is stored in the roots and rhizomes. During the late spring and summer there is a net loss of these reserves. Irrigation in the summer does not help prevent this loss. Reserves are also used during foliation in the spring.

Stuckey classified forage plants into annual and perennial root system groups. If the maximum production of roots occurred during the first year and they remained functional for more than one year, they were called perennial. If new root systems were formed every year, they were classed as annual.

Annual Root Systems	**Perennial Root Systems**
Timothy	Kentucky Bluegrass
Redtop	Canada Bluegrass
Meadow Fescue	Orchardgrass
Poa trivialis	Crested Wheatgrass
Perennial Ryegrass	
Colonial Bentgrass	

Beard's work reported in 1958 and 1960 showed similar root growth patterns in creeping bentgrass. He found satisfactory root growth at 80°F. but only half as much at 90°F. Clipping reduced growth to half that in uncut treatments.

60° — Best top growth and root growth.

70° — Most root branching.

80° — Fastest initial root growth.

90° — Very slow root growth. Growth was temporarily stopped if tops were severely cut back.

He suggested that soil temperature at a 6" depth was a major factor in predicting variation in root numbers. This indicates that soil temperature is probably the major factor in root development or loss. It is the most consistent environmental factor controlling root growth. Light was secondary, but measurement facility was questioned. Soil moisture was of poor correlation since putting green plots were kept near field capacity at all times.

Jordan, reporting his work in 1958 and 1959 showed that temperature was a primary influence in plant sugar production.

If high temperature is a factor in reducing a root system, what happens when other parts of the plant are subjected to demands for water? Since this is due to transpiration, we should consider what affects the transpiration of water from plants. Solar radiation, humidity, temperature, wind movement, soil conditions influencing water availability, and atmospheric pressure all play a part in the amount of water given off by a plant.

Solar radiation caused plant pores or stomata to open. Most moisture is lost through these openings. They do not open at night. Humidity affects the diffusion of water vapor out of the pores. It is thought that the higher the humidity the slower a plant will transpire. Temperature reaction is direct when in sunlight.

Wind effects are far from simple. We assume that wind movement increases evaporation. This is true if, in a still atmosphere, vapor given off by a leaf remains in the surrounding air and slows transpiration by increasing humidity. In nature, however, the air is seldom perfectly still. Another effect of wind movement is its twisting and bending effect on leaves. This movement constricts and squeezes leaf cells and forces the vapor from the leaf. A gentle wind is more efficient, because high winds are thought to close stomata. The cooling effect of wind also tends to slow transpiration.

Soil conditions influencing transpiration are water availability, soil temperature, aeration and the solute concentration in the soil water. These may be direct or indirect, and as we have seen, may be due to their effect on the root system.

Atmospheric pressure has a minor role but could influence the rate of evaporation. Under reduced pressure, plants can be expected to give up their water more readily.

Wilting occurs when plants lose their turgidity. This may happen in either wet or dry soils, as a result of higher transpiration than water imbition. The total volume of water in the plant shrinks, although not equal in all tissues. The greatest loss is in the leaf cells.

There are several states of wilting. On some days visible wilting does not occur at all, but incipient wilting is frequent. This corresponds to only partial loss of turgor by leaf cells. It is during such periods of incipient wilt that damage can be done by spray applications of even faintly caustic materials.

Irrigation practices based directly on transpiration are syringing to cool the surface during hot weather and irrigating in the early spring when soils are still cold but air temperatures are high.

Oversucculence and weakened plant cells are ripe for attack by many disease organisms. It is during summer periods that **Pythium**, brown patch and leaf spot disease are most prevalent.

Traffic damage during the summer may not be a primary problem but secondary. Both traffic and disease problems are more severe when the plants are weakened than during periods of active growth.

Since we can do nothing (yet) about the primary cause of weakness due to reduced root systems, we can do many things to reduce damage from other causes:

1. Develop the best possible root systems during periods of maximum growth — spring and fall. Aeration, adequate fertilization and proper mowing heights are most important.
2. Keep moisture additions to a minimum on bluegrass during hot weather. It may be best to wait for signs of wilt before irrigation. Merion bluegrass and Penncross bent tees perform beautifully as long as moisture is not oversupplied.
3. Manage hot weather fertilization to prevent over-availability of nitrogen. Nothing should be left to the vagaries of nature, or theoretical formulations. Adequate applications of fertilizers should be used in the spring and fall, but excess residual should be avoided. Periodic, light applications should be used to allow the turf manager to remain in control of growth during the stress period.
4. Maintain adequate, but not excessive levels of all other plant nutrients.
5. Assure good air movement across turf areas, especially putting greens.
6. Provide adequate sunlight, especially in the morning, to promote optimum growth of the grasses.

By making the most of the optimum growing periods, the plants will be better able to withstand stress during hot summer weather. A capable turf manager will consider all facets of plant growth and not simply react to a specific condition that crops up during a particular phase of growth. In so doing he is making his job easier and removing some of the stress on himself.

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W.G.C.S.A. SECRETARY'S COLUMN

By Rodney W. Johnson

Behind the scenes and in between working at our real jobs, your W.G.C.S.A. Board of Directors has been busy on several important items.

First of all are the bylaw changes which are being brought to a membership vote at our June meeting at Kettle-Moraine Golf Club. Proposed bylaw changes include a name change for our association and a change in Class B membership definitions which would allow for more than one Class B member from an individual club.

The membership committee consisting of Dale Marach and Bill Roberts has initiated an aggressive new member campaign. They have composed an excellent new member recruitment letter and will be sending it to 150 presently non-member Superintendents from throughout the state.

New members approved at our April and our May meetings are as follows:

Dave Oberle	Class D	Pine Hills Country Club
Scott Schaller	Class D	Pine Hills Country Club
Steve Dobish	Class A	Oshkosh Country Club
E-Z Go of Madison	Class E	
Elanco Products	Class E	
Steve Allen	Class B	Ville Du Parc
George Magnin	Class D	Blackhawk Country Club
Gary Hunerberg	Class B	Deer Run
Pat Shaw	Class B	Muskego Lakes
Gordon Wadington	Class D	Brynwood
John Syty	Class A	South Hills, Racine

In a related matter, Dr. David Cookson has been approved as an Honorary member. The W.G.C.S.A. Board has bestowed this honor on Dr. Cookson citing his frontrunner position in Wisconsin Golf and in appreciation for his continuing support as a regular contributor to the "Grass Roots."

Welcome to all new W.G.C.S.A. members.

MEET DR. WAYNE KUSSOW

It is the good fortune of the turfgrass industry in Wisconsin that Dr. Wayne Kussow, Professor of Soil Science at the University of Wisconsin—Madison, will be assuming a larger role in turfgrass research, teaching, extension and counselling in the College of Agricultural and Life Sciences. He is a person that WGCSA members will be getting to know better and better in the upcoming months as Dr. James R. Love approaches retirement.

Dr. Kussow received his B.S., M.S. and Ph.D. degrees from the University of Wisconsin—Madison Department of Soil Science. His varied background includes the following positions:

1965-67	Project Associate and Assistant Professor, UW Programs, University of Rio Grande Do Sul, Brazil.
1968-69	Assistant Professor of Plant Science, University of Delaware.
1969-73	Assistant Professor of Soil Science and Assistant Director of International Agriculture Programs, University of Wisconsin—Madison.
1973-76	Senior Resident Advisor/Rice Research Team Leader, U.W. Brazil Program.
1974-78	Associate Professor of Soil Science, University of Wisconsin—Madison.
1977-82	Associate Director of International Agriculture Programs, University of Wisconsin—Madison.
1979-present	Professor of Soil Science, University of Wisconsin—Madison.

Dr. Kussow's professional interests include plant nutrient dynamics in the soil in relation to nutrient uptake, fertilizer use, soil test methodology and soil test interpretation. His current focus is on phosphorus and potassium. He anticipates the development of a research program focused entirely on turfgrass, and that is where our good luck lies. This will also most likely include increased advising activity with turfgrass students as well as increasing responsibilities in undergraduate instruction. He currently is the major professor for two Ph.D. candidates.

Wayne, wife Carol, and his three sons reside in Madison. Soccer and competitive swimming keep them busy.

On the Horizon

By Dr. Wayne R. Kussow

This is undoubtedly not the time of year to expect you to lean back, relax, and speculate about what types of changes may be looming in your life as a golf course superintendent. But it is vital that at some point in each year, you **take the time** to do just that. If nothing else, you need to be mentally prepared for change. As Charles Francis Kettering once put it, "We should all be concerned about the future because we will spend the rest of our lives there."

What do I, as a soil scientist, see on the horizon that could well bring out change in your work-a-day world? A number of things — new tools that allow you to become a better manager, access to more refined diagnostic techniques, and maybe even new approaches to old problems.

For starters, let's consider new management tools. I am willing to wager that if it has not happened already, there is a personal computer in the future of many of you. Ridiculous? Not at all. Many of today's leading farmers start their day in front of their PC checking on their cash flow situation, formulating rations for their livestock, updating dairy herd records, and calculating fertilizer and pesticide needs for the coming season. You could already be using that same computer to:

1. Prepare daily, weekly, monthly, or annual work schedules.
2. Instantly check your inventory of equipment, pesticides and fertilizer;
3. Issue purchase orders;
4. Do your financial accounting, see where you stand budget-wise, and prepare new budgets;
5. Call up detailed records of everything you have done to each and every green and fairway; and
6. Printout maintenance records for every piece of equipment on the course.

But there is more, much more.

Knowledge has progressed to the point where we can successfully model plant growth. It has not been done yet for turfgrass, but the methodology exists. Once developed, turfgrass growth models could be interfaced with submodels such as those for nutrient uptake and water use. The result? By supplying the computer with key pieces of information such as type of grass, cultural practices being employed, the growth medium, time of year, and weather data, the computer could tell you on a green-by-green or fairway-by-fairway basis when moisture or nutritional stresses are likely to occur and what precisely is required to avoid these stresses.

Don't look for such a computer program for a few years yet. There is still a lot of research needed first, but it will come. In the meantime, you need to make use of the best means available for diagnosing problems. Two such tools, soil and plant analysis, have been around for a long time and are undergoing or have already undergone significant improvement. Changes being made now in soil testing methods will result in recommendations tailored to specific soils, grasses, and locations. This greater specificity means more precise and more cost effective fertilizer recommendations.

Advances in knowledge of how various factors influence plant growth has led to the realization that plant response to a change in supply of one nutrient is conditioned by the amounts of other nutrients in the plant. This concept is embodied in new methodology for interpreting plant tissue analyses. While not yet adapted to turfgrass, the methodology promises to significantly increase the power and reliability of plant analysis as a diagnostic tool for turfgrass managers.

Research with various agronomic crops has recently modified views regarding cause and effect relationships between plant nutrition and disease. For example, there is strong evidence that the potassium status of plants can determine whether or not changes in nitrogen supply induce diseases or are associated with changes in disease incidence. Look for renewed interest in research on this topic and be prepared for changing concepts in the years ahead.

A lot of soil and plant research has gone underground! How crop cultural practices unknowingly alter plant root systems has become a major research concern. Any restriction in root development reduces the surface area available for absorption of water and nutrients and increases irrigation and fertilizer needs. I am willing to predict that turfgrass researchers are going to be focusing more and more of their attention on the below ground status of the plant. If so, you are going to be looking at new recommendations for turfgrass culture that are directed more toward maintenance of healthy root systems than quality top growth.

Sometimes potential solutions to long standing turf problems lie outside the world of turfgrass. A case in point is compaction in fairways. Is there an alternative to costly time-consuming aerification? Perhaps. An implement developed in Britain a few years ago to reduce compaction in agricultural soils has found its way to the U.S. Those who have experimented with this implement feel that it could be adapted for use on fairways. We will never know until some bold individual steps forward and says, "I am willing to give it a try."

THEY'RE AT IT AGAIN

Never happy with a safe status quo, the "environmentalists" of Madison have proposed legislation that would require the posting of chemically treated grass areas with warning signs. The proposed under discussion calls for signs at 75-foot intervals along the perimeter of treated property — lawns, golf courses, commercial property, etc. — telling individuals to keep off for 48 hours. The signs are to include the name and phone number of the pesticide user, the date of application and the pesticide used.

Alderwoman Galanter proposed these requirements in spite of the facts that 1) the state regulates both companies and individuals applying pesticides through a registration program, 2) the pesticides themselves and their uses are regulated at the state and federal level, 3) the materials affected by such a law have been proven safe over many years of use in urban and agricultural applications, and 4) that such a law would be very costly and extremely burdensome to those affected by it. Violation of the proposed ordinance carries a $500 fine EACH DAY.

The legislation is being put forth under the argument (and disguise) of a "right-to-know" issue. Those supporting it argue that there is a responsibililty on the part of pesticide applicators to give people the right to make their own decisions about where to walk and where **possibly** toxic chemicals have been applied. They are deaf to any discussion about the safety of diluted pesticides applied to grassed areas. They also argue the welfare of children but merely ignore the fact, pointed out by opponents, that children cannot read such signs anyway! The privacy issue of posting telephone numbers on a public sign seemed not to sway their minds, either.

Almost all proponents presented at a hearing in Madison on May 29 worked in the public sector, principally the city of Madison and the state of Wisconsin. In addition to alderwoman Galanter, those speaking for posting were young health department employees, members of the city commission on the environment, the Audubon Society and the Public Intervenor's office. There was also a woman present at the hearing who claimed her child became ill after walking on a lawn treated with a herbicide.

A key point of the proponent argument was that other localities (about four in total) had legislation similar to this proposal. They did not mention that about 65,000 cities, towns and villages saw no need for it, and ignored legal challenges of already passed laws in those few where it exists.

Those in opposition included many WGCSA members, Dr. Bob Newman, representatives of the lawn care industry (both local and national), representatives from industry and manufacturers, park supervisors **and** home owners. An assistant city of Madison attorney point out the problem such legislation would impose on the city itself because it treats a large amount of turf on golf courses, parks and other greenways.

Opponents also expressed the opinion that, if it really was necessary, such legislation should be controlled by the state or federal government and that it was unwise for the city to intercede into this area. It also would be cumbersome to have regulations apply in Madison and not in surrounding municipalities.

There seems little doubt that this proposal will be put before the city council in one form or another. If it passes in Madison, it is only a matter of time before it hemorrhages and spreads to other cities.