Low Chemical Landscape Management on a Golf Course

PART II: *An IPM Approach to Long-term Plant Maintenance*

by Dr. Lois Berg Stack
Extension Specialist, Ornamental Horticulture
University of Maine Cooperative Extension

The problems which landscape plants can develop are difficult to identify and resolve because of the many variables involved. Problems can arise from either biological causes (including insects, diseases, animal damage, and genetic problems of the plants themselves), or abiotic causes including mechanical damage, fertilizer imbalances, water deficiency or excess, pollution and construction damage). Symptoms can vary dramatically from one plant to another, and from one environment to another. Some problems cause a rapid reaction, which can be diagnosed and treated immediately, but other problems develop slowly over time and may not become evident until the casual agent is long gone. While one problem is developing, others can begin, producing a diagnostic mystery that would baffle even the best of detectives.

No two plants are exactly alike. Even two plants of the same cultivar planted side by side have their differences. For example, they may be pruned differently, or one may be more exposed to wind, or one may be planted over a ledge which affects root development. Since no two plants are identical, it makes sense that they would not react to a biological or abiotic pressure in the same way. But with all this variation there is a bottom line: the healthier a plant is, the better it is able to fend off problems. The first part of this series (see the last issue) focused on promoting healthy plants on the golf course through proper plant selection, sound landscape design, and getting plants off to a good start through proper planting and early care. This "preventive medicine" is the first step toward reducing chemical use in landscape management.

That's fine ... but let's get practical! Unless you are developing a new golf course, you already have established plants. They may not have been selected with low maintenance in mind, they may not have been planted in the most appropriate environments, and they may not have been planted correctly. How do you establish an IPM program in an existing landscape? How do you determine what problems are already active, and which ones should be treated?

To get started, you need a person dedicated to developing a low-chemical landscape management program over time. Find someone who loves landscape plants, who wants to learn more about them, and who looks at landscape plant management as a systematic, interdisciplinary process. Developing an IPM program requires attention to detail, substantial knowledge about plants and their problems, an appreciation of how the various components of a landscape are connected, and a desire to learn. A person with these traits can develop an effective program following these five basic steps.

Step 1: Assess the plantings and the environment

Get to know the plants. Check reliable references (Dirr, 1990; Hasselkus, 1991; Sabuco, 1987; Wandell, 1989) for proper identification of landscape plants. If you can't identify a plant from a reference book, take a sample to your local county extension office or to a nursery. Proper identification of plants in the landscape is a critical first step to success.

Make notes not only of plant identification, but also of plant condition. Assess the plants' age, health and size, and evaluate the environmental setting and its appropriateness for the plants in question. Try to determine past stress on the plants—evidence of previous insect and disease pressure, construction damage, pruning damage, drought or winter stress, etc. Create a profile of the health of the plants. Remember that a healthy plant can fend off problems more effectively than a stressed plant, so a stressed plant should be monitored more closely.

Create a map of the major ornamental plantings on your golf course. This may seem like a major effort, but it will create the framework for your monitoring program, and will allow you to be systematic in your efforts. A good map can minimize the amount of record keeping needed later on. You may have a hundred sugar maples, but if only a few of them are in stressed condition, those are the ones you should concentrate your monitoring efforts on, because they will be most susceptible to problems.

Step 2: Assess the potential problems

Good plant reference books are the basis for determining potential problems. Books such as Dirr (1990), Gerhold, H.D. et. al (1989), Johnson and Lyon (1988), Pirone (1978) and Sinclair, Lyon and Johnson (1987) provide excellent summaries of the problems woody plants can experience. Of course, not every pest is a problem on

every plant in every environment. For example, you may read in a reference book that bagworms can be a serious problem of arborvitae and juniper, but you are unlikely to see a perennial bagworm problem in most of Wisconsin, because bagworms do not overwinter successfully in northern areas. [Nursery stock coming in from southern states may have a minor bagworm infestation but handpicking serves as an excellent control, and the problem should resolve itself after winter.] On the other hand, you will find scab on susceptible crabapples every year, and should be alert to the problem.

Learn the key pests in the system—those pests that cause economic damage year after year. In many cases, relatively few pests are involved. For each type of planting your landscape, identify the pests you expect to be problems.

Remember: you are not alone! Pests and weather patterns do not stop at landowner or political boundaries. Other landscape managers in your area probably see the same problems you see, at about the same time. In fact, you can use other people's observations to predict the timing of problems in your landscape, since many weather-related problems move in a predictable direction. This is important, because if you are trying to reduce the use of chemicals in the landscape, you must identify problems in their early stages, and implement control measures before problems reach devastating proportions. One excellent source of information on active plant problems is the Wisconsin Cooperative Pest Survey Bulletin, a publication which you can request at no charge by sending your name and address to: 801 West Badger Road, PO Box 8911, Madison WI 53708. The bulletin is distributed weekly during the growing season, and less frequently during the off-season.

Step 3: Monitor the landscape regularly

Monitoring, or scouting, has a specific purpose: to gain ongoing, accurate information about plant health, environmental conditions and the presence of pests, on which you can make appropriate management decisions. Chemicals have allowed us to almost ignore problems until they have reached damaging levels, because chemical application has the ability to rapidly reduce pest populations (especially insects). But if you want to use alternative methods, you must realize that some methods require a period of establishment before showing significant control. For example, a predatory insect must establish itself in a new environment and build up its population before it is able to keep a target pest insect at a low level of activity. That means that you must monitor the situation and recognize problems at an early stage, in order to have time to establish effective controls.

Monitoring is an ongoing educational process. Through monitoring, you can develop a great knowledge of plants, their growth patterns and seasonal changes, and the environmental conditions that promote high performance. Over time, you will learn to notice relatively small changes in your landscape plants, before those changes can develop into serious problems. You can learn to identify the pests and beneficial organisms that are active in your landscape.

But exactly what do you look for when you monitor? In a nutshell, you learn to identify what is normal, and then monitor for anything that is abnormal. Perhaps a better question is: How do you monitor? First, you can assess plant health by inspecting plants from a distance to see their form and general color, then approaching them to look at vigor, amount of new growth, leaf color, and the presence of abnormalities (leaf spots, cankers, wilting, insect feeding, etc.). Be sure to record cultural events such as pruning, fertilizing, and watering.

Second, record environmental data. As a golf course superintendent, you already keep good records on temperature and rainfall. In monitoring landscape plantings, you will want to record temperatures because plant growth responds to temperature, and because insect development is closely related to accumulated heat over the season. Rainfall is important because it affects plant vigor. And humidity is important because many fungal pathogens require high humidity to develop.

Third, you can look for pest problems by several techniques. The methods you use depend on what you expect to find. For example, if it is early spring and you expect to see scales on a euonymus, then you would look closely at the bark. Or, if you expect to find small flying insects within the foliage of a plant,

you would sweep with a net. Or, if it is midsummer and you expect you might see box elder bugs, then you would look for the typical leaf chewing damage and the adult insects. Many insects can be monitored through the use of traps. For example, attractant traps can be used to assess the populations of Japanese beetles and predict their potential damage before heavy foliar feeding becomes evident.

Remember that monitoring is a learning process. Don't wait until you have "all the answers" to begin (you would have to wait a long time, because all the answers aren't available). Don't be intimidated—you didn't wait until you had "all the answers" before you started to manage pests with chemicals; you started with one or two, and expanded from there, learning as you went along. The same is true for reducing your dependence on chemicals.

Step 4: When a pest needs to be controlled, choose the best approach

Through monitoring, you will be able to observe insect or disease problems over time. You will learn to tell the difference between a low pest population which is not damaging, and a pest problem that is severe enough to require control. Trial and error, along with good records, will help you refine your assessment of pest levels.

When you find a pest that requires management, you'll need to determine first what control method is most appropriate, and second whether the pest would best be controlled immediately or if it would be more susceptible at a different time. A good example is the gypsy moth population here in Maine. Monitoring earlier this season would have revealed that foliar feeding damage was high in some areas, but over time the feeding stopped, because the damaging larvae matured. They did their feeding in spring and early summer (when B.t. would have been a good control measure). Next, the adults emerged to lay their eggs. By now, the egg masses are evident. Since this year's damage is done, and next year's damage won't begin until spring 1992, we are entering a relatively long period of time during which a very effective nonchemical control measure can be practiced—the fuzzy brown egg masses can be scraped off the surfaces of trees, buildings, and wherever those prolific moths chose to lay their eggs earlier this summer.

The control measure you choose should always be one that can control the pest at a level which is minimally damaging to both the landscape plants and to the environment. It may not be possible to eliminate chemicals from a landscape maintenance program, but the frequency of chemical use can be reduced to those occasions when no other control measure is feasible.

There are five approaches to pest control which should be considered before chemicals:

- environmental (examples: spacing roses to increase air circulation and reduce relative humidity, in order to reduce powdery mildew and black spot; planting root rot-susceptible plants on well-drained sites);
- mechanical (examples: handpicking and destroying small numbers of rose chafers; trapping slugs; syringing foliage with water to reduce populations of aphids and spider mites; pruning out egg masses of tent caterpillars);
- cultural (examples: using resistant cultivars of crabapples to reduce incidence of scab, cedar-apple rust, mildew and fireblight; pruning out cherry branches with black knot);
- physical (examples: using barriers such as buildings, ponds and fairways between plantings susceptible to the same pests); and
- biological (examples: using ladybird beetles to control aphid populations; using milky spore against Japanese beetles; using B.t. against tent caterpillars).

Again, chemicals are an option. If you find that chemical control is necessary, you can reduce the amount of chemical required by using more effective and efficient application methods (good sprayers, proper calibration); using "softer" chemicals and using pesticides wisely by properly identifying plants, pests, and control methods. Remember to rotate chemicals with different modes of action, avoid tank mixing, and spot treat whenever possible. And, of course, try alternative controls before using chemicals.

There are many people who can help when you need advice. Try your Cooperative Extension office, an experienced consultant, the IPM program at the University of Wisconsin Cooperative Extension Service, and colleagues who are trying the same things you are trying. Talking to people in your area who are gaining experience in reducing chemical use in the landscape can be the best source of information, because those people are dealing with the same pest complexes as you.

There are some helpful publications, too. The Wisconsin Cooperative Pest Survey Bulletin, mentioned earlier, will help you establish a sense of pest threshold levels and pest populations in your area. Other available publications include:

- "Landscape IPM Updates," a bimonthly newsletter which contains up-to-date IPM information and product reviews, and ideas for low chemical pest management. This newsletter is available for $36 per year, by writing to PO Box 309, Mt. Home NC 28758.
- Common-Sense Pest Control, a 715-page volume by W. Olkowski, S. Daar and H. Olkowski. It is printed by Taunton Press, and lists at $39.95. Order it from Bio-Integral Resource Center, PO Box 7414, Berkeley CA 94707.

Step 5: Evaluate and plan ahead

Evaluation and planning are important in any process. There is always room for improvement. Mistakes are made, and in spite of the best laid plans, something beyond your control can change

the outcome of what you do. Over time, you can learn from your experiences, but only if you keep records, evaluate what worked and what didn't and plan ahead for improvement.

Keep records of pest incidence, plant damage, effectiveness of control measures, and any other effects which may be of concern (environmental damage or human safety concerns, for example). Good records can help you predict future pest outbreaks before they cause significant damage, determine how well a control measure worked, and plan future landscape plantings to minimize problems.

The side benefits of low chemical pest management

You have been to enough pest management seminars, and have read enough literature about pest management, to know that there are compelling legal, business, safety and environmental reasons for reducing the amount of pesticides you use on your golf course. But there are two additional benefits you should be aware of.

Worldwide, natural habitats for animals are dwindling. Golf courses, especially in urban areas, provide open spaces and sanctuaries for birds, small mammals, beneficial insects and many other animals. This is a very positive and valuable contribution to maintenance of species diversity. The Audubon Cooperative Sanctuary Program (ACSP) encourages and recognizes golf courses that take a leadership role in conservation, and provide advisory information services on how to encourage environmental protection on golf courses. For more information about becoming a certified Cooperative Sanctuary, contact the Audubon Society of New York State, Inc., Hollyhock Hollow Sanctuary, Route 2, Box 131, Selkirk NY 12158. There are currently 149 members in 37 states (including Wisconsin).

Golf courses are also becoming a very important connection to nature for people who live most of their day-to-day lives in urban environments. If you ask people why they golf, their first reason might be enjoyment of the game, but their second reason would probably be that the golf course provides a beautiful, natural setting that they can access easily. Why not let people know that you are making every effort to provide that setting with as few chemicals as possible? Why not let them know that the "natural setting that they enjoy" really is as natural as you can make it? The public relations possibilities are endless!

Literature Cited

Dirr, M.S. 1990. *Manual of Woody Landscape Plants.* 4th ed. Champaign IL: Stripes Pub. Co.

Gerhold, H.D., W.N. Wandell, N.L. Lacasse, and R.D. Schein. 1989. *Street Tree Factsheets.* Penn State University. Factsheets 1-122.

Hasselkus, E.R. 1991. *A Guide to Selecting Landscape Plants for Wisconsin.* University of Wisconsin-Extension. Bulletin A2865.

Johnson, W.T., and H.H. Lyon. 1988. *Insects That Feed on Trees and Shrubs.* Ithaca NY: Cornell University Press.

Pirone, P.P. 1978. *Diseases and Pests of Ornamental Plants.* 5th ed. John Wiley & Sons.

Sabuco, J.J. 1987. *The Best of the Hardiest.* 2nd ed. Flossmoor IL: Good Earth Publishing, Ltd.

Sinclair, W.A., H.H. Lyon, and W.T. Johnson. 1987. *Diseases of Trees and Shrubs.* Ithaca NY: Cornell University Press.

Wandell, W.N. 1989. *Handbook of Landscape Tree Cultivars.* Gladstone IL: East Prairie Publishing Co.

University Career Sprouts at Experimental Station

By Lori Ward Bocher

Dr. Gayle Worf, University of Wisconsin-Madison plant pathologist for nearly 30 years, has been fascinated with science ever since his childhood days on a farm near an agricultural experimental station in southwestern Kansas.

"Looking back over the years, I know full well that my future was strongly influenced by the proximity to that station because I could rub shoulders with the people who were involved with experimentation and trying to help solve agricultural problems in the area," Gayle recalls.

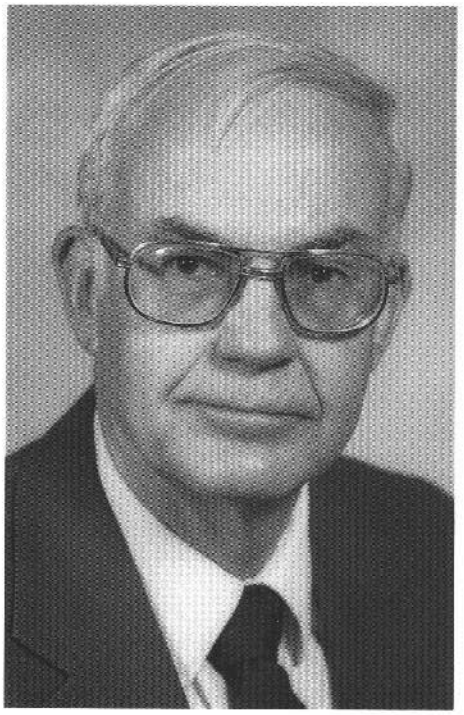
"A lot of the research work was done off the station and on my dad's farm," he continues, referring to their irrigated farm on which the main crops were sugar beets, alfalfa, wheat and sorghum. "So I saw what these people were doing. I could see the magical differences where good resistance had been found to a disease or where treatments for chlorosis changed plants from yellow to green. That was exciting."

So he went to Kansas State University and received a B.S. in agriculture in 1951. For the next four years he was in the military service and was able to earn an M.S. degree in agronomy and plant pathology from KSU. After three years in county extension work, he decided to go back to school before he lost the chance to go under the G.I. bill.

"I picked the University of Wisconsin-Madison because I did a lot of detective work to determine where the best schools were. I didn't know anything about Wisconsin at the time," he says, adding that he was told that the four best schools to consider were Wisconsin, Cornell, Minnesota and the University of California-Davis. He contacted all four universities.

"But I got the royal treatment by people here in Wisconsin, including an air mail response from the department chair and individual correspondence from faculty members," Gayle recalls. "That's why I came here. And I've never regretted it."

After earning his Ph.D. in plant pathology and botany in 1961, he spent



two years on the faculty at Iowa State University where he was the only extension plant pathologist. That's where this Kansas farm boy did his first work with turf and ornamental plants. "Although I had all the other crops to deal with, I ended up spending as much as a third of my time on turf and trees," he recalls.

Being the only plant pathologist at Iowa State left Gayle with too broad an area of responsibility. So when he had a chance to come back to Wisconsin as one of two extension plant pathologists, he took it. "That left me with the agronomic crops and the turf and ornamentals, which was more appealing because no longer did I have to deal with vegetables and fruits," he says. "So I was making progress toward specialization." The move to Wisconsin also gave him a chance to get into research.

Through the years, the UW plant pathology department was able to move toward its long-range goal of adding someone to deal with agronomic plants, so eventually Gayle was able to concentrate on turf and ornamentals.

"We were able to do that until 1987 when the severe cutbacks within extension and the campus caused us to lose one of our positions, so I had to go back to the broader spectrum of responsibilities. But, by that time, I already had carved a niche in the turf and ornamental area and was able to sustain it—but not quite at the level that I wanted to nor to what it deserved," Gayle says.

Worf has had responsibilities in research, extension and the classroom. He enjoys the variety and believes it's impossible to assign a certain percentage of time to each responsibility. "I don't quite know where my applied research in the field ends as research and begins as outreach," he says. "Sometimes research becomes demonstrations, and research becomes newsletter information or material that we can share with the turf and tree people during our winter meetings."

In the classroom, his one regret is that turf and ornamental students are not offered a course that deals with disease problems specific to those crop areas. "We get the information to them in different ways. But it would be fun to have the opportunity and time to dig into these diseases in some detail with them," Gayle says.

"There's so much for a person to learn and so little time to do it," he adds. "We want to make sure that our students learn the things on campus that will equip them to be efficient and effective learners from that time forward.

"I heard a statement the other day that I think is absolutely true, even though it was said in jest," Gayle continues. "'Four years of college never hurt anyone as long as the person was willing to learn something after he or she graduated.' I think that's very true."

Worf believes that summer internships are one of the turf program's greatest strengths. "The classroom experience is one component. But the internship gives students a chance to extend their learning opportunities and

experience, see them from a different perspective. It makes the classroom exercise more meaningful.

"And, with the internship, students don't have to learn all of the important innuendos and nuances of the job in the classroom," Gayle continues, "They need to learn basic soils, basic horticulture, basic plant pathology and basic entomology in the classroom. But details they have to pick up through other mechanisms."

Gayle thanks the people in the turf industry who are "willing to take these young people on and give them the extra time and TLC—and sometimes a kick—that they need."

When it comes to turf research and management, Gayle has seen "an absolutely profound change" in his 30 years as a plant pathologist. "If Rip Van Winkle had seen what was going on in the 60's and then awoke in the 90's, he would not recognize turf as the same entity," he says.

Gayle believes that this "profound change" is most prominent in two areas: the intensification of all sectors of turf management; and the greater sophistication of turf managers.

"An example of the intensification on golf courses is the kind of equipment that's available today to make it possible to cultivate and manicure the crop in the fashion that it is," Gayle explains, referring to aerating equipment, lightweight mowers and sophisticated irrigation equipment.

"I don't know what the numbers would have been, but I bet less than 10 percent of our golf courses were irrigating fairways in the 60's," he continues. "Today, not only are fairways irrigated, but a large percentage of courses have highly sophisticated, computer controlled equipment that does a much better job.

"At the same time there have been more demands placed on the product," Gayle points out. "The answer to that has not only been the equipment, but I see a vast change—an absolutely unbelievable change—in the sophistication of the golf course superintendents, the evolution of the professional mind. The superintendents today are much more knowledgeable. As a group they're much more bent upon—bentgrass pun not intended—doing a better job.

"Coupled right in with that is the tremendous pressure that all of us are feeling to provide that superior product, but at the same time do it within the realm of concerns about our environment," Gayle continues.

"If I had any regrets about leaving at this particular time, it's that this is the dawn of opportunity for a new era of research with the O.J. Noer Turfgrass Research Center," he adds. "I can't help but feel that properly constructed projects will be awfully important to help the citizenry accept what turf offers in the way of benefits to the environment. But we also are going to have to be more knowledgeable about what, in fact, we are doing to the environment.

"I'm confused at the moment with the different reports that I see as to what does or does not move through turf and into the groundwater," Gayle admits. That's just one example of what has to shake out through research over time.

"And what about dislodgeable residues—concerns that the products we use to maintain turf rub off and come in contact with people. Is this a problem?" Gayle asks. "My premise is, and there's a limited amount of work that backs me up, that this is not a concern except in one's mind. But we need to have the kind of information that can satisfy those questions at a little better level than we have now. These get to be more difficult kinds of research projects to undertake."

When he speaks of leaving turfgrass research, there are two reasons. The first came in 1990 when Worf was named Acting Associate Dean for Extension Programs. Why the move to the Dean's office? "I suppose the easiest answer is that somebody had to do it," Gayle answers.

In this position, Worf serves as an interface between the Cooperative Extension Service and the College of Agriculture and Life Sciences. He also looks for ways to foster CALS outreach programs.

The second reason will come in July of 1992 when Gayle retires from the University. This retirement originally was scheduled for July of 1991, then moved back to September of 1991, then to July of 1992.

Gayle and his wife, Mary, had planned to retire together; she retired this year after 26 years of teaching 4th grade. Now they will have to wait another year before they can share retirement. "We love to travel, camp, fish," Gayle says. "We love to bowl. We're looking forward to participating in Elderhostels, taking care of the grandkids, or letting them take care of us."

The Worf's have two married sons, both living in Nashville. Between the two sons there are six grandchildren, including two sets of twins—one set in each family.

Gayle's final words for this Personality Profile interview put the column in perspective and says a lot about the caliber of this issue's "personality".

"You've given me a rare opportunity to just sit here for an hour and talk about myself," he comments. "You've given me an opportunity to feel very important for a little while. I appreciate that."

Native Son Hosts July Meeting

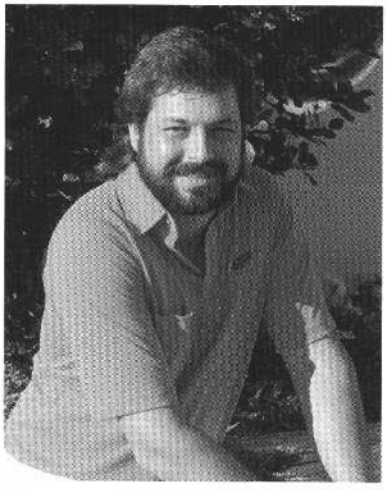
By Tom Schwab

A definite event on the superintendents's busy midsummer schedule should have been the Wisconsin Golf Course Superintendents Association meeting at Lake Wisconsin Country Club on July 8th. Out host was Kendall Marquardt. Kendall grew up playing golf and working at Lake Wisconsin. He then received a degree from the University of Wisconsin-Madison, and worked as an assistant superintendent in Colorado. He then moved to Philadelphia C.C. to get more experience and returned to Wisconsin to manage his home course. We're glad to have an active member back. He hosted this great meeting in only his second year as superintendent.

The 55 golfers were greeted by a welcome break in the weather and a fabulous golf course. This period of the summer normally has temperatures and humidities in the 90's. For this one day, temperatures dropped into the upper 70's and humidity disappeared. Kendall's crew had the course in excellent shape. Everyone also enjoyed the interesting layout with holes like #12 which had you teeing off from an island out on the Wisconsin River.

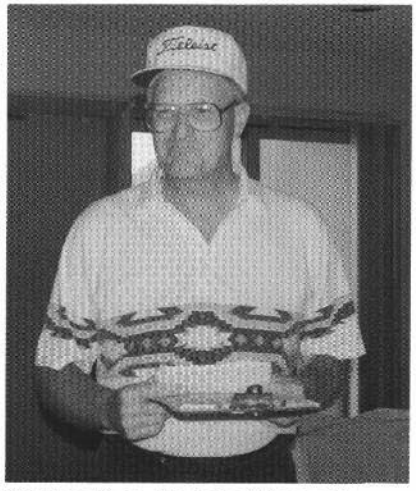
The golf event for the day was a four person best ball & skins game. The winners of the best ball were also locals—Steve Barritt, Jake Renner, Lee Radel and Alvin Alt. Second place was a three-way tie among teams of Charles Ocepek, Bob Baldig, Rich Handek and Jeff Mahnke; Ric Lange, Mike Handrich, Joe Wollner & Mike Hager; and Steve Bailey, Bill Knight, Paul Olson and Greg Kallenberg. Skin winners were Tom Schwab, Jim Shaw, Ed Devinger, Steve Barritt, Alvin Alt, Justin Lee, Jeff Barlow, Bill Rogers and Bruce Worzella. Flag event winners were: long putt—Gil Bergdoll and Jeff Barlow; long drive—Bruce Worzella and Chuck Frazier; proximity—Charles Ocepek and Bill Knight. Congratulations to the winners.

Special thanks should also go to club manager, Roger Myers, for putting on a wonderful buffet dinner and to Mr. Lake Wisconsin, Ray Kizer. Ray has been golf pro at Lake Wisconsin for some 25 years and is one of the most helpful pros I've ever had to work with. Most thanks go to Kendall for volunteering to host this monthly meeting.

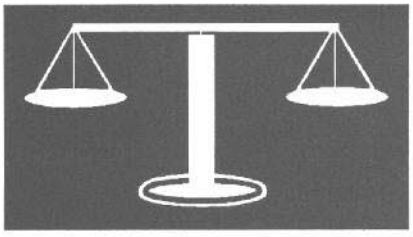


Host Kendall Marquardt

Site of the July meeting, Lake Wisconsin C.C.



Mr. Ray Kizer, Mr. Lake Wisconsin



Pesticide Ruling Harmful to Agriculture

By Russ Weisensel

EDITOR'S NOTE: Russ Weisensel hardly needs any introduction to WGCSA members. As the executive director of both the Wisconsin Agri-Business Council and the Forestry/ Rights-of-Way/Turf Coalition, he is one of the most articulate and best informed spokesman in all of agriculture. He has been a meeting speaker for the WGCSA, the keynote speaker for our Wisconsin Golf Turf Symposium and this spring addressed a meeting of the Greater Milwaukee Area Country Club Association. He is equally comfortable in front of an urban group or a rural gathering.

Below are Russ' thoughts about the recent U.S. Supreme Court decision in the Town of Casey suit.

Federal and state governments have a comprehensive set of laws and administrative rules to regulate the manufacturing, packaging and application of pesticides. Hundreds of pages of well-thought-out rules are in place. A number of these regulations establish standards which include variances to meet local needs to protect humans, to protect groundwater and to limit "target" pesticides and crops.

In Wisconsin, Ag 29, Ag 30 relating to atrazine and NR 107 are excellent examples of specific rules governing pesticide applications. The recent decision of the U.S. Supreme Court, however, states that under existing federal law each local unit of government can enact its own pesticide-use regulations.

Town of Casey officials view their ordinance as a simple "right-to-know" rule to inform people what is being sprayed. The ordinance requires a permit 60 days prior to the application of any pesticide on public lands, or private lands subject to public use, and for any aerial application. This 60-day advance notice alone precludes any kind of an integrated pest management program where a pesticide application is made only after field scouting or when conditions warrant specific targeted application, e.g. for army worms.

The Casey ordinance also is not just a simple permitting process, but in effect requires a mini-environmental impact statement to be filed with each permit. The town, by forbidding the pesticide application on half of Mr. Mortier's land, in effect made it impossible for him to grow trees.

Both the Wisconsin Department of Agriculture, Trade and Consumer Protection and the Department of Natural Resources have authority and major programs dealing with our pesticide rules. The heads of these departments each made comments prior to the Supreme Court ruling:

- Alan Tracy, secretary, DATCP—"...We believe that state pesticide regulations are also responsive to local health and environmental concerns.... We are concerned that a widespread regulation of pesticides by local governments could lead to an unworkable patchwork of duplicative or inconsistent local requirements..."
- C.D. Besadny, secretary, Wisconsin DNR—..."The department's position is that local ordinances inconsistent with state pesticide laws are pre-empted.... I believe that it is in the state's best interest that the town of Casey efforts to regulate pesticide use fail..."

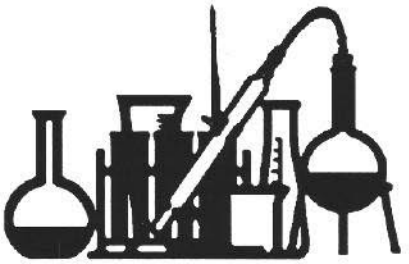
Taken to its logical conclusion following last month's Supreme Court ruling, the state of Wisconsin Department of Transportation would have to seek some 55 different town permits just to apply Roundup around sign posts on Highway 51 from Iron Mountain, Mich., to South Beloit, Ill. (That's the same herbicide homeowners use around trees to make lawn mowing easier.)

An aerial applicator would have to check with every town board prior to treating any farmer's crops for army worms, or forests for gypsy moth. Any local unit of government could prohibit timely or effective applications.

Based on the Casey ordinance, a Wisconsin farmer may have to apply for a different local permit for each and every pesticide he or she used in each and every township in which land is operated. Both pesticide use and the application methods could change at the town line.

In 1984, the National Association of State Departments of Agriculture passed a resolution which stated: "...Local pesticide ordinances could threaten the historic federal/state relationship and could create an unending hodgepodge of pesticide restrictions which would totally destroy uniform pesticide regulation in this country..."

The Supreme Court ruling widely opened the door for the potential of 1,900 different pesticide regulations in every township, county and village across this state. The impact of this ruling on agriculture, forestry, rights of way maintenance, aquatic nuisance control, lawn care and indeed all other types of pest control including that relating to public health may now be legal, but it is not good public policy.



Questions From the Floor

By Dr. Wayne R. Kussow
Department of Soil Science
University of Wisconsin-Madison

Q: For the five previous years or so, a hot topic among golf course superintendents was "the black layer". Special symposia were held, articles were written and every educational program from Maine to California had speakers addressing this subject.

Suddenly not a word about the dreaded black layer. What happened? Did the problem go away or wasn't it a problem in the first place? SAUK COUNTY

A: The silence is puzzlinq. As you know, a flurry of research came up with some remedial actions; deep, frequent aerification, use of the nitrate form of fertilizer N and a halt to use of elemental or sulfate-sulfur on putting greens. Nothing much was ever said about preventing black layer.

I can only guess why black layer has not received any press lately. If the basic causes of black layer are being researched for the purpose of learning how to prevent the problem, I can understand the silence. This is long-term research that won't come up with answers quickly. The precursor to black layer is interrupted drainage several inches from the putting green surface. This can result from the layering of topdressing sand over native soil. Once the sand depth is such that aerifier tines no longer break through the sand-soil interface, a saturated layer begins to form at this interface when rainfall is heavy and/or there is persistent overwatering. In sand matrix greens, the most likely cause of impeded drainage is downward migration of silt and clay particles from poor quality construction materials and eventual blockage of sand pores. In either case, these are conditions that require several years to develop.

I feel weather may also have played a role. Even after drainage has been impeded, it takes two to three months or more of water saturation before black layer begins to form. My first encounter with black layer was during a season following a very wet fall and an equally wet spring. Automated irrigation systems seem to have been a contributing factor to black layer in other instances. Another reason we haven't heard much about black layer lately may be because it's not a popular topic among those who heavily promote sand topdressing without regard to the nature of the soil from which putting greens have been constructed.

I personally don't feel that we've heard the last about black layer. The preconditions for its development have been and still are being created. All that's needed is a prolonged period of above normal rainfall.

Q: We have been forced to stop hauling our grass clippings to our local landfill and have decided to compost them. We were almost immediately discouraged, however, by the overwhelmingly bad smell. Neighbors and players are starting to complain. Is there anything we can do to get rid of the barnyard smell or must we abandon composting altogether? DODGE COUNTY.

A: Composting is a little more than microbial oxidation of organic matter. The basic requirements for rapid decomposition are fresh organic matter with a favorable C:N ratio, moisture and oxygen. The problem with grass clippings is the last requirement. Clippings pack so tightly that with the first burst of microbial activity all the oxygen in the pile is consumed and none can enter from the surrounding air. The decomposition process then becomes that of fermentation in which vile smelling organic acids and other aromatic organic compounds form. At this point what you're producing is not compost but grass silage!

The only way you can compost grass clippings is to somehow maintain aerobic conditions in the compost pile. Two things must be done. First, you have to mix the grass clippings with some type of dry material that will prevent compaction in the pile and allow for free interchange between carbon dioxide formed by microbes in the pile and oxygen in the surrounding air. Examples of such materials are dry tree leaves, wood chips and chopped straw. They need to be thoroughly mixed with grass clippings at a ratio of approximately one volume dry material to two volumes grass clippings. Secondly, the compost pile cannot exceed about 125 cu. ft. in volume. This is to ensure adequate oxygen in the center of the pile. Lastly, if you want the composting process to be complete in 2 to 3 months, you'll have to mix the pile a couple of times and make sure it stays continuously moist.

As you can see, composting is not a simple, low-cost disposal method for grass clippings. But don't give up completely on the thought of composting your clippings. As more and more municipalities go to solid waste composting you may be able to enter into a cooperative venture wherein you supply low C:N ratio grass clippings that will hasten the composting process.

Q: There are really a lot of exotic blends of fertilizers coming into our market. They are being sold under the guise of "slow release". Does the blending approach to slow release fertilizer really work? WOOD COUNTY.

A: My answer to this question is based on the assumption that what we're talking about here are blends of soluble and slow release N (SRN) fertilizers developed with the idea that such products give quick greenup followed by fairly uniform color and growth for a period of several weeks. Blends of this type are the industry's effort to come up with the "ideal" turf fertilizer and a competitive advantage in the marketplace.

Surprisingly, there is very little research information regarding the advantages of different combinations of

(Continued on page 21)

JACOBSEN. UP FRONT IN LIGHTWEIGHT FAIRWAY MOWING.

Introducing the all-new Jacobsen LF-100, the 5-gang designed to increase your lightweight mowing productivity.

The wing mowers are up front for better visibility. So the operator can hold a closer line—even at mowing speeds over 5 mph—to take full advantage of the 100" cutting width. This unique, up-front configuration also gives better access to all mowing units to quickly empty catchers and make mower adjustments easy.

Heavy-duty reels deliver a greens-like cut. New heavy-duty reel construction provides extra strength for long life in demanding fairway conditions. The fully floating, 22-inch steerable 7-blade reels are heavier, to follow ground contours closely, for that smooth, consistent Jacobsen cut that's the envy of the industry.

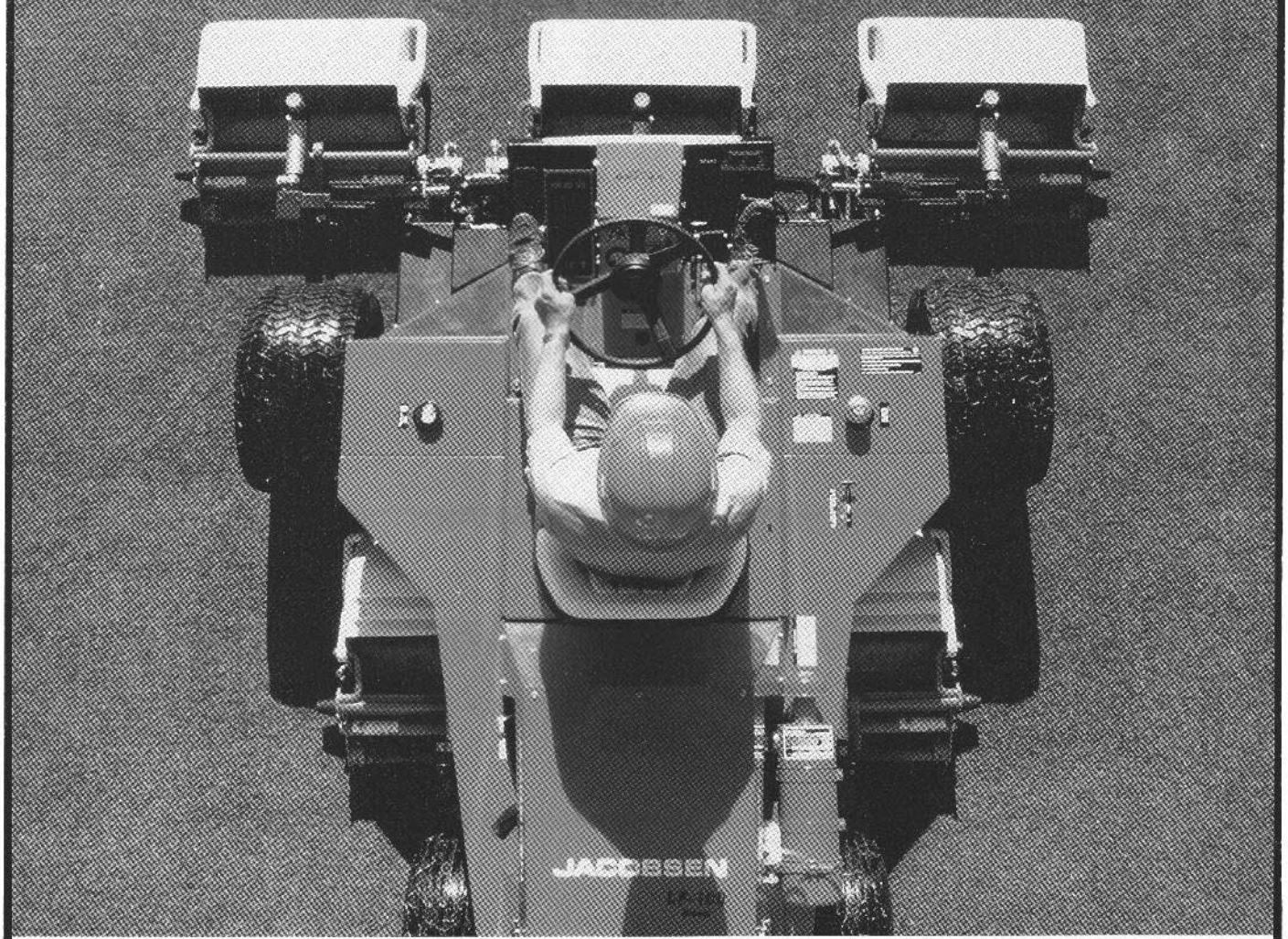
True lightweight mowing. Newly designed low-profile turf tires produce the lightest ground pressure, and the rear wheels roll on a different track than the front, so your tender turf thrives with less compaction. And the wide 4-wheel stance offers excellent traction, increased stability and a tight turning radius.

Built to last. The LF-100 has a proven, rugged chassis, a durable and simple hydraulic system and liquid-cooled diesel engine for a longer, trouble-free life on your fairways.

What's more, the entire machine is backed by your Jacobsen distributor, so you're never far from dependable parts and service support.

See all the LF-100 differences. Ask your Jacobsen distributor for a free demonstration. Attractive lease and finance plans available. Or contact: Jacobsen, 1721 Packard Ave., Racine, WI 53403.

JACOBSEN
TEXTRON
Jacobsen Division of Textron Inc.



WISCONSIN TURF EQUIPMENT CORP.

★ ★ TWO LOCATIONS ★ ★

1917 W. Court
JANESVILLE, WI 53545
608-752-8766

21520 W. Greenfield Ave.
NEW BERLIN, WI 53151
414-544-6421