

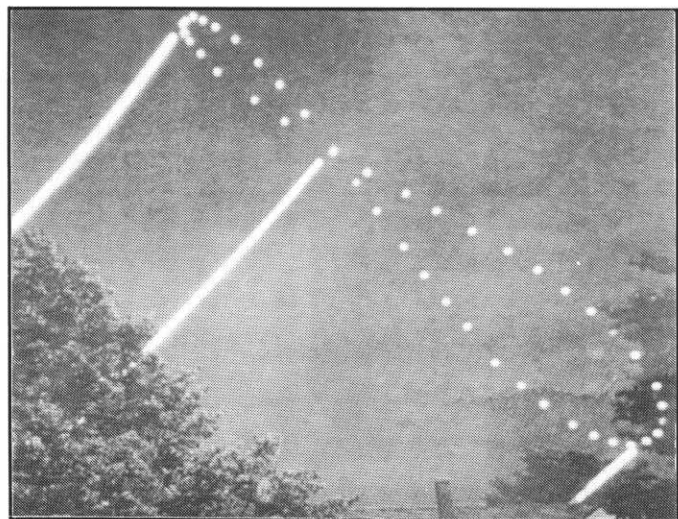
Ace in the Hole—

(Continued from Page 30)

addition to golf course needs.

Complex astronomic algorithms take into consideration all of the factors influencing sun position. These algorithms can output exact quadrants that can be translated into a position by a sun location instrument. A computer generates the sun's coordinates in one-minute increments for every day of the year for a given geographic location. These coordinates are computed on site and are recomputed for each individual course. The sun location equipment is then set up in the shadiest portion of the turf area in question. Coordinates for a chosen time and day are entered into the equipment, which then indicates the position of the sun. By inputting multiple dates and times, sunlight and shade patterns can then be computed for various periods throughout the year with equal accuracy.

Edgewood Valley Country Club (Wis.) had five greens and one tee deck where light was believed to be a limiting factor. Ron McCarthy, the club's superintendent, and a USGA consultant identified light as the limiting factor on these areas. Realizing that he needed hard data to make good recommendations, McCarthy hired ArborCom Technologies to do three major tasks.



This is a time-elapsd photo showing the sun's position throughout the year at 8:30 a.m. It demonstrates the need to take into consideration the sun's position during the growing season.

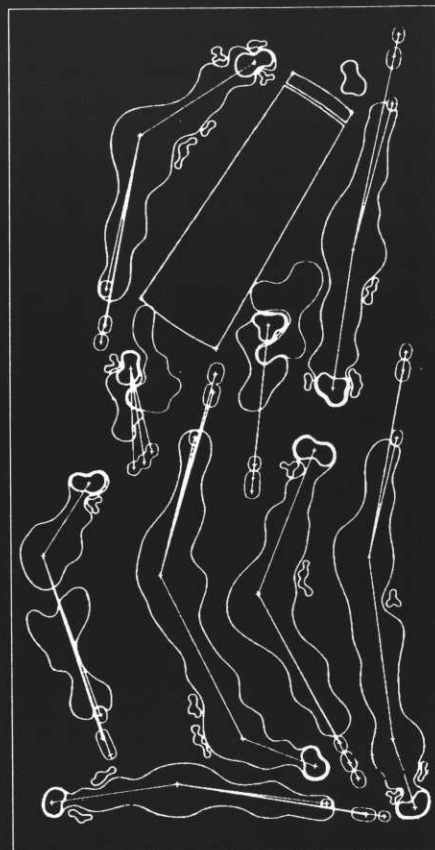
findings, using digital photos and charts, to the Green Committee so they could approve the removal or pruning of trees, as required, to get more light penetration.

As the one given the responsibility for insuring playable, quality turfgrass and visually pleasing surroundings, McCarthy faced huge communication challenges when he realized that there were certain trees bordering the greens that were blocking an enormous amount of light, yet adding little to the course strategically or aesthetically when it came to the light needs of the turfgrass. The main obstacle was, as is so often the case, a great reluctance to remove any trees, or parts thereof, along the golf course. People's affinity with trees is just so strong. Also making things difficult was having to potentially guess, albeit an "educated guess," which trees or limbs to remove. That reduced McCarthy's bargaining power with the Green Committee to the "not very convincing" level.

It was for these reasons Ron McCarthy decided to call in sun location consultants to utilize their technology to ascertain precisely how much and

(Continued on Page 32)

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Ace in the Hole—

(Continued from Page 31)

when light was reaching the trouble spots, thus enabling scientifically-backed recommendations for specific tree removal. Putting the challenges into perspective, McCarthy explained that easily fifty percent of the golfers are not low handicap golfers. As such, they are there to get out of the cities and enjoy the fresh environment of the outdoors. In particular, they enjoy all the trees. To touch the very thing that is attracting the golfers, the club's bread and butter, is really taboo. As such, the benefits gained have to far outweigh the perceived or realized cost to the trees.

Touching this point, McCarthy stated that the light penetration gained is "priceless" to the green. Edgewood spends upwards of \$35,000 annually on tree pruning.

ArborCom's recommendations help pinpoint exact needs when doing this pruning. When asked about the Green Committee's initial reaction to the recommendation of removing a number of trees, McCarthy stated that several members were shocked. Sensing this, McCarthy used ArborCom's findings to make a hole-by-hole, tree-by-tree "road map" of the actions needed. He used logical reasoning backed by hard, scientific data. He was able to quanti-

fy how much more sunlight would penetrate to the turf, thus making for a superior putting surface. The data enabled the committee to move from the "This guy's crazy!" reaction to one of more acceptance and finally agreement.

The recommendations were used to show where five particularly troubled greens would greatly benefit from increased light. On one particular hole, the course president stood alongside McCarthy and stated that three-quarters of the membership would never even realize any changes took place to the surrounding trees.

Ron stated that he was actually surprised at some of the trees that were blocking light. ArborCom's consultation demonstrated that some greens' sun windows were being adversely affected by trees two and even three hundred yards away! Again, scientific data proved far more convincing than an "educated guess" when it came time to make pruning recommendations. The scientific report helped McCarthy give the decision-makers of the golf course a working knowledge of the big picture. They started to see where the limited sun windows were and the importance of broadening those windows. It has opened the door for McCarthy to grow healthy, vigorous bentgrass.

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MGCSA BUSINESS OFFICE UPDATE

By Scott Turtinen
Executive Director

The 1998-99 MGCSA Directory will be printed in July. It is being printed later this year to better coincide with membership dues. Since we have sent out 49 job openings through March, we will be able to have a more updated and accurate roster. Please inform us at the business office if your address changes before July.

* * * *

1998-99 Dues Statements will be mailed in early May. They will be due on June 1, 1998. Research Donation Forms, usually sent along with dues statements, will be mailed in August.

* * * *

The 1998 Turf Tourney takes place the week of June 8-12. Money generated from this event goes into the MGCSA Research Fund. Over the years this money has funded many timely research projects which directly benefit all golf courses. The Research Fund also insures that specific problems are researched, and the Research Trust Fund that continues to grow will guarantee continued dollars into the future.

We have 16 courses and clubs participating this year. They are:

- Braemar Golf Course
- Dellwood Hills Country Club
- Edina Country Club
- Edinburgh USA
- Golden Valley Country Club
- Hillcrest Country Club
- Izaty's Golf & Yacht Club
- Mankato Golf Club
- Midland Hills Country Club
- North Oaks Golf Club
- Northland Country Club
- Southview Country Club
- Stillwater Country Club
- The Pines at Grand View Lodge
- Wayzata Country Club
- Woodhill Country Club

Please encourage your members to participate in this important research fundraiser for the MGCSA. Cost will be \$80 per person which includes green fee, cart, research donation and a tee prize. If you need entry forms, call the business office at (612) 473-0557 or toll free at 1-800-642-7227.

* * * *

If you are planning to send out a job opening, remember that you need to state the salary or wage. Also, the club

must pay membership dues to the MGCSA and GCSAA for Class A and B members who are hired. Clubs using the MGCSA job opening service also must be willing to pay expenses for educational seminars throughout the year.

* * * *

Thanks go out to our MGCSA Affiliate members for taking out 22 pages of advertising in this month's *Hole Notes* which created a 44-page April issue. Our affiliate members play a tremendous role in the strength of our association. Please support these vendors who generously support our association.

PROPOSED FOR BLAINE

MGA Supports National Youth Golf Center

The Minnesota Golf Association has received inquiries regarding its position with respect to the National Youth Golf Center being proposed for Blaine by the Minnesota Amateur Sports Commission.

The MGA supports the National Youth Golf Center because of its significant focus on junior golf. A resolution supporting the National Youth Golf Center was adopted by the MGA's Executive Committee in December 1997.

The mission of the MGA is to promote, preserve and foster the game of golf in the State of Minnesota. The promotion and expansion of junior golf is one of the MGA's core programs. The MGA believes the National Youth Golf Center will assist in furthering this goal.

Existing golf courses have done an excellent job of conducting and hosting junior golf programs, events and competitions. However, a facility such as the National Youth Golf Center is needed and will greatly enhance the opportunity to expand junior golf in the State of Minnesota. This facility would also allow the expansion of the type and number of junior golf events and competitions.

The Minnesota Amateur Sports Commission has invited the MGA and the Minnesota Section of the PGA to assist in the design of the golf courses and practice facilities to assure they are consistent and appropriate for junior golf. The MASC has also invited the MGA and the Minnesota Section of the PGA to assist in the development and implementation of the junior golf programs, events and competition. The MGA and the Minnesota Section of the PGA have accepted this invite.

Applications For MGCSA Legacy Awards And MGCSA Scholarship Awards Are Available at the MGCSA Office

The MGCSA Legacy Awards offer educational aid to the children and grandchildren of Class AA, A, B, C, D and Affiliate MGCSA members who have been an active members. Questions regarding the scholarship program should be directed to the MGCSA Scholarship Committee at (612) 473-0557.

Is Your Chemical Storage Area Up to Par for the '98 Season?

By **BILL KEEGAN** and **DAVE BROWN**
SECOR International Incorporated

Over the years there has been an increase of allocated governmental funding to develop and enforce environmental rules and regulations. Because golf courses handle many chemicals and substances having hazardous properties, including those that are toxic, flammable, reactive and corrosive, they are one of these regulated industries.

The owner or operator of the facility is responsible for complying with all applicable requirements of federal, state and local regulations. Often, state and local governments develop regulations that are more stringent than federal requirements. These diverse and occasionally overlapping regulations often result in the golf course owners/operators finding themselves overwhelmed and confused on where to begin.

The golf course maintenance area is where contamination of soil, surface water and groundwater is most likely to occur. Day-to-day maintenance operations include activities such as pesticide mixing and loading and equipment maintenance. The maintenance area stores a wide range of hazardous materials such as pesticides, fertilizers, fuel and solvents. Contamination can occur when hazardous materi-

als are spilled, containers leak and rinsewater from containers and equipment cleaning is not properly disposed. The best way to avoid contamination is to implement good management practices.

One of the most common environmental violations for a golf course maintenance area is the improper storage and management of pesticides, fertilizers, solvents and degreasers. In order to minimize the liability and expense typically associated with these areas the following items should be addressed:

Best Management Practices For Pesticide Storage Areas

- Lockable concrete or metal building;
- Located 50 feet from other structures;
- Shelving should be metal or plastic;
- Flooring constructed of an impermeable material (concrete or steel), sealed with a chemical resistant paint, a continuous sill and sloped toward a sump area;
- Automatic exhaust fans;
- Emergency shower/eyewash station and personal protective equipment immediately outside of the storage area;
- Explosion proof lighting;
- Flammable pesticides stored apart from non-flammable pesticides, and
- Warning signs on building and fence.

Best Management Practices for Solvents And Degreaser Storage Areas

- Flammable and toxic hazard employee training;
- Kept away from ignition sources;
- Adequate ventilation;
- Bermed, impermeable floors;
- Emergency equipment easily accessible;
- Kept away from pesticides and fertilizers;
- Should be used over a collection basin;
- Collected material recycled or properly disposed;
- Drums labeled with content and collection date, and
- Solvents prevented from draining into pavement or soil.


Best Management Practices For Fertilizer Storage Areas

- Stored separately from solvents, fuels and pesticides;
- Secondary containment;
- Kept away from water sources;
- Spills cleaned up immediately, and
- Excess or spilled material should be applied.

Best Management Practices for Used Oil, Antifreeze, Lead Acid Batteries

- Recycle;
- Or dispose of as hazardous waste.

Proper management of hazardous chemicals is an important part of responsible pesticide and chemical use. Improper management practices can lead to serious legal liabilities, regulatory penalties and poor public image. By addressing these issues before your season gets into full swing, you will limit the potential environmental and financial liabilities that can land your course in the bunker!



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7-1351-472	Green Pro 12-3-8 # Fe Fairway	40-50# Bags	\$ 16.25	\$ 650.00
7-1353-472	Green Pro 12-2-6 # Fe Fairway	40-50# Bags	\$ 11.50	\$ 460.00

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VINTAGE PHOTO FROM 1954



Gill Foster, Keller Golf Course, putts while Maynard Erickson (far left) and Irwin Fuller, Sr., cheer him on. Maynard Erickson was superintendent at Theodore Wirth Golf and Irwin Fuller, Sr. was at Mankato Country Club.

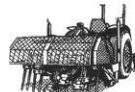
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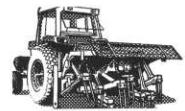
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205 Model -
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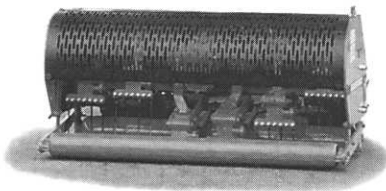


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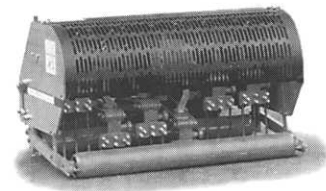


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Microbes

*Next to the Grounds Crew,
Microbes May Be the Hardest Workers on the Golf Course.
Would Adding to Their Numbers Be Advantageous?*

By **RICK GABLER**
Florantine Products

Microbes have been around the earth much longer than man, and by most accounts, will be around much longer after man is gone. The complexity of organisms within the soil environment is so wide that even the experts can only speculate at their numbers. By some estimates, no more than 5% have been identified. They have grown and evolved for millions of years. Microbes can survive or repopulate in almost any environment, it seems the only setbacks in the last couple millenniums were the winters of '96 and '97.

To better understand this little guy, let's go over some of the basics of soil microorganisms in a golf course environment. We will simplify some of the information to try to get the important facts out.

Soil Contains 5 Major Groups Of Microorganisms

- Bacteria
- Actinomycetes
- Fungi
- Algae
- Protozoa

We will focus on the bacteria groups (I will call microbes) as they are the workhorse and the most abundant group in the soil (usually more than the other four groups combined). Research indicates that select bacteria strains, either alone or in combination, can accomplish the same tasks in the soil as the other groups.

Three Major Categories Of Microbes

1) **Aerobes.** Aerobes must have oxygen. The good guys in nutrient conversion for plants.

2) **Anaerobes.** Anaerobes flourish only in the absence of oxygen. The bad guys that help in the black layer formation.

3) **Facultative Anaerobes.** Can thrive either in the presence or absence of oxygen.

Microbes Can Have Two Distinct Stages in Life

1) **Vegetative.** Vegetative microbes are alive and reproducing. They are susceptible to dying due to large changes in their environment, i.e., lack of food/oxygen, low/high temp or no moisture. Sunlight exposure can be deadly.

2) **Spore.** The microbes are enclosed in a protective sac in a hibernating state. The sac protects them from large extremes in their environment and can last for extremely long periods of time. When the environmental conditions

(Continued on Page 38)



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Microbes—

(Continued from Page 37)

are right, the microbes will emerge from their sacs and become vegetative, (i.e. functional).

Many Factors Affect Microbial Growth, Proliferation and Functional Activity

- Carbon Source (organics)
- Mineral Nutrients
- Soil Base Saturation
- Moisture
- Temperature
- Atmospheric Composition (gas)
- Sunlight
- pH
- Genetics of the Microorganisms
- Interactions between Different Species

To this we add a human/golf factor:

- Application of Fungicides and Synthetic Fertilizers
- Compaction
- Low Cut Turf
- Sandy Soils

Knowing how to deal with these factors is critical for effective green management. Grass and microbes help each other thrive. Through photosynthesis, the plant produces carbohydrates to feed itself and then can use up to a 1/4 of those produced carbs to be exuded out the roots and into the root zone to attract microbes. These carbs are a source of food for the microbes. The microbes then break down the organic matter dropped by the plant and convert it over to proteins and amino acids. They also convert elements in the root zone that the plant uses as a food source. Under a healthy microbial population environment the plant would not have to expend energy to entice more microbes to the root zone. It can then store those extra carbs for stressful times.

This natural relationship works very good until, as with a putting green, environmental factors become imbalanced. Note that almost all of the primary factors that affect microbial growth (as listed) have been altered in a golf course green. Once the beneficial microbes diminish, the root zone can repopulate with organisms that can be detrimental to plant growth and health. Many of these new organisms can cause disease. We then apply a fungicide to kill the disease pathogen. Unfortunately, even more beneficial microbes are also killed during this process. At its worst, we are setting up for a vicious cycle of fungicide applications. This cycle, over a period of time, is what enables the disease pathogens to build up a tolerance to certain fungicides.

Like all technologically-driven industries, the advancement of new products is moving at a fast pace. As you may know, microbial products are the golf course maintenance "HOT" new product.

Universities and commercial microbiologists have learned and developed technology on how to **isolate and culture natural occurring select strains of the ben-**

eficial microbes. Their biggest challenge was getting the microbes from the laboratory and into real world field applications and having the new microbes survive in their new environment in the soil. To overcome this obstacle, scientists basically would take these select strains and submit them to different extremes. They would then remove the microbes that survived. These microbes of course were the strongest and had a very good chance of surviving in a soil profile over a wide variety of conditions.

One of the reasons early field applications of the *microbial only* products didn't work well was because there was little if any food source and a poor environment for the new microbes. Not surprisingly, since it was this fact that made the original micros diminish in the first place. Funny how Mother Nature keeps pointing us back to the basics.

Microbial treatments for turf are packaged and delivered in two ways: Some companies manufacture the microbes on site and dispense them through the irrigation system mainly at night. This had to be done during darkness due to the fact the bacteria were injected in a vegetative state (active) and sunlight would damage them. A great deal of care is required to keep the system free of contaminants. This type of delivery requires a somewhat constant input of the microbes to the target areas.

Finding the right solutions and carriers were the breakthrough for being able to apply and deliver microbes at any time. In this manner the selective microbes are aseptically (desired microbe only) grown and the majority are held in a spore (hibernative) condition. They are applied with a food source (available carbon) and nutrients to help them sustain life and grow into the root zone after they enter the turfgrass soil profile and transform to the vegetative state. Because these microbes are surrounded by a food source going into the new soil environment, they have a very good chance for survival.

There is so much more to be learned and proven in soil microbiology in the years to come. There are many different kinds of bacteria that a manufacturer could use in its microbial product. If the painstakingly steps of growing aseptically cultured bacteria are not taken, there is the possibility of having that many unwanted guests.

Microbiologists have long known the specific functions of different bacteria strains. Couldn't we be highly selective and isolate and cultivate bacteria to perform very specific functions? For example, sulfide reduction for black-layer, algae control or disease control. Though the science is still young, products that can contribute to such beneficial results are available today. And the possibilities beyond this are enormous.

We have only touched what goes on under our feet and how and why these new microbial products have emerged. Can these new microbial products be a cure-all? Absolutely not. Can they be another tool in your box to work together with your other proven cultural practices to help you in your turfgrass management? It would seem so, but only you can truly answer that. However, if these little creatures could lessen the stress on your turfgrass, wouldn't they, in fact, be doing the same for you?

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