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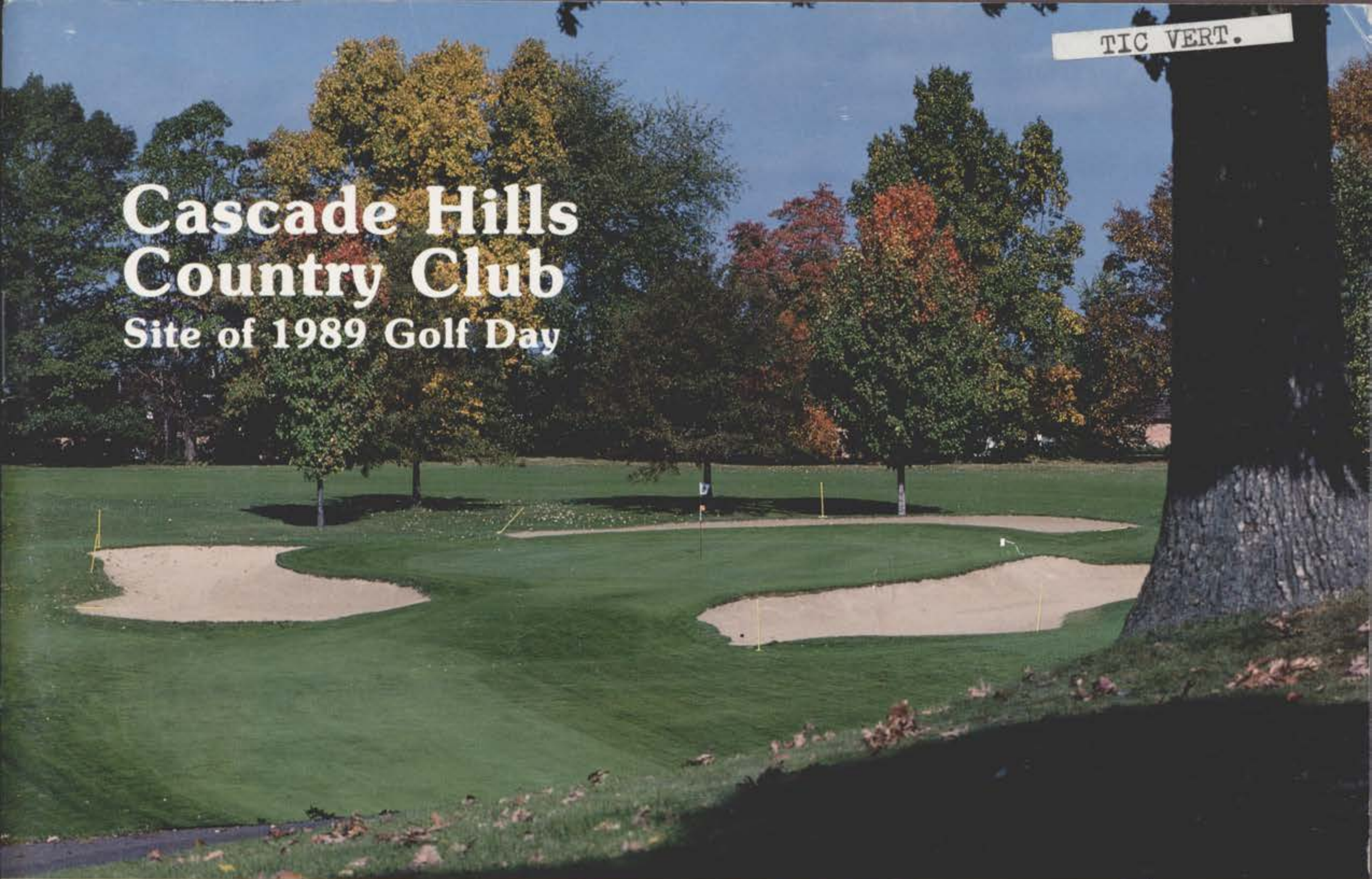

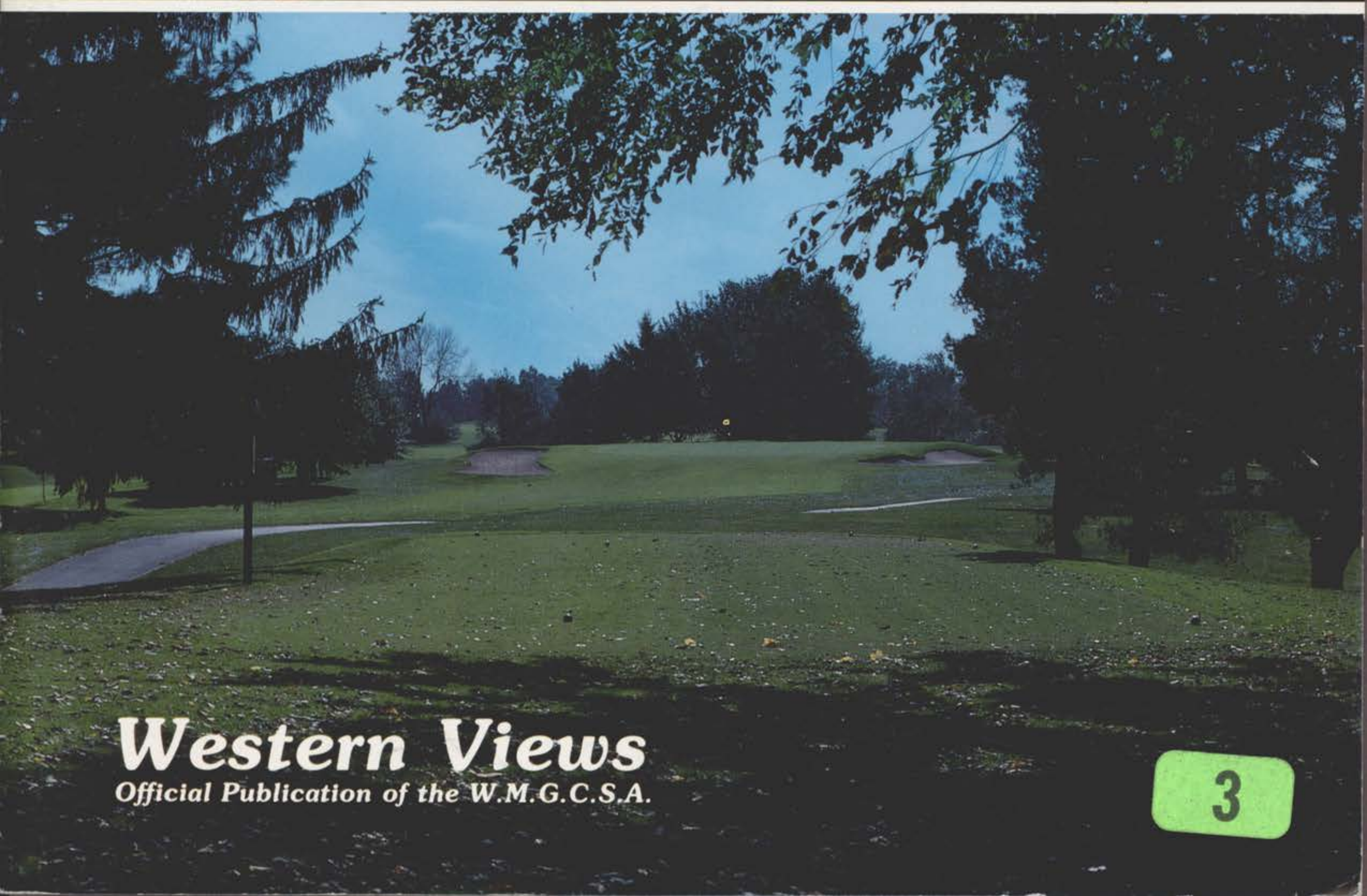

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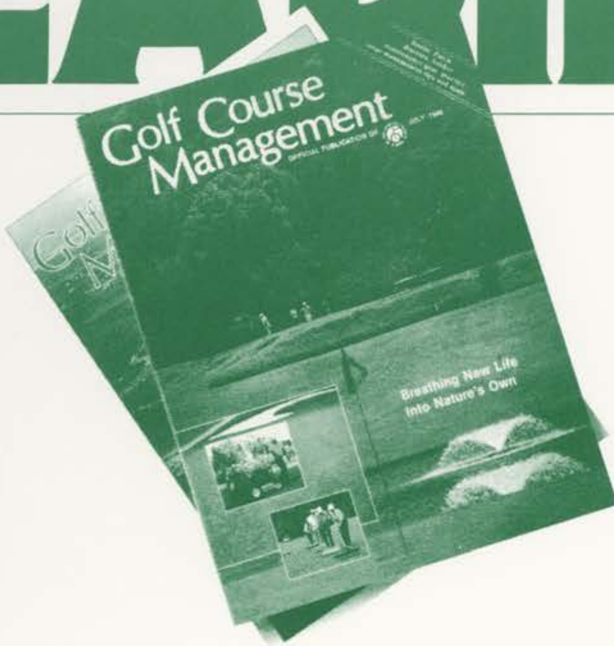

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PRESIDENT'S MESSAGE
Roger Barton

Tim Dark did a very nice job with the August meeting at Marywood Country Club. I would like to thank him and the Club for hosting the meeting. We had a very nice day. The golf course was in great shape. We played golf in the morning, and the afternoon was spent by the pool with a great steak fry. Thanks again Tim.

Our next meeting is at Spring Lake Country Club. Paul Richter will be our host. This is our annual meeting, so let's try to attend and have some fun.
We were unable to complete plans for a July 23rd picnic with families, so this year it was in combination with our August meeting at Marywood Country Club.
Everyone have fun with your fall projects, and I will see you at the September and October meetings.

Sincerely,

Roger Barton
Blythefield Country Club

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The Golf Course Superintendents Association of America (GCSAA) will break ground in early 1990 to begin construction of a $4 million headquarters complex one mile from the group's current Lawrence, Kansas, site. GCSAA President Dennis D. Lyon, CGCS, said that the association's officers approved schematic plans for the project during a meeting at the U.S. Open in Rochester, N.Y.

"GCSAA's growth has mirrored that of the rest of the golf industry," Lyon said. "We now have more than 8,600 members and the association offers more services to them than ever before. This new building will allow us to keep meeting the needs of our growing membership and the golf community at large."

The new site is just west of the current GCSSA building, which has been located on the Alvamar Golf and Country Club since the association moved to Lawrence in 1974. Despite the relocation, the new headquaters will still overlook an Alvamar course: a new 18 hole championship layout being designed by architect Ken Kavanaugh and developed by Alvamar owner Robert Billings. Construction of the course is set to start early next year and both building and course should be complete and open in 1991.

"We plan to have the building finished and the staff moved by summer of 1991," said John M. Schilling, GCSAA's executive director. Schilling added that the building could be ready for occupancy by spring of 1991, "if the Kansas weather cooperates."

Planned for 35,000 square feet, the new building will nearly triple the space available for GCSAA's 42-member professional staff and still leave room for project growth. In addition to the four story headquarters building, the new complex will feature an attached 70 seat classroom and meeting facility. The entire design, which is being completed by the Lawrence architectural firm of Peters, Kubota and Glenn, P.A., will "make superintendents who visit feel proud to be a member of GCSAA," according to Lyon.

Since 1926, GCSAA has been the national professional association for the men and women who "keep golf green." By providing a wide range of opportunities for education and professional development for superintendents, the association has played an ongoing role in improving golf conditions both in America and abroad.

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GOLF COURSES AS COMMUNITY ASSETS

FINDINGS:

Of all the kinds of development that can occur in a community, a golf course is possibly the most desirable. As part of an important nationwide recreational indsutry, a golf course confers many direct and indirect economic benefits. In addition, a golf course may be the only kind of development which immediately improves the environmental health of a community.

GOLF AND THE ECONOMY:

A study sponsored by the National Golf Foundation shows there are 20 million Americans who play golf and that some $20 billion is spent on golf every year. In addition, golf course maintenance is a $3.5 billion a year industry which employs 60,000 to 140,000 workers and supports many industries that supply golf courses with equipment, materials, and service.

Currently, the number of Americans playing golf is increasing 2 - 3 percent per year, three times as fast as general population growth. Unlike sports such as professional football and basketball, however, most of the money spent on golf is spent by participants, not spectators. Golf is thus a truly democratic sport that can be played by persons of all ages.

In 1986, 20.2 million U.S. golfers played 421 million rounds of golf. At the present rate of increase in participation, there could be as many as 41 million persons playing golf by the end of the century. Under one reasonable scenario, golf could be a $31 billion industry by the year 2000. In fact, the current 12,400 golf courses will be overwhelmed by the demand, and we may be 4,000 courses short of the projected demand in another decade. This could lead to severe overcrowding and deterioration in current facilities unless more courses are built.

GOLF AND THE COMMUNITY:

Fortunately, golf courses are an asset to any community and are superior in many ways to almost any other type of development. Experience has shown public golf courses can be built that will yield an adequate return on investment without the use of public funds. Golf courses provide a sanctuary for many kind of bird and animal life, reduce air pollution and, of course, provide a valuable recreational resource to the community. Golf courses increase the community's tax base and help raise millions of dollars for charity every year. Especially for those over 50, golf can be a significant source of exercise. Since golf courses often allow strollers, joggers, and cyclists to use their grounds, a golf course can contribute in many ways to the health of your community.

GOLF COURSES AND THE ENVIORNMENT:

In contrast to many kinds of commercial development,

(Continued on Page 7)

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 (Continued from Page 5)

it is easy for golf courses to fit in and harmonize with the natural environment. Golf is a "green" business and golf courses function as valuable green belts, producing pure oxygen and cooling the air. Because a typical golf course can provide seven times as much groundwater recharge as it uses for irrigation purposes, a golf course is actually a net water supplier. Golf courses help conserve valuable land by reducing soil erosion. Numerous golf courses have been built on old waste landfills, further conserving the earth's resources.

As noted earlier, golf courses can provide an oasis for plant and animal life. Golf course developers and environmentalists have worked together to preserve endangered species when their habitat has been threatened. Increasingly, golf courses are being designed with natural rough and wild areas in order to further harmonize with the environment and reduce water and pesticide use.

CONCLUSION:

Golf is the oldest organized sport in the world and surely one of the most popular. It is a truly democratic, participatory sport as most of its players are ordinary duffers, not paid professionals. The golf courses on which they play are an asset to any community. In addition to their obvious economic benefits, golf courses have many environmental advantages. They can recycle waste land and water, cleanse the air of harmful pollutants, reduce soil erosion, and generally contribute to a healthful atmosphere.

GOLF COURSE IMPACT ON WATER QUALITY

FINDING:

Golf courses do not pose a significant pollution threat to the nation's water supplies. This conclusion is based on a review of the scientific evidence that is currently available. Neither groundwater nor surface water is threatened by golf course runoff. Further studies show that stormwater runoff is near zero from golf courses.

GROUNDWATER:

About half of all people in the United States depend on groundwater for their drinking water, and the figure is 90 percent in rural areas. Results from ongoing scientific studies show that the use of pesticides on golf courses does not threaten public drinking water. Because of the low mobility and quick biodegradation of most golf course pesticides, they simply do not reach groundwater in significant quantities.

One environmental Protection Agency-funded study being undertaken on Cape Cod in Massachusetts provides for a "worst-case" estimate of groundwater contamination. To date, test results have been encouraging, demonstrating that golf courses and clean groundwater do coexist.

Some experts argue that golf turf offers uniquely favorable control mechanisms to prevent groundwater contamination. Dr. Stuart Z. Cohen, a former Ground Water Team Leader for the EPA in Washington, notes that

(Continued on Page 9)

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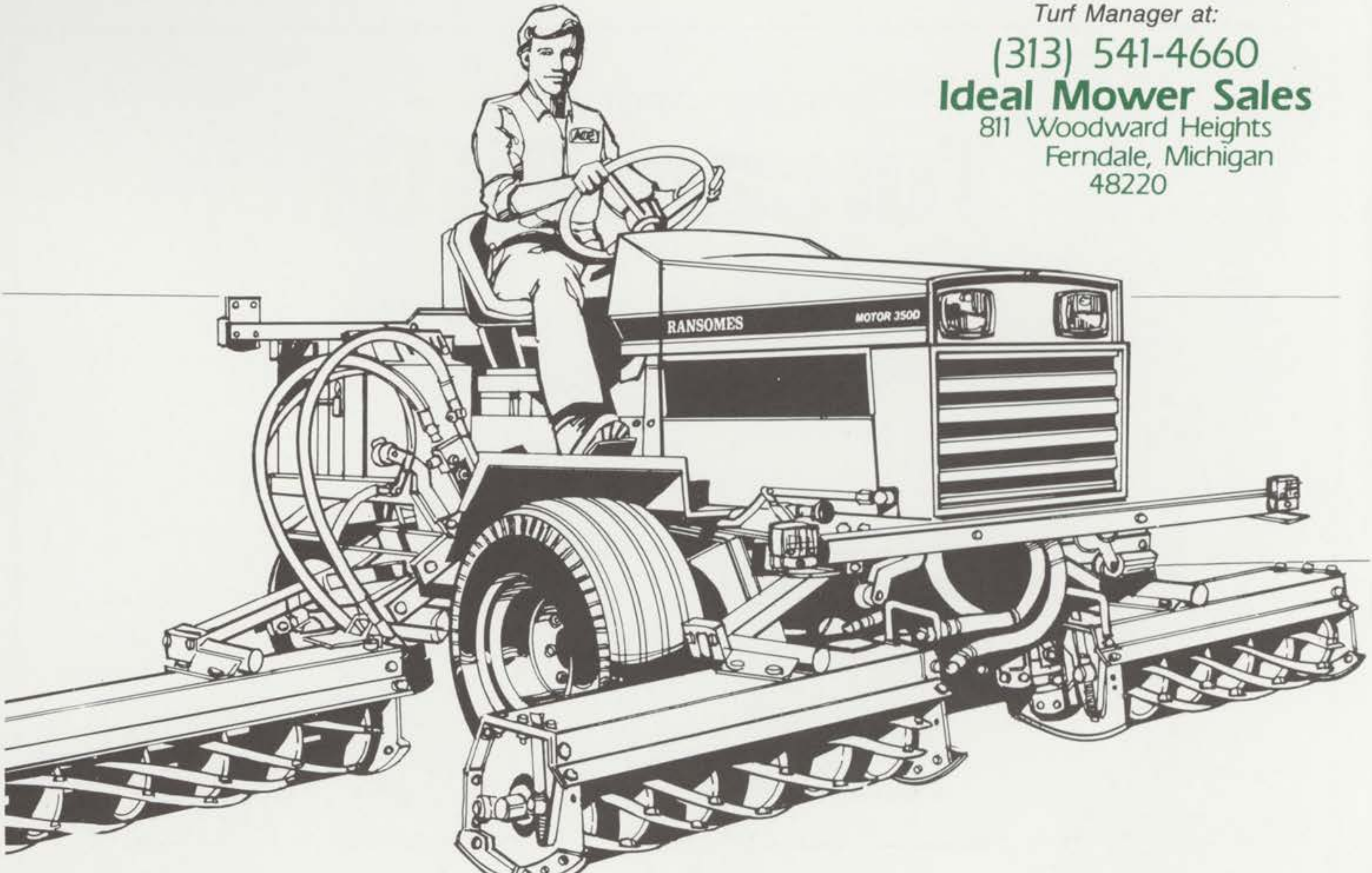

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GCSAA REPORTS

(Continued from Page 7)

"the use of pesticides on golf courses poses less of a threat to the nation's groundwater than does the agricultural use of pesticides.

Additionally, turfgrass provides a "thatch layer" not found in row crop situations. Thatch binds up pesticide residues and increases degradation of some chemicals. Dr. Harry D. Niemczyk of Ohio State University has found that as much as 99% of recovered pesticides are found in turfgrass thatch.

In some areas golf courses are also helping to mitigate the groundwater pollution effects of hazardous waste sites. Many of the nation's golf courses fertilize soil using sludge compost mixes prepared by urban waste recycling programs. These sludges might other wise be disposed of in municipal land fills. Thus, potential groundwater leaching from dumpsites is averted by careful community planning and recycling.

STORMWATER RUNOFF:

Stormwater runoff from golf courses is not a significant environmental hazard. Research conducted by Dr. Thomas Watschke, a turfgrass specialist at the Pennsylvania State University, indicates that thick, healthy turf reduces runoff "to next to nothing."

An average golf course of 150 acres effortlessly absorbs 12 million gallons of water during a three-inch rainfall. Dr. Watschke finds that thick, carefully managed turfgrass has 15 times less runoff than does a lower quality lawn. As a result, almost all of the pesticides applied to the grass remain in place after peak rainfall.

Dr. Richard J. Cooper of the University of Massachusetts argues that turfgrass cover "reduces soil erosion and prevents soil and chemical runoff into water sources.

By comparison, parking lots, streets and even residential areas load nearby waters with hazardous pollutants carried in runoff from road surfaces, gutters and catch basins.

SURFACE WATER:

Golf courses help decrease sedimentation pollution of rivers, streams and lakes by preserving topsoil erosion. The major polluter of U.S. surface water is sedimentation from soil erosion. However, turfgrass reduces erosion, as compared to alternative land uses.

For instance, studies show that grassland experiences 84 to 668 times less erosion than areas planted with wheat or corn. Construction has an even more devastating impact on topsoil, so golf courses can greatly reduce erosion effects as compared to other land users, like shopping malls or housing developments.

Sedimentation from soil erosion costs society billions of dollars in increased transportation, shipping, and cleaning costs. Thus, by preventing soil erosion, golf courses serve a very beneficial societal purpose.

CONCLUSIONS:

Golf courses do not threaten the nation's water supplies. Scientific studies show that pesticides used on golf courses do not seep into neighboring groundwater sources. Other studies demonstrate that stormwater runoff is greatly reduced by turfgrass. Finally, still more studies show that grassy areas reduce soil erosion, which is a major cause of sedimentation pollution in the nation's rivers, lakes and streams.

On the whole, a golf course makes an environmentally sound contribution to any community.

INTEGRATED PEST MANAGEMENT AND THE GOLF COURSE

FINDINGS:

Golf courses are increasingly using Integrated Pest Management (IPM) to control pests through a variety of carefully planned methods. This trend will increase in order to meet industry concerns over reliance on chemical pest control strategies. IPM has proven effective in a variety of contexts and represents an environmentally sound means by which golf course superintendents can harmonize course requirements with nature.

DEFINITION OF IPM:

According to Dr. Victor A. Gibeault of the University of California at Riverside, "IPM is defined as multiple tactics used in a compatible manner in order to maintain pest populations below levels that cause ecomonic or unacceptable aesthetic injury without posing a hazard to humans, domestic animals, or to other nontarget life forms. Integrated means that a broad interdisciplinary approach is taken, using scientific principles of plant protection, to fuse into a single system, a variety of management strategies and tactics."

Fulfilling this definition requires the pest manager to establish measurable tolerance levels for pest populations, monitor turf areas for pest incidence, maintain accurate records of monitoring data and select appropriate actions in response to changing pest populations.

The range of tactics available in an IPM system include the following:

- ***Regulatory:** Quarantines, seed certification, pesticide laws;
- ***Physical:** Trapping, screening, hand destruction, harassment;
- ***Chemicals:** Attractants, repellents, sterilants, growth inhibitors, soaps, synthetic pesticides;
- ***Cultural:** Water management, sanitation, aerification, thatch control, fertilization, mowing height;
- ***Biological:** Use of resistant varieties, natural enemies, propagation of pest diseases/parasites, release of sterile pests.

In addition to these control strategies, construction techniques which utilize proper drainage, birming, plant selection and so forth are important contributors to effective IPM.

One of the objectives of IPM is to use chemicals only when necessary, but it is a misconception that IPM programs always replace chemical control. Rather, IPM en-

(Continued on Page 11)

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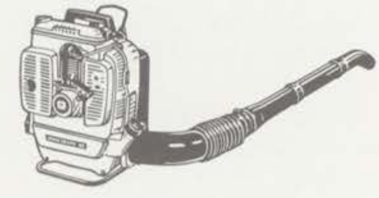

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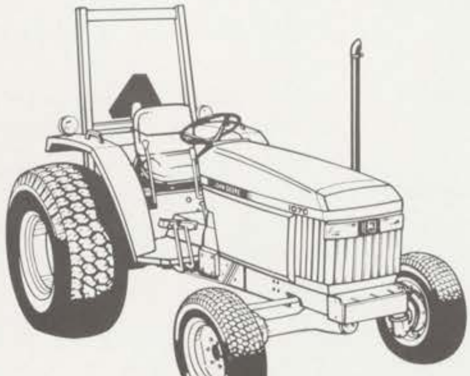

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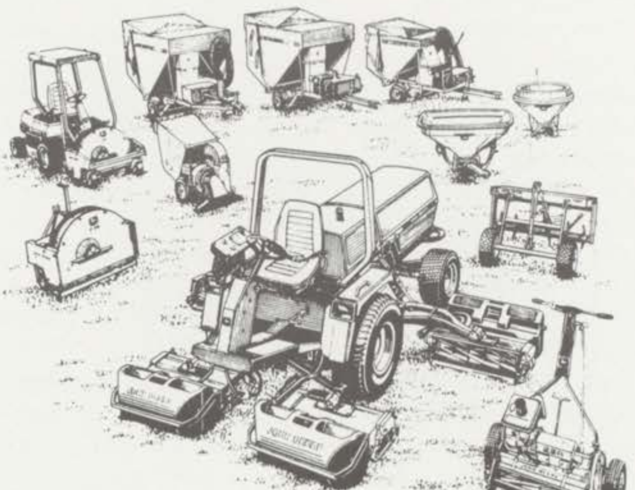

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 (Continued from Page 9)

courages the pest manager to use chemicals wisely, which can mean less often.

EFFECTIVENESS OF IPM:

IPM has proven effective in a wide variety of contexts. In a study of tree care reported by Dr. Michael J. Raupp an entomologist at the University of Maryland, pesticide use was reduced by more than 90% when IPM was utilized. Dr. Don Short, extension entomologist at the Uniersity of Florida, recently reported that in a three-year study in south and central Florida, spot treatment with pesticides and weekly monitoring of the turf resulted in good control of chinch bugs and webworms. "This is primarily due to the fact that we are not killing off beneficial organisms that may be providing more control than pesticides," Dr. Short concluded. As Christine Casey, an IPM agent notes: "Landscaped IPM programs have shown great potential having reduced pesticide usage up to 70% while improving plant quality. When monitoring costs are included, this corresponds to a cost reduction of 20%-30%.

An IPM plan that could serve as a model for other courses was recently adopted by Sherman Hollow Golf Course in Vermont after negotiations between the Sherman Hollow management and the Environmental Protection Agency. The plan provides for the monitoring of the course by a turfgrass expert, the limited use of chemicals when necessary, and the keeping of precise records.

Another IPM method that has proven effective is the use of pests to control pests - biological agents that attack pests and that are more effective than chemical agents. This method can be as simple as building bird houses on golf courses that will attract insect-eating bird species. Computers are also being used at a number of golf courses to monitor pests, predict future infestations, and arrive at balanced solutions to pest problems.

ROLE OF GCSAA:

In addition to the training required under federal and state laws, GCSAA sponsors an extensive education porgram to assure that professional golf course superintendents are well-trained in safe pesticide application techniques. While these techniques have not always been understood as part of an IPM approach, many existing practices are easily assimilated within IPM.

GCSAA supports IPM at another level through funding for basic research on turfgrass. The joint USGA/GCSAA research project on turfgrass stress is designed to develop hardier plant materials capable of withstanding pests and stresses with lesser maintenance.

CONCLUSION:

Golf courses increasingly are relying upon IPM in their operations. In fact, many IPM techniques have been used for years without explicitly being labeled IPM. Integrated Pest Management is a proven method that can help minimize reliance on chemicals while effectively controlling harmful plant and animal pests.

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While speaking on the telephone recently with a good friend and superintendent, an interesting observation popped into my head: probably 90% of all conversations I have with other superintendents involves politics rather than the technical aspects of our profession. Even when the original purpose of a call was of a technical nature, nearly every conversation seems to include the latest example of some superintendent's political problems-often our own.

The various educational paths taken by superintendents make this observation particularly relevant. As far as I know, none of the golf course or turf schools offers any courses which help prepare the prospective superintendent for the reality of dealing with a greens committee or any other form of management. Few even touch on basic employee/employer relations.

The training one receives is technical in nature, as well it should be, given the diversity and depth of the field. No one prepares the superintendent for the reality that he is more likely to be fired because he doesn't get along with the green committee chairman than for any deficiency in his technical expertise.

Qualified superintendents are being run out of the business. Young superintendents, especially, are chewed up and spit out like bubblegum, all because they haven't learned the fine art of dealing with people.

It's a darn shame because many clubs end up hiring an unqualified person or a crook or sometimes both. Time and time again I have seen a smooth talker get a superintendent's position because the club was so impressed that his credentials, if they were checked out at all - became secondary in importance.

Because of tremendous growth of golf and the proliferation of courses, this scenario will probably continue for many years. The demand for qualified superintendents will exceed the supply unless enrollment dramatically increases at the turf schools or new programs are started in new locations.

While on the subject, I would like to make it clear that graduation from an accredited golf course operation or turf school does not a qualified superintendent make - far from it. The technical training a prospective superintendent receives is just the cornerstone of his or her qualifications to hold such a position. Before even attempting the duties of a superintendent, most graduates serve a two to four year apprenticeship as an assistant superintendent.

If the apprentice is lucky, he will discover at this time the intricacies of political gamesmanship before it costs him a job and smudges his reputation. As a matter of fact, the assistant is often the beneficiary of a political action, replacing the superintendent who hires him.

I am not so naive as to think that other occupations don't have their share of politics, but I am alarmed at the overly significant role it plays in the success and security of the superintendent's profession, especially when little is done to prepare one for the reality.

Both the formal turf schools and the continuing education programs provided by the trade associations should recognize this deficiency and begin offering curricula to correct it.

CREDIT: Mark Jarell, West Palm Beach,FL

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New materials were added to the program from Alabama, California, Texas, Rhode Island, and Minnesota. Several tall seeded accessions were collected in Northern Minnesota.

Severe drought and heat conditions resulted in identification of stress tolerant strains of **Poa annua**and **Poa supina**. Summer dormancy mechanisms were observed in several materials in the field. All these materials were collected, increased and established in a new field space planting.

Replicated plantings of 8 selections were established at 18 golf courses located in 16 different states for evaluation. Progeny testing is being conducted for heritability for materials up to the 7th generation from when received. Seed dormancy of up to 3 months was found in some biotypes. Stolons of Poa annua and Poa supina maintained viability throughout 24 weeks of cold storage. Chlorophyll (green color) was maintained in the dark cold storage in Poa annua for 12 weeks.

Poa annua was separable from Poa supina and pedigree relationships were distinguishable in some crosses and selfs. Paper on stolon storage, electrophoresis, reproductive biology in poas, and chemical suppression of flowering to maintain pure stands were or will be presented at Society meetings. Experiments demonstrated that Poa annua and Poa supina are resistant to the grass herbicide Sethoxydin.

The "floral pic" technique for isolation and control of crossing performed equally well whether the carbon sources were sucrose or fructose sugar. Approximately 1,000 matings and seed collections were accomplished with the floral pic technique and analysis of resulting data is underway. Analysis of data indicates that, with some biotype, more than twice as much seed is produced from sib crossing as with selfs or crosses. This information is extremely important to developing a seed production system.

(Continued on Page 16)

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Only the rugged Jacobsen LF-100 combines high productivity and superior lightweight quality mowing to give you tournament-quality fairways day-in and day-out.

The wide 100" cutting width, unique up-front reel configuration and mowing speeds of over 5 mph deliver increased productivity for more economical lightweight mowing.

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A common problem with the lighter greens-mowing reels competitors use is their tendency to rise up in heavy thatch, giving the fairway a "wavy" look. But the heavy-section Jacobsen reels are specially designed to hug the turf. Combine that with our fully floating, steerable reels and you get smooth, flawless fairways with the LF-100 that are the envy of the industry.

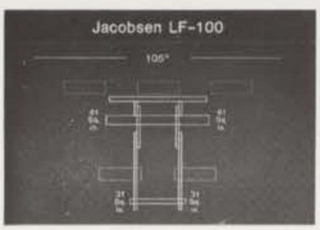
The weight of the LF-100 is evenly distributed over four low ground pressure tires. Plus, each tire rolls on a separate track, for the lowest compaction possible and less marking . . . to make sure a greens-like cut is all the LF-100 leaves behind.

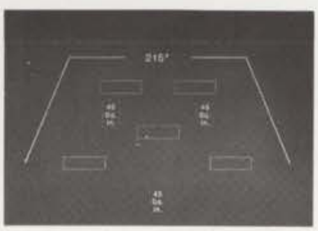
What's more, the LF-100 stands alone on steep, hard-to-cut fairways. Its low-profile, four-wheel, wide track stance provides exceptional stability and traction. And our new "on-demand" 4-wheel-drive option helps the LF-100 climb hills where others give up—without the turf-damaging wheel spin and slippage competitive units can produce.

The operator can go from 2-wheel-drive to 4-wheel-drive and back, "on-the-go." For confident braking even on slopes, the

Up-front wing reels and four-wheel design deliver increased mowing efficiency.

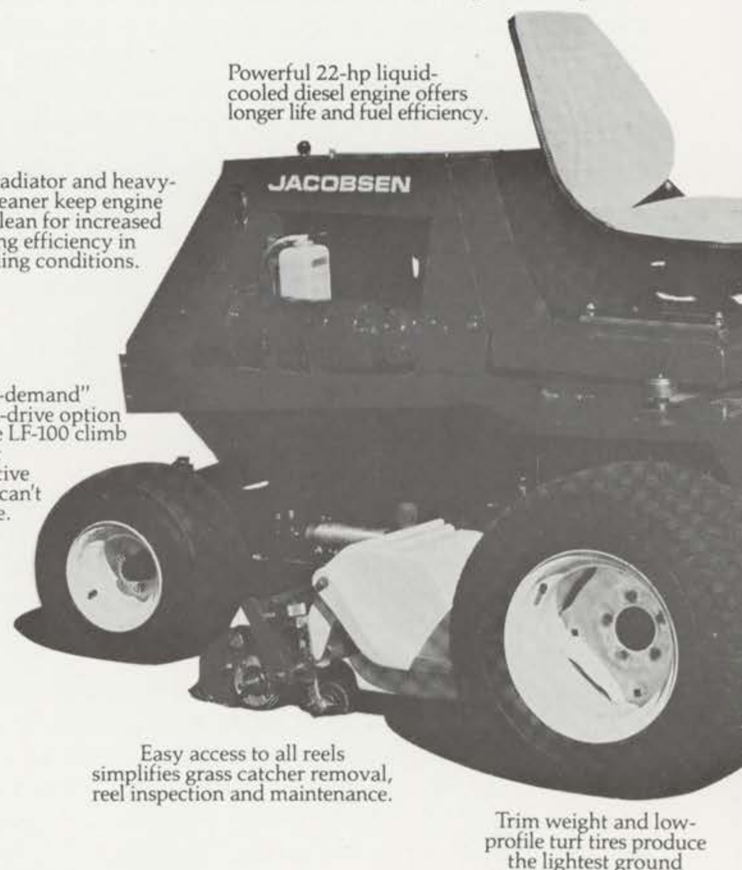
Unlike competitive mowers, the LF-100 has the outer reels up front for better operator visibility. This allows the operator to see the trimming edge without looking back over their shoulder, away from the mowing path. The end result—a closer, cleaner mowing line for maximum productivity.





This unique configuration also provides a shorter uncut circle of grass on turns and better access to all grass catchers, so there's less time wasted when emptying them.

The wide, low-profile configuration delivers better traction and stability on slopes for more efficient mowing with less turf damage due to wheel spin and slippage.



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LF-100 comes equipped with powerful drum brakes.

As nimble as it is productive, the LF-100 features "on-the-go" pedal-operated reel lift to cross-cut fairways more efficiently.

Also, a tight turning radius and power steering provide extra maneuverability and improve striping accuracy.

The result of more than 60 years of experience in building heavy-duty professional turf equipment, the Jacobsen

LF-100 withstands the day-in, day-out pounding of high-production fairway mowing. It has a rugged, time-proven chassis design and extra-heavy-duty lift arms. Separate high-capacity pumps for traction and reel drive functions deliver increased efficiency and simplify maintenance. And for longer life and dependability the LF-100 comes equipped with a tough 22-hp liquid-cooled diesel engine. Diesel economy can save you up to 50% in fuel costs over an air-cooled, gasoline engine. A wide-core radiator and heavy-duty air cleaner help keep the engine cool and clean in demanding conditions.

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Exclusive, heavy-section reels help make the LF-100 the ultimate fairway mower.

Jacobsen introduces an innovative new reel unit for a superior quality fairway cut from a lightweight mower.

Lighter greens mowing reels tend to rise up in heavy thatch, producing a "wavy" look that detracts from your course's beauty. And these reels are designed for lighter-duty, greens mowing applications, so they lack the long-life durability needed for demanding, high-production fairway mowing conditions.

However, this innovative Jacobsen reel, specially designed for the LF-100, features heavy-section blades and bedknives, heavy-duty shafts and frames for extra strength and longer life in punishing high-production fairway conditions.

The added weight of this wide 22", seven-blade system works with the fully floating, steerable reel units to hug the turf, creating smooth, uniform fairways your patrons will appreciate again and again.

All five of these unique Jacobsen reels are hydraulically driven for a superior cut even in heavy, wet grass. Plus, backlapping is standard, for easier maintenance.

Together, these exclusive reels and the unique design characteristics of the LF-100 make it the ultimate lightweight fairway mower.

And you'll only find it at your Jacobsen distributor. To arrange a complete demonstration, contact your distributor, today. Attractive lease and finance plans available.

POA ANNUA/POA SUPINA (Continued from Page 13)

Divergence - Incongruity (Barriers to crossing and hybridization) were found. The phenomena was found in materials that were collected from wide geographic areas. For instance materials from Arizona will not cross with materials from western Canada and materials from New York did not cross as well as local materials with Canadian materials.

Twenty Seven different esterases* were found in 54 Poa annua biotypes while 23 were displayed by 10 Poa supina biotpyes. The electrophoretic gels of the 64 biotypes displayed 46 different esterase patterns.

In addition to maintaining the vitality of the project, the work for 1989 will focus on seed production evaluations and problems and field evaluation of selected materials.

***Esterase** - any of a group of enzymes by whose action the hydrolysis is accelerated.
Ester - an organic compound, comparable to an inorganic salt, formed by the reaction of an acid and an alcohol.

CREDIT: USGA Research Summary, 1988

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Sunlight and Your Skin

by

Stephen E. Chiarello, M.D.P.A.
Dermatology & Dermatological Surgery
Dipolmate of the American Board of Dermatology

Why Avoid the Sun?

Sunlight permanently damages the skin. Ordinary sun exposure durning tanning and outdoor sports causes permanent skin changes. These changes build up over the years, so that even moderate repeated sun exposure causes visible skin damage. Most of the wrinkling, roughening, and freckling that appears on the face, hands, and arms of white adults comes from sum damage, not aging. You can see this if you compare less sun-exposed areas such as your face, neck, or upper surfaces of your arms. The natural coloration of your skin, pigment, protects you from the damaging effects of sunlight. Persons with fair skin, who have little pigment, are more prone to sun damage than dark-skinned individuals.

The Skin-Damaging Effects of Sunlight

The skin-damaging effects of sunlight gradually lead to roughening, freckling, and wrinkling. Many people in their 30s and 40s are unhappy because their wrinkled, roughened, sun-damaged skin make them appear 10 to 15 years older. Unfortunately, there's no way to undo these changes. Young people should realize that they'll ultimately pay a steep price for the temporary glamour of a deep tan.

A more serious effect of sun damage is skin cancer. Sun damage is the chief cause of skin cancer. Here again, fair-skinned individuals are much more susceptible. Skin cancer tends to occur on sun-exposed, areas such as the face, neck, shoulders, and arms. While skin cancers can usually be removed by minor surgery in a doctor's office, it's better to prevent them.

Ultraviolet Rays - The Invisible Enemy

Sunlight contains both ordinary, harmless, visible light and shorter, invisible light rays called ultraviolet light. Tanning, burning, and skin damage from sunlight are caused by ultraviolet rays. Since ultraviolet rays produce both tanning and skin damage, it's impossible to tan "safely" and avoid permanent skin damage. Discussions on sunbathing that describe "safe" tanning refer to the avoidance of sunburn. By proper timing, most persons can get a deep tan without a sunburn. However, no one can get a tan without some skin damage.

Sun-Protective Measures

There are two basic ways of protecting your skin from the damaging effect of ultraviolet rays: (1) blocking out all light with an opaque material such a clothing; (2) using a chemical sunscreen that selectively absorbs ultraviolet rays. Blocking out all light with clothing is most effective. Certain sun protectives depend on the same principle. They coat the skin with a paint-like pigment that mechanically blocks light. They work well, but they're messy and rather unsightly.

There are also many clear sunscreens that absorb ultraviolet light. These "clean" sunscreens contain either PABA (para-aminobenzoic acid) or a benzophenone compound. Some of the PABA-containing sunscreens are taken up by the skin and will provide some protection in the water, provided they're applied one or two hours before swimming. An ocassional person is allergic to PABA or it's derivative. So please try PABA-type sunscreens on a small area of skin before spreading it all over your body.

The other chemical class of sun protectives, the benzophenones, rarely cause skin allergy. Benzophenones wash off, however, and therefore do not protect swimmers. Some benzophenones have a bitter taste that can be annoying when applied near the mouth.

There are many sun protectives on the market. If they're designed and act as "sunlight blockers" and contain PABA light blockers and contain a PABA derivative of benzophenone, they're probably adequate. Water removes most sunsreens. Remember to put on another coat of sunscreen after swimming or bathing. If you're sweating heavily, use some more sunscreen every hour or two. If you're in very bright sunlight, it's wise to protect your skin as much as possible with clothing (long sleeves, gloves, wide brimmed hats) and use sunscreens on the parts of your skin exposed to the sun.

Protect your lips from sun damage. The darker lipstick shades are effective for women. Men - and women who don't wear lipstick - should use ultraviolet-absorbing lip promade. Women can use make-up with a sun protective. The sun protective should be applied first, then the make-up itself - especially if heavily colored.

You should aim to minimize sun exposure, not avoid it. Being outdoors is fun and healthy; don't let fear of sun damage keep you inside during sunny weather. Do use sun protectives when enjoying sports or a walk in the sun.

Specific Sun Protection Instructions

1. Avoid the 10 a.m. to 2.00 p.m. sun whenever possible as 70% of the earth's harmful radiation reaches us at that time.

2. Wear protective clothing; a broad brimmed hat and long sleeved, tightly woven white cotton shirt.

3. Apply a sunscreen containing both PABA and Benzophenone to dry skin at least one (1) hour before sun exposure for maximum protection. Wipe or wash residual from palm. Let dry before putting on clothes.

Hydration of skin: Bath or Shower immediately before application, provides an increased "protection reservoir." Always reapply after swimming or excessive sweating.

Exposed areas of the skin most likely to suffer sun damage are the face, (especially ears and nose, and scalp if you are bald), the back of the neck, arms, top of the hands and exposed parts of the chest.

CREDIT: The Florida Green

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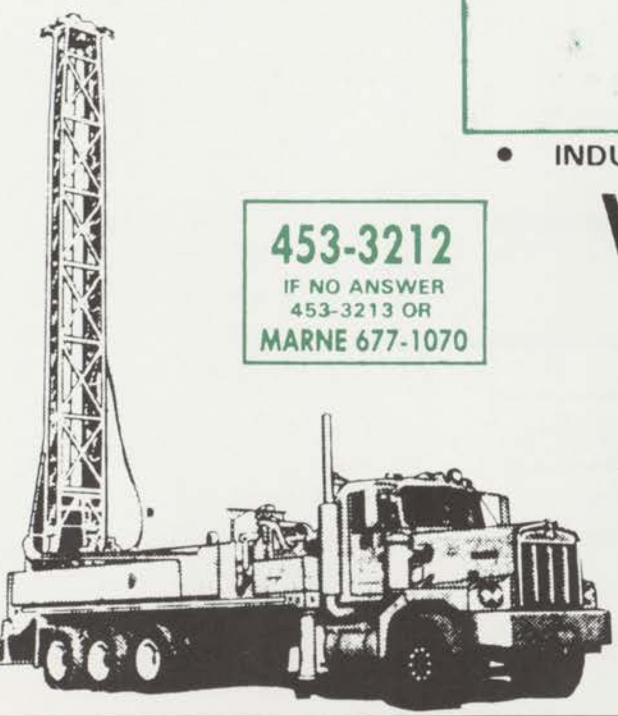

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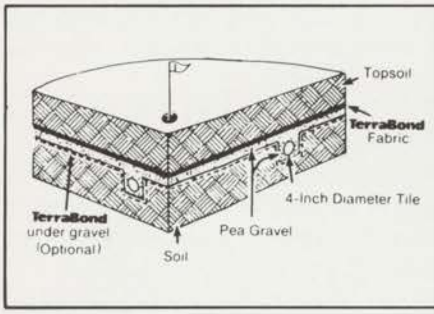
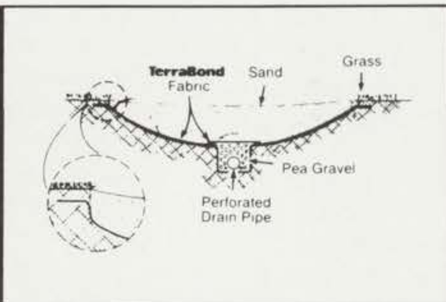


Use TerraBond as a replacement for the usual 2″ coarse sand layer between the greens mix and the gravel drainfield. The fabric will eliminate downward migration of the mix into the gravel and the subsequent reduction of water flow from the green.

TerraBond's high water permeability and highly engineered uniform density and EOS (AOS) make it an ideal fabric for this use. It will not rot in the soil-water environment. Its horizontal (planar) flow characteristic moves excess water horizontally out to the sides.

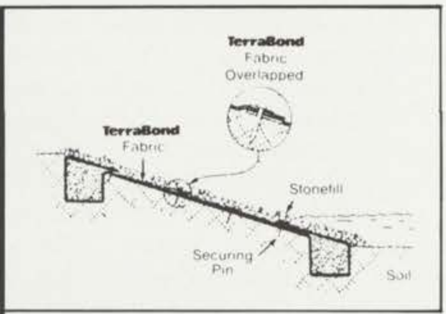
SANDTRAP LINING



Line the entire golf sand trap with TerraBond, including 6″ under the surrounding sod. The sod's roots will knit the fabric to the soil beneath. Clay and rocks will be totally restricted from moving up into the sand.

Sand wash-down in rainstorms will be dramatically reduced, because TerraBond interrupts the interface of sand/soil. Rakeup will be greatly reduced. Time will be saved. Also, "wrap the gravel" in the trap drain to keep it flowing indefinitely. TerraBond's polyester will resist chemical and ultraviolet degradation.

SLOPE EROSION CONTROL



TerraBond is utilized beneath cut slope stone protection (rip-rap) as shown above. The fabric provides long-term confinement of cut slope or fill material.

Being constructed of soft and pliable needle-punched polyester, TerraBond will remain stable and functional for many years, in spite of potential exposure to the sun's ultraviolet rays and/or concentrated hydrocarbons such as gasoline, diesel fuel, oil or hydraulic fluid.

TerraBond also can be used in weed control, gravel path construction, retaining wall filtration, subsurface drainage, patio construction and planter filtration/separation.

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THE EXPERTS AGREE

Winter 1984-1985 Wind Desiccation Damage Test on bentgrass greens
(Univ. of Nebraska-Test compared the protection of TerraShield cover with clear plastic cover and uncovered control area.)

- Desiccation injury around test site was severe. Uncovered control area had 60% damage. TerraShield covered area had no injuries. Control area produced only 36% of the green cover obtained under TerraShield blanket.
- Green-up occurred 24 days earlier with TerraShield . . . and remained significantly greener than the uncovered control area for 21 days after cover was removed.
- TerraShield produced 3 times the recuperative potential of the control area . . . and twice that of clear plastic covered area.
- TerraShield enhanced soil temperature compared to uncovered control area.
- TerraShield remained in place all winter with no ripping or tearing despite heavy winds.

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RED THREAD
A DISEASE ON THE INCREASE

by

Dr. Noel Jackson

University of Rhode Island

Dr. Jackson's update of the red thread disease situation featured the following points.

—Five years ago we thought we knew all there was to know about red thread. Not so!

—Turf of low vigor (similar to dollar spot) is susceptible, especially fine fescues (red fescues more than Chewings fescues) and perennial ryegrasses. Bermudagrass is susceptible to pink patch, too. Ryegrass cultivars differ in susceptibility.

—Recent evidence indicates that more than one fungus is involved. Corticium has been studied in detail, but there are at least two fungi involved - one causes red thread and one causes pink patch. The two diseases are similar and easily confused, one for the other. Often a disease complex - red thread/pink patch - are considered as one disease.

—Infection starts usually at leaf tips as small spots develop. These spread down the leaf. Fungi have pink mycelia that are easy to see. Cool, wet weather favors the development of the fungus. Compact masses of fungi produce a resting stage which gets darker red as it dries and becomes hard and brittle. Also, little cushions of mycelia are produced. There is a fruiting stage that produces more mycelia. Turf grown under low fertility is more prone to infection but even vigorously growing turf can become infected. At times the fungus may act like snow mold under snow cover in the winter.

—The fungus may work on living tissue as a parasite or on dead tissue as a saprophyte. Some symptoms differ; patches may not produce dark red thread-like mycelia. More than one fungus may be working together at the same time under some conditions. The fungus glues or mats the leaves together so the pink appearance is more conspicuous.

—Control of the two fungi with chemicals varies —

—cadmium good for both;
—daconil good for red thread;
—benomyl good for pink patch;
—bayleton good for both;
—chipco 26019 good for both.

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FERTILITY ASSAY OF SANDS

by

Jack A. Paul, Dept. of Environmental Horticulture

Unversity of California

Use of sand as growing media, either as a component in soil mixes or alone, stems from desirable physical properties imparted by sand, not their fertility. Generally, sands are thought of as being poor nutritionally. Under those circumstances where sand is used in potting soil, the fertility of sand is not important since nutrition in container culture is easily effected with combination of chemical amendment, liquid fertilization, controlled release and dry fertilizers. Under conditions where sand is used as a sporting turf soil (putting green, football field) and will not receive the intense fertilizer management of a container soil, inherent fertility is important. If sand can provide some of the plants nutrients, management is easier. Fertility of sands, as a separated class of soil, has not been evaluated, yet it would be useful to have this information.

The purpose of this work was to assess fertility of sands suitable for horticultural purposes with particular references to sand used for turf. The present study evaluates nitrogen (N), phosphorus (P), potassium (K), and sulfur (S) status of 35 sands using the pot testing method (Jenny, Vlamis and Martin, 1950). Soil testing for estimating available P and K in sand is also presented.

Before discussing the results on fertility, it is worthwhile to review briefly the reason for using sand as a traffic soil. It is not necessary that all turf soils be constructed of sand. Under conditions of low to moderate traffic and with good management, soil other than sand can and will support good turf growth. Heavy traffic can cause extra demands on management to keep the soil permeable to water and air, and it is under such conditions that sands are most useful.

Soils containing silt and clay are more or less in a state of aggregation. Under a compactive force, moist soil aggregates deform and flatten, in the large air and water-conditioning pores between the aggregates.The remaining pores are very small and conduct water slowly. Sands form rigid networks of grain that can with stand compaction. After compaction, there is little change in numbers of conducting pores between grains, and so permeability to air and water is preserved. This ability to withstand com-

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paction is the principle reason for preferring sand rather than finer textured soils.

Particle size distribution

Since natural sands are generally unsorted sediments particular attention should be given to the particle size distribution. Not all sands are ideal for growing plants or for managing. See Table 1.

Silt is 0.05 mm and clay is less then 0.002 mm. Fine gravel is greater than 2.00 mm. Sands having a broad particle size distribution, i.e., a fairly continuous particle size representation, are poor horticultural sands, because the finer grains fit into pores between larger grains, and if silt and clay are also present (8 to 10% by weight), the problem is further aggravated. The resulting mixture is a very dense (bulk densities of 1.9g/cc), though matrix with only fine pores. We seek uniform sands in horticultures, medium sands for sports turfs and medium-coarse sands for potting soils. Uniform medium and medium-fine sands are permeable after compaction (6 to 12 in./hr.) and contain adequate available water (1¼ to 1½ in.) in the surface 4 inches of a 12-inch depth following drainage. Medium-coarse and coarse should probably be amended to increase plant-available water. For a review of sands recommended for putting greens see Davis (1973 a,b).

In selecting sand to meet the physical requirements for traffic soil, to what extent is fertility sacrificed? Sands have little or no cation exchange capacity; sands taken from below the surface foot have no organic matter and probably a small microbial population. Visual inspection of some sands suggests that they consist primarily of quartz. Such sands would require careful and complete fertilization. Other sands appear to be rich in primary minerals. Thus, some sands appear to have no plant nutrient bearing minerals, while others seem to have a full complement of such minerals.

Fertility of sands

The pot test method was used to assess fertilizer requirements of 35 sands obtained from various commercial sources in central Califonia. It consists of treatments with elements in various combinations with elements subtraced one by one - e.g. PKS minus N (N_0); NKS: P_0; NPS: K_0; NPK: S_0; -: Check.

Plants were grown in 4-inch plastic pots containing 650 grams of sand. The fertilizers were applied as chemically pure salts at the following rates:

Relative yield (percent)	Percent of sands deficient in N_0	P_0	S_0	K_0
0 - 20	100	3.1	6.2	0.
20 - 40	—	6.2	18.8	3.1
40 - 60	—	25.0	31.3	6.2
60 - 80	—	15.6	25.0	37.6
80 - 100	—	50.0	18.7	53.1

(Continued on Page 22)

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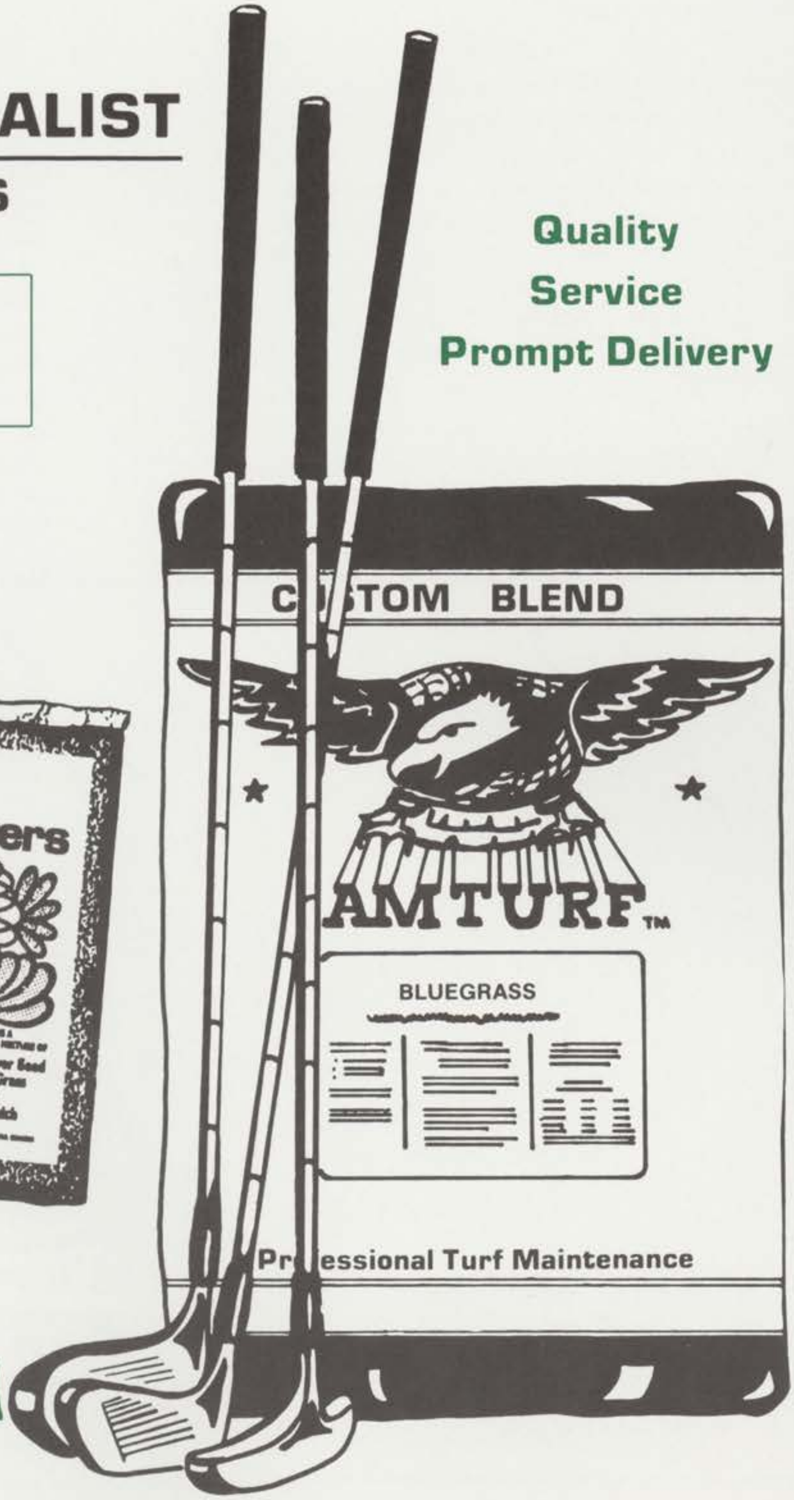

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Nitrogen was applied as a split application with one-half applied 45 days after planting.

One hundred mg of sand of bentgrass (*Agrostis tenuis cv. 'Pencross')* were planted per pot. The grass was grown for 60 days, and three harvests were made by taking clippings, 30, 45, and 60 days after planting. Total dry weight yield per pot was obtainded by summing the three harvests. There were four replicates per treatment. Relative yield (yield of subtractive treatment per yield of full treatment, x 100) is used to compare fertilizer responses between sands.

All experiments were performed in a cool greenhouse (night temperature 55°F and day temperature 80°F) from April through October.

Results

The following table summarizes the extent and frequency of fertilizer responses obtained for 35 sands.

Nitrogen

The N_0 treatment for all sands had relative yields (RY) of 0 to 20 percent. Yields of this treatment were no better than the check, which suggests that the sands were absolutely deficient in available nitrogen. This is not too surprising if the source of sand is considered. All came from subsurface deposits. Nitrogen-deficient grass was stunted light yellow.

Phosphorus

Fifty percent of the sands tested were well supplied with available phosphorus (RY, 80 to 100 percent) and 9 percent were severely deficient. It is interesting to note that in the P_0 treatments for some sands, growth rate increased after the first clipping. This suggests that, with time, more phosphorus became available. Moderately phosphorus-deficient grass is stunted and dark green with narrow blades.

Sulfur

Sulfur-deficient sands appeared to be more or less represented in all RY categories. It is speculated that S compounds originally present in these sands were leached with low sulfate waters, and since no organic matter is present, there is no mineralization from organic sources. Sulfur-deficient grass is very similar to N deficiency.

Potassium

Fifty-three percent of the sands were adequately supplied with available K. Three percent were severly deficient, and 38 percent were moderately deficient. Potassium-bearing minerals, such as mic and the feldspars (microline and orthoclase), would be the main source of K; clay-derived K would be minor, since clay was generally less than 3 percent of the sand sample.

Micro-nutrient treatments were included in any of the sands, but no significant yield increment was obtained in these treatments. None of the sands tested indicated a need for lime, and no calcium (Ca) or magnesium (Mg) deficiency symptoms were noted, but this does not rule out the possibility that some sands will be deficient in these nutrients. Since only 35 sands were evaluated, no generalizations can be made regarding micro-nutrient and lime requirements.

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Chemical analyses

The pot testing method provides a reliable means for assessing the fertility status of soils, but it requires proper facilities and time. Soil tests are not as reliable, but if they are well correlated with fertilizer requirements, they are very useful. They are also less expensive. Soil analyses for phosphorus and potassium were performed on all sands and were correlated with appropriate subtractive treatments. Nitrogen need not be considered for obvious reasons.

Phosphorus

Available phosphorus was estimated on untreated sand samples by two methods: .05M $NaHCO_3$ extractable P and water soluble P (Rible and Quick, 1960). For the $NaHCO_3$ method, extractable P is reported as ppm P on a soil basis, while water soluble P is expressed as ppm P in the extract. Both values are potted against the RY of the P_0 treatment.

The correlation between P_0 RY and $NaHCO_3$ extractable P suggests that this procedure could be useful in predicting phosphorus fertilizer requirements. While the correlation is not excellent, a value of 3 ppm P appears to be near the critical level. This value is lower than is recommended for soil (6ppm). The relation between P_0 RY and water soluble P provides a better correlation. The critical level is about 0.15 ppm P. This value is at the same as that cited by Bingham (1962) for soil, with cereals as the indicator plant. Both methods are useful in estimating phosphorus fertilizer requirements in sands.

Potassium

Available K was estimated by extracting with neutral normal NH_4OAc (ammonium acetate). Sands have a very low cation exchange capacity, and extractable K is expected to be low even in sands well supplied with K. Beyond 20 ppm there is no response to K fertilization. This critical value is considerably lower than for soils containing clay, but it is in keeping with the critical level found for sands in Australia.[2]

In addition to P and K analysis, salt and pH should be determined. Salt should not present a problem since it is easily leached if the sand is a permeable one. Sands having a very low pH (4 to 5) indicate a need for lime or dolomite, while sand havin g a pH^{5}8 may have lime present.

Conclusions

The results of the pot test for a limited number of sands indicate that they behave as might be anticipated for subsoil. The extent and frequency of P deficiency is similar to surface soils which have been tested (Vlamis 1966). Nitrogen is completely lacking. Occurrence of S and K deficiency is probably more frequent in pot tests than in valley soils in California.

It is apparent that all sands will require N to start grass, and many will also require S. Soil tests can help decide whether P and K should be added also, but sand well supplied with P and/or K initially may eventually become deficient in these nutrients as clippings are removed. Soil and tissue tests may be useful to indicate when these nutrients should be applied.

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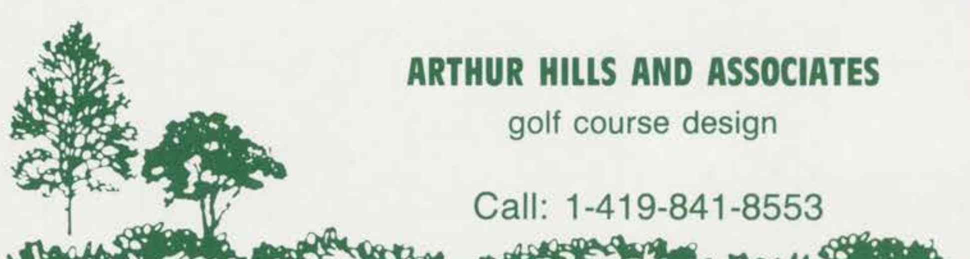

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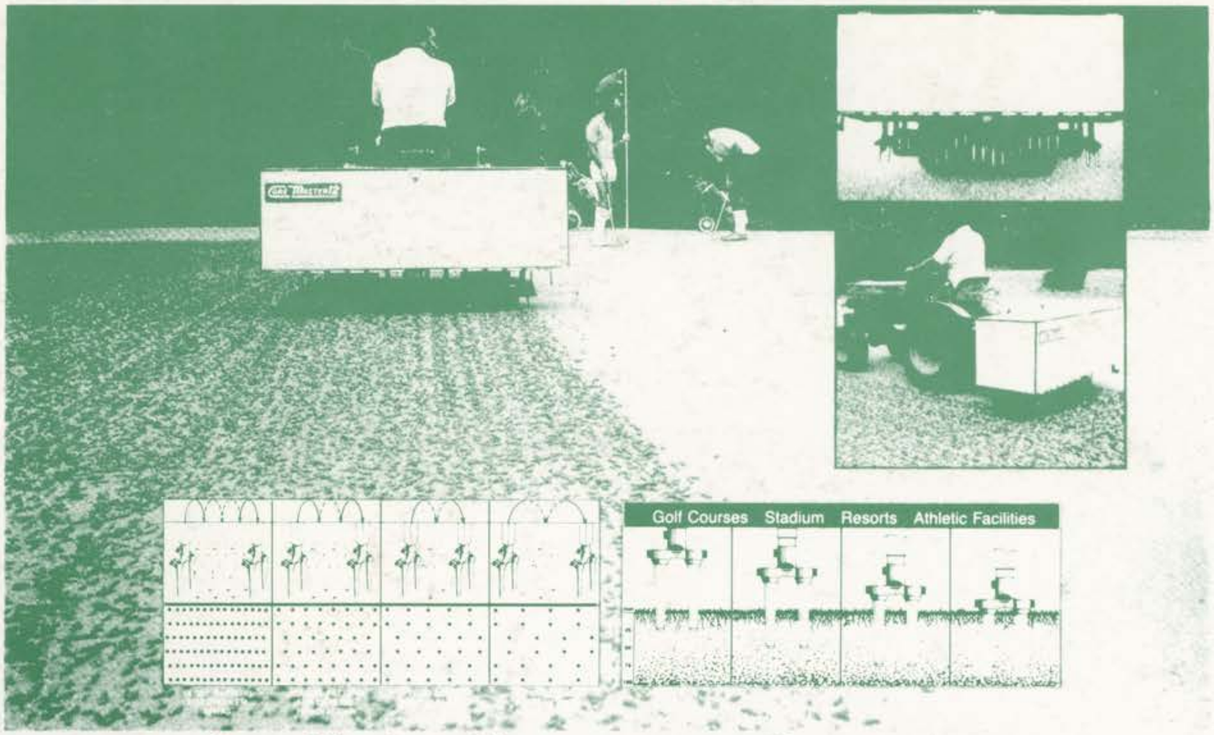

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