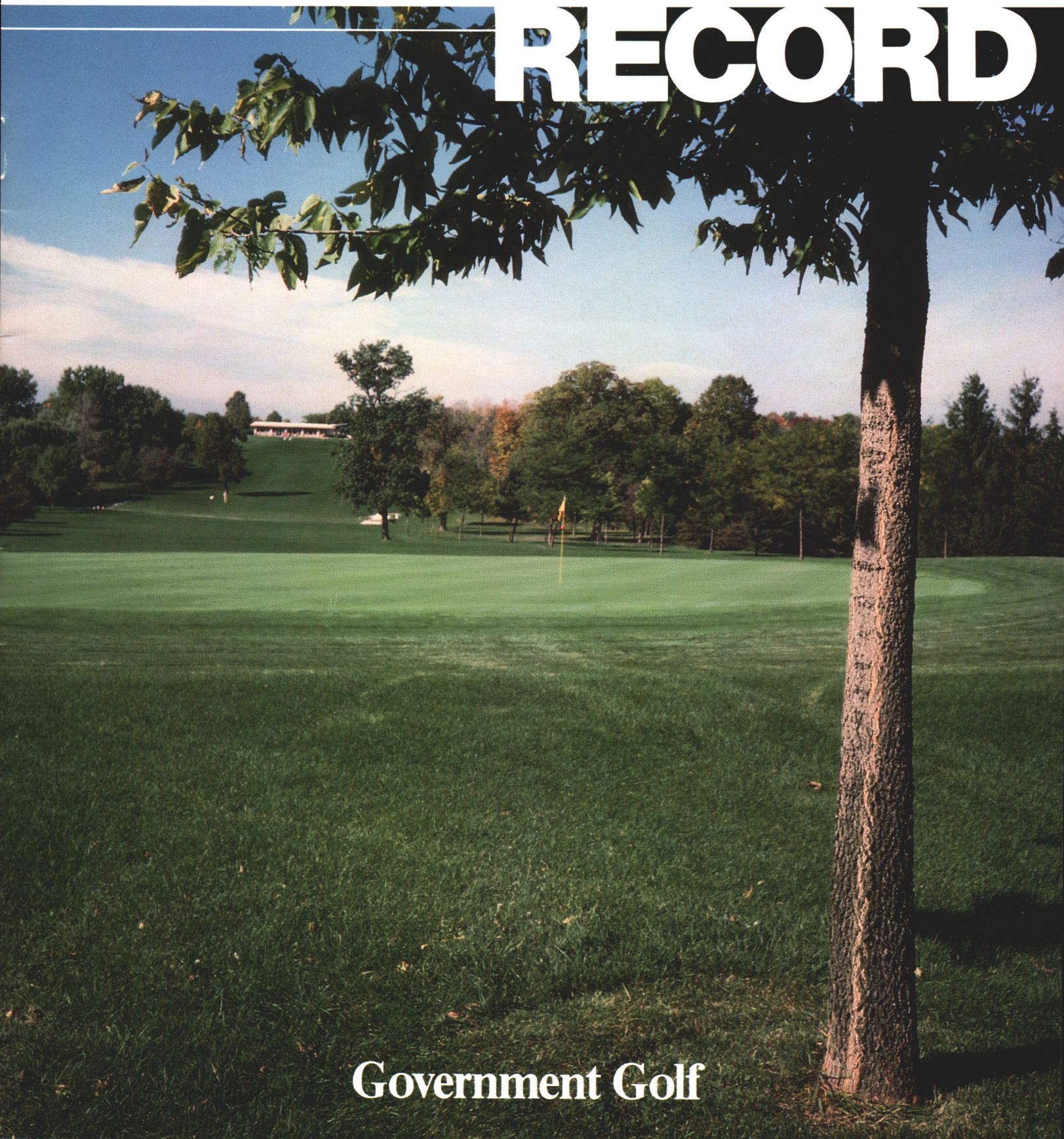


USGA®

Green Section **RECORD**



Government Golf

USGA®



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Vol. 26, No. 5

SEPTEMBER/OCTOBER 1988

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Cover Photo:

Dretzka Park Golf Course exemplifies the continuing commitment to golf by the Milwaukee County Park System, which maintains seven 18-hole courses, one 9-hole executive course, two 18-hole par-3s, and six pitch-and-putt operations.

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GREEN SECTION RECORD (ISSN 0041-5502) is published six times a year in January, March, May, July, September and November by the UNITED STATES GOLF ASSOCIATION®, Golf House, Far Hills, N.J. 07931. Subscriptions and address changes should be sent to the above address. Articles, photographs, and correspondence relevant to published material should be addressed to: United States Golf Association Green Section, Golf House, Far Hills, N.J. 07931. Second class postage paid at Far Hills, N.J., and other locations. Office of Publication, Golf House, Far Hills, N.J. 07931. Subscriptions \$9 a year. Foreign subscriptions \$12 a year.



Alternate greens (foreground) on several Milwaukee County courses are kept in excellent playing condition for use when the regular greens are being aerated, topdressed, sprayed, or mowed. Efficient labor use and uninterrupted golf make the cost of maintaining the extra area worthwhile.

Government Golf — Keeping Up With the Competition

by JAMES M. LATHAM

Director, Great Lakes Region, USGA Green Section

GOVERNMENT-OWNED courses (city, county, state, or federal) are in better condition than ever, thanks to competition. For years, golfers who play these courses have been subjected to cavalier treatment by some parks and recreation commissions, their administrative staffs, or both, who rationalized that since there was no other public facility nearby, golfers would accept anything, provided it was cheap.

Early private operators had to meet the price of these courses, because theirs were little better. Not anymore. Golf businessmen have demonstrated that good golf courses can be merchandised at an affordable cost. Although they

aren't cheap, they are nevertheless affordable to a majority of public course players on a regular-play basis. These privately owned public courses are providing competition, and the smart park/recreation administrators are doing something about it, even if it means raising green fees. Most government budgets are strapped for funds, so the users have to do more to support the institution, and rightly so.

Government courses have failed to compete with private operations in only a few categories, namely the quality of greens, tees, and fairways. Many have failed to understand that a lot of green grass doesn't make a good golf course.

Greens are often overwatered and overfertilized. Putting quality is often an unknown term. It is amazing how well some of these greens respond to aeration and topdressing operations that have been properly programmed. Improved fertilization and irrigation techniques put the icing on the cake. Eventually some greens must be totally rebuilt, but rehabilitation can prolong their usefulness.

Some fairways have never seen an aerifier. The poor things were just mowed and perhaps fertilized every spring just like the lawn at city hall. When golfers complained about cuppy lies, the mowing height was lowered. Now, though, fairways are being reclaimed through inten-

sive aeration, properly timed fertilization, interplanting with new, vigorous turf cultivars, and a measure of traffic control and path development.

The tees? Well, those old postage stamps under trees with a crabgrass-*Poa annua* crop rotation are being enlarged to accommodate play. Using the rule of thumb calling for 100 square feet of level surface per 1,000 rounds of golf per year, the tees on par-4 and par-5 holes have grown significantly. Par-3 tees, which should be twice the size of the others, have not come that far, but they are much larger than they have been in the past. Tee quality has also been improved by intensive cultivation and planned tee marker placement. Bentgrass is not an uncommon surface on some Great Lakes region courses, and closely cut perennial ryegrass plantings are doing quite well, too.

Unfortunately, weed control and other pesticide work has become politicized in some areas. The policy setters in parks departments are quite sensitive to environmental groups that strive to make all things natural. Geese are more important than golf, but take off your shoes before you come into the house.

Public course golfers have become more mobile, and have had access to a growing number of fine privately owned daily-fee courses whose owners' liveli-

hoods depend on the products they sell: well-maintained turf, an interesting design, and courteous, obliging employees. Sports-oriented resorts in the North and the South are providing vacationers with these conditions, too, and the memory carries over when golfers return to their home base. Public links players aren't without income; check the cars in the parking lots. Many of these golfers are beginning to growl and ask some rather pointed questions about public course operations.

"Why can't we have better playing conditions?" or "The income from 70,000 rounds of golf should provide us with a better course! Who is responsible for this mess?"

The answers to these questions are often embarrassing to the chiefs who may play golf but show greater concern with softball diamonds, soccer fields, swimming pools, and bike trails. The user fees for public recreation are curiosities in themselves, and few operations are self-supporting.

Non-revenue producers are often subsidized by money siphoned from golf income but attributed to the largesse of the department. Maybe golfers should follow the truckers' lead about road taxes and post a sign at the courses stating: "This golf course supports two swimming pools, eight softball diamonds, and the toboggan run."

User fees on golf courses are called green fees, and can have the most imaginative structure ever devised. There are resident, non-resident, senior, junior, regular, annual, ad infinitum. There are golf car rentals and trail fees for personally owned cars, and storage fees for those who don't want to tow their golf cars every day. When they are parlayed properly, all of these can make for awfully cheap golf. There's nothing illegal to it, but when golf on a well-maintained course costs a frequent player 75¢ or 91¢ a round, that golfer isn't paying his way. Those numbers, incidentally, are real. The game costs less than the refreshments.

Because of labor costs, budgets in most government operations are much higher than one would expect. Fringe benefits and wage scales, union or not, push the staff cost-per-person much higher than at clubs or privately owned fee courses. The hourly cost for a beginner can be \$10 to \$12 per hour, straight time. The value received, however, is another matter, because these people are usually protected by rigid grievance procedures.

Outright discharge of incompetent or unwilling workers is rare. Oral and written warnings precede layoffs, which precede outright discharge, and even then appeals are possible. These steps require the full attention and time of the supervisor, so running government golf operations gets into a serious amount of record

During the Drought of '88, greens are everything at unirrigated Milwaukee County courses. The Brown Deer Golf Course (below) has hosted three USGA Public Links Championships. Dretzka Golf Course (facing page) is another challenging course, recently fitted with fairway irrigation.



keeping and time away from the job at hand.

Purchasing by government golf operations is difficult because of low-bid requirements and often inadequate specifications. For example, topdressing material and fertilizer are two of the most important components in high-traffic golf operations, but they amount to only small percentages of the budget.

There is little reason, then, to be satisfied with anything but the best quality, but unless tight specifications are written, the courses are given inferior products. It takes a lot of intestinal fortitude sometimes to defend the purchase of special topdressing sand that costs \$25 a ton when someone offers washed masonry sand for \$5, and the purchasing agent has no earthly idea why either is necessary.

Golf course superintendents on government golf courses come with a variety of abilities, depending upon individual systems. Some are college trained and operate their courses better than private organizations because of their ability to function despite rigid rules. Their success is fostered by progressive departmental management.

These individuals have the ear of a responsible administration, and they work within the system to establish good relationships with willing workers. They prepare and have a strong voice in the presentation of realistic budgets to meet the needs of the golf course.

Other superintendents have come up through the ranks to become excellent managers. They have the interest and the ability to observe and learn from every source of information at hand.

These folks really work at turf conferences and superintendents association meetings to improve their knowledge of golf turf and the people who play the game.

Then there are the others, who have simply been there longer than anyone, and assumed the position by divine right. They become bosses, and may even grow pretty grass, but it is a far cry from golf turf, simply because they don't care to learn how their course plays, much less how it compares with others. They have job security, and they take their vacation any time of the year they wish. It is heartening to know that this is a vanishing breed, even if only through attrition.

Too often the structure means that pay raises for a superintendent at the top of the scale must be accompanied by a promotion that takes them out of golf completely. It is, therefore, impossible to retain topnotch people on golf courses and keep them in the positions where they can continue to produce good results and train other employees to become skilled supervisors.

Until this sinkhole of talent is plugged, these superintendents will be lost to golf forever, or they will leave public service for private operations. A move of this

kind is questionable for a person with 15 or 20 years of tenure. Either way, government golf will lose another skilled superintendent.

To improve their skills, many greenkeepers (the normal term for golf course superintendents in public operations) must use vacation time and their own funds to attend superintendents association meetings, so it is difficult for them to participate in the continuing education provided by the wide variety of speakers at these sessions.

Associations in which the clubs pay for the superintendents' memberships and meeting costs can easily price themselves out of the range of these individuals. Those departments that now classify meetings of this sort as training are helping themselves, even though the fiscal unit may gasp at the cost of some of the dinners.

The enlightened departments who see the round of golf the superintendent may play during an association meeting as education are providing goals toward which their people can strive and the knowledge with which to attain them. These meetings are the "only source of supply," in bid language.

The budget sometimes gets in the way of attempts to translate good operational procedures at a classic private club into useful practices at a public course, but grass grows the same way at both places,



and the budget/traffic differences may have less influence than one might imagine.

WHEN a decision is made to upgrade or rehabilitate these courses, things happen, although slowly, because organizational rigidity prevents crash programs. This is not necessarily bad, provided the time lag is not simply reluctance to act.

An assessment should be made of the entire maintenance operation, literally from the ground up. Soil conditions, drainage, and turf status are the basic points of need. Irrigation and other equipment need to be evaluated for their capability to perform the operations necessary for higher-quality turf. Past maintenance practices must also be examined to determine their effectiveness.

Whenever possible, an assessment of this type should be made by an agronomist from outside the organization who is knowledgeable in the development and care of golf turf. Should architectural changes be necessary, a qualified golf course architect rather than a landscaper should be brought in.

Construction work is usually done better and faster by contractors with golf course experience than by departments within the organization, unless they, too, have the experience. When all costs are figured in, the outsiders are probably less expensive. Master plans offer the best overall approach to general rehabilitation.

People like to see action, so while the long-term, less obvious operations are getting underway, the more visible improvements should begin — weed control, trimming, policing the entire area, especially the entrances, to show that something good is happening.

If a significant amount of work is to be done on greens or tees, temporary greens and tees should be prepared well in advance to develop the sites into very playable turf through aeration, topdressing to smooth the surface, overseeding, and fertilization. Play can then be transferred at a later date without the threat of insurrection.

Properly located, these temporaries can become alternates for future use while the regular greens are being tended, perhaps while they're being mowed. They are especially helpful during aeration, topdressing, and pesticide applications, and they can save putting quality when they're put to use after storms, or during transition periods in the fall or spring, when the regular greens should not be played.

The Milwaukee County courses have done this successfully for many years. These permanent temporaries may add 15 or 20 percent more surface to maintain, but they pay that back in job efficiency.

The key personnel in the upgrading process are the golf course superintendents and the administrators. Superintendents must be enthusiastic about the plans, or all the work to be done will accomplish nothing.

The administrators must see that the material, equipment, and personnel needs are provided and are protected in future budgets. These people must be kept on track and on top of the work schedule if the fiscal and physical progress is to remain intact.

The golfers must be kept informed of what is going to happen, when it is going to happen, and why it is necessary. They understand construction and spraying, but not all those aeration holes in the ground or all that mud or sand on the turf surface. Grass eradication or suppression prior to replanting is always questioned because the turf surface is the wrong color. Let's not kid ourselves, green is a primary color to all golfers.

Player complaints or observations can be a real help in identifying problems and setting priorities. Associations at government courses are most critical of putting surface trueness and shot receptivity but not necessarily speed, unless the greens are shaggy or extra-fast.

Poor drainage anywhere on the course is unpleasant, particularly to walkers. Thin turf on fairways brings on perpetual winter rules, which makes handicaps questionable.

Poor turf on tees is a gripe, even though pegs are used to support the ball. Too many tees are so rough that only a small portion is level enough to use, and that becomes a water-holding dish when the ground is worn bare.

Those of us who do not reach the greens in regulation consider the approaches to be the second most important pieces of turf on any golf course. They are usually too wet, rutted, compacted, and the terrain too uneven to hit a little chip shot at the hole.

Hearing and heeding criticisms is certainly a part of marketing. Governments must begin to do this if they are to gain public support. These *are* the hands that feed the kitty from two directions — green fees and taxes.

Analytical administrators begin to see the light when the lowest play days are Saturday and Sunday. The city golfers are outward bound. The heavy-play/poor-quality dodge doesn't work any-

more, since the private operators handle 300 to 400 or so 18-hole golfers a day in 4½-hour rounds, and on good turf, too. Competition is a strong lever in any business; it can be quite keen in the field of recreation, where price and performance go hand in hand.

Golfer's associations can, and some do, become friends and encourage elected officials to think kindly enough of the courses to redirect funds toward their continual upgrading. Poor turf and/or slow play literally drives golfers away from government courses. Some will drive an hour or more to a good private daily-fee course, have an enjoyable round, and be home before they could finish a round on a ratty local facility.

It is unlikely that a government could or would change its entrenched policies on personnel or purchasing procedures, but this means only that the plans have to be more long-range, with set performance dates. The municipality might, however, let the golf courses become a private enterprise operation that retains its income and assumes responsibility for all debts.

Even where operating budgets come from the general fund, adequate financing is not impossible when public golf is shown to be a valuable lure to commerce and tourism as well as an asset to residents.

Some public officials believe contract maintenance or leasing their courses is a cop-out on their obligations to the people. Others, however, feel that these are fiscally sound means of handling an operation in which administrators have neither the will nor the skill to manage.

In a few instances golf associations have taken over the fiscal responsibilities and operate as a sort of semi-private club/non-profit corporation. Few golfers care how a course is managed as long as it is playable.

Leases of any kind or term must have some owner protection built into the document to insure that the lessee maintains or even improves the property during the term of the contract. Performance inspections by an unbiased, authoritative agency are usually sought by both parties. The Turf Advisory Service of the USGA Green Section is often used in this capacity throughout the country.

Money is the rooting medium for good golf turf. The quantity depends on the dollar stretch provided by good management. There are no free rides. If golfers want better playing conditions, they will have to demand more funds from tax revenues and be willing to pay higher green fees, amend some of the deals, such



(Above) Milwaukee's Dretzka Park. Large, level, grassy tees are a must if government golf courses are to keep pace with the quality presented by privately owned daily-fee operations.



(Left) Flowers are used throughout the Dwan Golf Club at Bloomington, Minnesota, to complement the excellent turf quality, including bentgrass tees. This bandbox course on 97 acres hosts 64,000 players every year during the short northern season.

as season tickets, special age fees, or accept surcharges in some form.

From the turf's viewpoint, every golfer contributes to soil compaction and wear, whether he is a resident or a non-resident, old or young.

Junior golfers should certainly be encouraged, through reduced rates, because they are the future of the game. Rate setting at other levels is strictly a local affair, but perhaps this is another place where government golf should take a page from its counterparts in the private sector.

Any way you cut it, dirt-cheap green fees equate to dirt-poor greens. Privately owned daily-fee courses (not just the supercourses) are growing, because they present affordable, pleasant, well-maintained playing conditions. In them, government golf operations have a pattern for efficiency and effectiveness that can be translated to fit their needs. It is being done today, to the delight of public-play golfers.

Photograph by DEAN REITSMA

Injuries on the Golf Course — Do You Know What to Do?

by **DR. GLEN COUCHMAN**

Medical Director, Scott and White Hospital — Waco Clinic, Texas

A GOLF COURSE is a great place to spend three to four hours in pursuit of recreation, but overzealous pursuit of that recreation can result in significant injuries. Although golf is not considered a high-risk game, people die on golf courses every year, and many more are injured or suffer a serious medical problem. Common, yet serious problems are heat stroke, heart attack, lightning injury, and bee or wasp stings.

While people vary widely in their ability to tolerate heat, several factors have been identified that predict who will be most likely to suffer some form of heat reaction. These include poor aerobic conditioning, obesity, increasing age and blood pressure, male sex, alcohol consumption, and drug use (prescription and narcotic).

Excessive heat exposure and intolerance to it produce a series of events, beginning with heat cramps and heat fatigue, then progressing to heat exhaustion, and finally to heat stroke. No one really knows what produces heat cramps, but it can be assumed it is caused by the lack of several essential salts and minerals. Observations show individuals have fewer cramps when their fluid intake is adequate and their diet includes citrus fruits, bananas, fresh salads, and table salt.

Heat fatigue refers to the unusually rapid onset of weakness and fatigue in the unacclimatized athlete exposed to high temperature and humidity. When the condition is not treated with prompt rest and fluid replacement, it may progress to heat exhaustion, which is characterized by severe fatigue, nausea, a throbbing headache, and the feeling you may lose consciousness.

The fainting sensation is caused by dilation of the veins in an attempt to carry more blood to the skin's surface and release built-up heat. This dilation of the veins causes pooling of blood in

the lower extremities and decreased blood pressure, which results in the sensation of, or actual blacking out.

Heat stroke is a true medical emergency manifested by the cessation of sweating, a body temperature of 105 degrees, and mental confusion and disorientation.

The most efficient and safest way to treat these heat reactions is total body fanning after wetting with moderately warm water. Prompt replacement of fluids and electrolytes is also essential, but remember that in 99% of the cases, the number-one problem is water depletion, not the loss of salt. Giving salt pills to someone who is hot, woozy, perspiring, and who is experiencing muscle cramps is not likely to help him. He needs to be given plenty of cool liquids (preferably water) after getting him out of the sun, removing most of his clothes, and fanning him off with towels. Also, laying him down with his feet elevated will help resolve the feeling he'll faint.

If in fact it appears you are dealing with true heat stroke, an EMS unit should be called.

Prevention of these heat reactions makes more sense than treating them once they occur. Be certain plenty of water is available, and that shaded benches are scattered liberally throughout the course. A clearly visible thermometer and an area to post severe heat conditions should be provided.

Heart disease is one of the leading causes of death in the United States. How can you recognize the signs of a heart attack or an impending heart attack on the golf course?

Obviously, if the individual is conscious it would be very helpful to get a brief description of how he is feeling. Some common symptoms of a heart attack are a severe heavy pressure-like chest pain that may radiate into the neck, shoulders, or arms. This is frequently accompanied

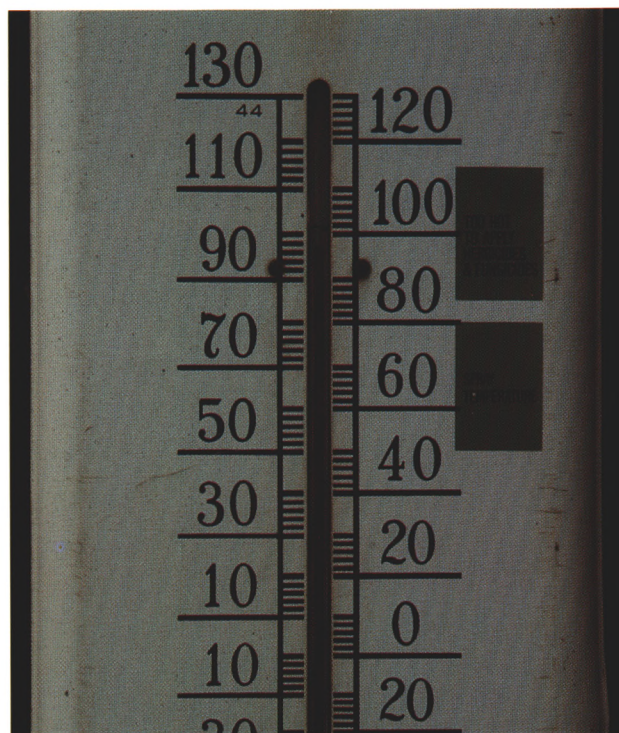
by the sensation of shortness of breath, nausea, profuse sweating, rapid heart-beat, and dizziness.

Typically this pain is related to exercise; it grows worse with activity, and becomes better with rest. Arrange for transportation to the clubhouse or shop area. Discourage the victim from smoking a cigarette or having a drink of alcohol to calm his nerves. Find a physician and arrange for transportation to a clinic or hospital. Do not let the victim drive himself away from the course.

If you are faced with the unfortunate situation of finding an unconscious or semi-conscious person, immediate action is imperative. At this point, hopefully, you have taken a CPR course from your local Red Cross office. Immediately send someone for an EMS unit. Next, be certain to clear the victim's airway. Sometimes this simple step can be life saving. Check for a pulse and respiration, and begin CPR if you can't find either. If possible, while you're waiting for EMS to arrive, check for any med-alert necklace or bracelet that may provide clues to the victim's current condition. Continue CPR until EMS arrives.

Like the ancient Greeks who believed lightning bolts were cast from the heavens by an angry Zeus, most golfers believe nothing short of an act of God should interfere with their round. Too frequently they continue their game despite a rapidly approaching thunderstorm. From 400 to 600 people die every year from lightning injuries and other natural disasters. Thousands more are injured but survive. Many of these injuries occur on the golf course.

Lightning is nothing more than a discharge of electrical energy equalizing the potential difference between negatively charged storm clouds and the positively charged earth. Normally the air insulates against the discharge of this electrical field until a potential difference of ap-



(Top) Good communication between course personnel can save lives.

(Left) First-aid supplies should be readily available.

(Above) As temperatures rise, so do the chances of heat-related injuries.

proximately 30,000 volts exists. At that point a leader stroke dives to the ground. When that happens, our unfortunate golfer or crew member comes into danger. He's a sitting duck to help dissipate this enormous amount of electrical energy, particularly if he's wearing metal objects (good conductors) like golf spikes on his shoes, walking across a moist fairway or green, or holding metal golf clubs or tools.

Victims of a lightning strike may be injured in three different ways. They may be directly hit by a lightning discharge. They may receive a splash injury, which occurs when the lightning bolt seeking the path of least resistance jumps from a vertical object with high resistance, like from a tree to the human body. Thirdly, if lightning strikes the open ground, a person walking or standing nearby may be injured. Of victims seriously injured, it is estimated that 20 to 30 percent die, and perhaps 70 percent suffer permanent damage.

The medical consequences of a lightning strike include a large variety of injuries, depending on the exact circumstances of the accident. A variety of cardiovascular, musculoskeletal, eye and ear injuries, and skin damage have been reported in medical literature.

Again, as in the treatment of heat injuries, the best way to treat lightning accidents is prevention. Current weather conditions should be monitored. If a

severe weather warning is issued or lightning is sighted, a warning should be sounded to clear the course. Anyone caught in the open should immediately discard metal objects and squat down or curl up in the lowest area of ground nearby. If a rubber or plastic raincoat, or any other non-absorbing material is available, squatting on this may provide protection from any ground currents if a lightning bolt should strike the ground nearby.

If a lightning strike does occur, prompt attention should be directed to the victim's apparent injuries. Any bone or joint injury should be splinted before he is taken to a medical facility. If the victim is unconscious but breathing and has a pulse, I would advise not moving him until an EMS unit has arrived to insure his spine is properly stabilized before he is transported. CPR should be initiated to anyone with apparent cardiopulmonary arrest, even if he has been unattended for several minutes, because there have been many reports of miraculous recoveries from lightning-induced cardiac arrest.

Bee or wasp stings usually are present with painful, red, swollen papules at the site of the sting. These can be simply managed by applying ice and elevating the area to minimize swelling. Over-the-counter drugs like Benadryl will help decrease the itching and local reaction. The more dangerous reaction to a bee

or wasp sting is called an anaphylactic response. This may include a fall in blood pressure, difficulty breathing, and generalized hives. It can occur quite suddenly, and it requires prompt medical intervention. Faced with this situation, immediately transport the victim to the nearest medical facility.

Hopefully none of these medical problems will ever occur on your golf course. Possibly some preventive education will help ensure that they don't, but if the worst should happen, prompt decisive action may minimize the consequences.

REFERENCES

- Kenny, W. Larry: Physiological Correlates of Heat Intolerance. *Sports Magazine* 2:279-286 (1985).
- Hanson, Peter G.: Heat Injury in Runners. *Physician and Sports Medicine* 7:6:93, June 1979.
- Jaffe, Rebecca: Sports Medicine Emergencies. *Primary Care* Vol. 13, No. 1, March 1986.
- Cooper, M. A.: Lightning Injuries: *Prognostic Signs for Death*. *ANN Emerg. Med.* 1980: 9(3): 134-8.
- Apfelberg, D. B., Masters, F. W.: Pathophysiology and Treatment of Lightning Injuries. *J. Trauma* 1974: 14 (June): 453-60.
- Strasser, E. J., Davis, R. M., Menclay, M.J.: Lightning Injuries. *J. Trauma* 1977: 17(4): 315-9.
- Craig, Steven R.: When Lightning Strikes. *Postgrad Med.* Vol. 79, No. 4, March 1986.

| | Heat Fatigue | Heat Exhaustion | Heat Stroke |
|-------------------------|---------------------------------|--|---|
| Symptoms | Hot, fatigue | Fatigue, nausea, headache | Disorientation, incoherent speech |
| Mental Status | Clear | Usually conscious but may faint | Confused or unconscious |
| Body Temperature | 100.4 - 103 | 104+ | 105.8+ |
| Skin | Flushed | Pale | Flushed |
| Sweat | Profuse | Profuse | May not be sweating |
| Treatment | Oral fluids, allow to cool down | Fanning and IV fluids by EMS personnel | Cool with ice, IV fluids, and prompt transfer to hospital |

Integrated Pest Management — A Different Approach for the Same Old Problems

by JOHN H. FOY

Agronomist, Southeastern Region, USGA Green Section



Pythium



Grubs



Nematodes

It doesn't matter whether it's a disease, insect or weed problem, the end result is an unacceptable turf condition.

BEFORE the Second World War, chemical pest control in all aspects of agriculture was, by today's standards, virtually nonexistent. Man was fighting a losing battle against weeds, diseases, and insects because brute force could not win over sheer numbers. Then in 1944 it was discovered that the synthetic chemical 2, 4-D controlled dandelions, plantains, and other broadleaf weeds in bluegrass turf. A new era in pest control began shortly after the war with the tremendous success of synthetic organic insecticides, such as DDT and BHC.

According to United States Department of Agriculture records, by 1971 more than 900 pesticides had been registered, and American manufacturers were producing 1.1 billion pounds of pesticide material each year. While enormous economic gains such as increased crop production and reduced world health problems were being realized from using these pesticides, it also had become apparent

that their uncontrolled use had negative effects on the environment. Rachel Carson's book *Silent Spring*, published in 1962, focused attention on the negative aspects of pesticides, and public awareness on this subject has continued to increase. It is a fact, though, that present standards of life could not be maintained without them.

While most research on pest control has focused on chemical approaches, alternative pest control methods have also been pursued. The concept of integrated pest management (IPM) began to be popularized in 1971 for commercial crop production. In the May issue of *Agri-Chemical Age*, it was reported that today, 50 USDA-sponsored IPM projects covering 23 crops and two livestock pests are in effect. Over the past decade, the popularity of the IPM approach has continued to grow in urban horticulture and turf management.

Integrated pest management would best be described as a total management system of combined pest control alternatives to most effectively and efficiently limit pest damage.

It must be realized and accepted, however, that totally eradicating any pest organism is economically and environmentally impossible. Thus, an integral part of an IPM system is establishment of an economic or unacceptable aesthetic injury threshold. Once this threshold is determined, multi-disciplinary tactics are incorporated into a total management system that prevents pest populations from reaching sufficient numbers to cause damage. To achieve this objective, management strategies utilizing regulatory, genetic, cultural, biological, physical, and chemical tactics are all incorporated into a total program.

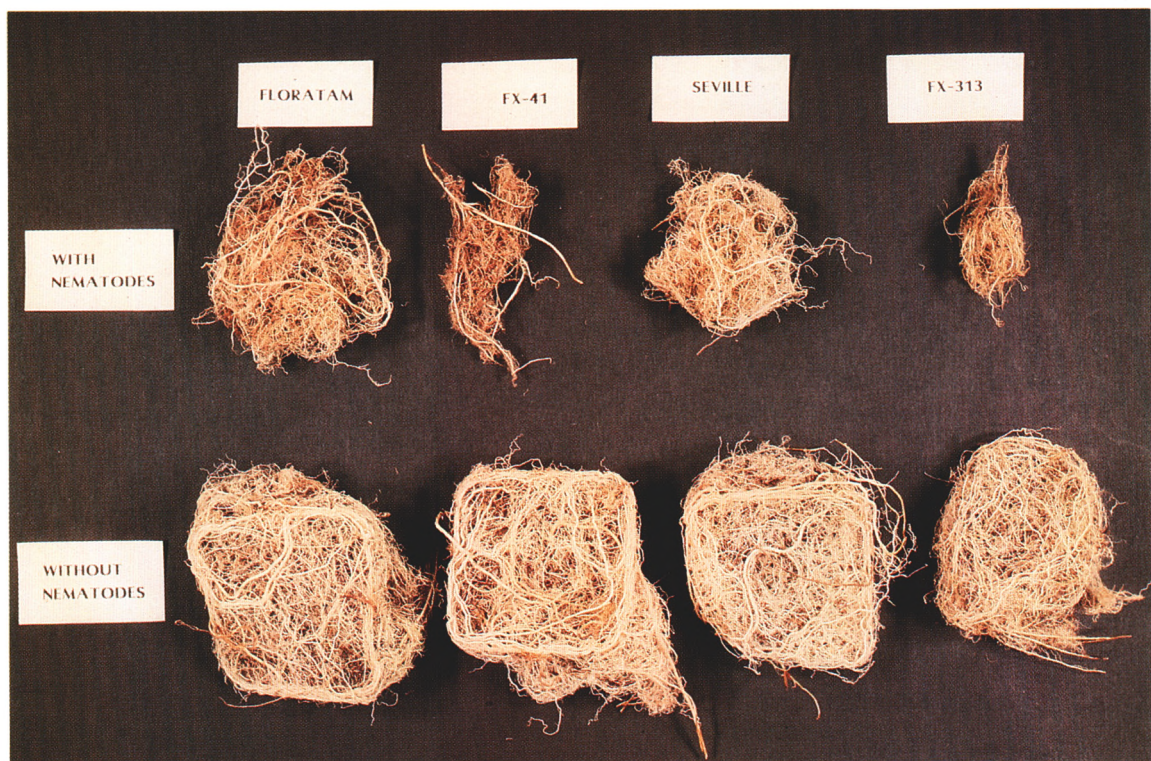
Examples of these tactics can be seen in basic course management programs.

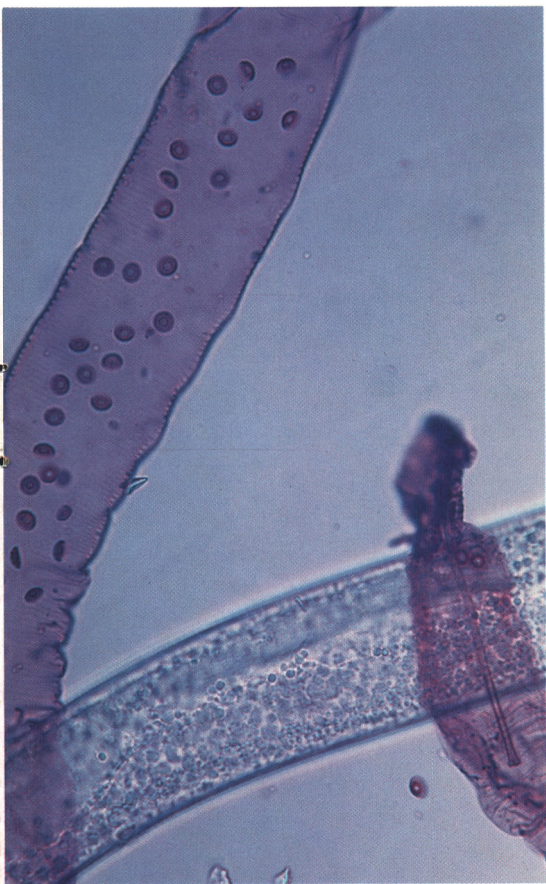


(Above) Correcting situations which limit turf growth and quality, such as poor drainage, are as integral to successful pest control as knowing the correct rate of a particular pesticide to apply.

(Right) Nematode populations on St. Augustinegrass.

(Opposite page) The control of sting nematodes with a bacterial organism.





Regulatory — Typically this involves governmental or industry practices such as inspection and/or certification of seed or vegetative planting material.

Genetic — Without a doubt the oldest and most widely used pest control measure of all. The use of naturally occurring resistant varieties of turfgrass, or the development of resistance through breeding programs has and will continue to provide a defense against pest activity. The rapidly growing science of genetic engineering should lead to further advances in this area.

Cultural — It is well known that a healthy, dense, and actively growing stand of turf will compete against weed invasion. Also, a healthy turf will tolerate and recover more rapidly from attacks of insects and diseases. Thus, the practices of proper fertilization, irrigation, and mowing frequency, along with other basic cultural management practices such as aerification and verticutting for thatch control can be considered as pest control measures.

Biological — This is one area that has received increased attention for quite a few years. Biological control is the use of natural enemies such as diseases, parasites, or predators against a target pest organism. In Florida, mole crickets

annually damage a tremendous amount of golf course turf. Research efforts are underway to develop biological control of mole crickets by using all of its known natural enemies. Another example of biological control is milky spore disease (*Bacillus popilliae*) of Japanese beetle grubs, which has had some commercial success. However, the practicality of biological control tactics on golf courses may be limited because of the lag time between implementation and control, which results in a potential for unacceptable damage. Also, the regular use of pesticides typically has a negative impact on control organisms.

Physical — The simple act of cutting a goose grass crown out of a putting green would be classified as a form of physical pest control. This and other activities such as trapping June beetles or even correcting a drainage problem are useful tactics that definitely should be incorporated into the total pest management program.

Chemical — When IPM systems were first initiated, environmentalists thought all agricultural endeavors could be handled on a purely organic level, while at the same time, pesticide manufacturers opposed IPM because of the presumption that they would be put out of business. In reality, both groups were wrong, because it is a fact that pest problems are not going to disappear. On a golf course where acceptable thresholds are quite low (and actually zero in the putting green area), the selective use of chemicals will continue. As for pesticides in an IPM program, the objective is intelligent use. Frequent observation, accurate record keeping, and evaluations for alternative control methods or adjustments to basic management practices precede the application of a pesticide. The pest organism must be accurately identified so that the most effective control material can be used.

In reality, IPM is not a totally new technology or method of pest control. Without a doubt, at one time or another, every golf course in the country has applied IPM tactics. For the most part, however, they were probably not done with the conscious thought of developing a total program. But in a few cases, IPM programs have been developed specifically for courses.

Brunswick, Georgia, located on the lower coast, has been an active seaport since the late 1700s, when cotton was king. In 1897, mole crickets were introduced into the United States at Brunswick in ships' ballasts. Because it had no natural enemies, and the long hot sum-

mers, mild winters, and sandy soils of the area were an ideal environment, the mole cricket easily became established. The lush turf of the golf courses that were developed later on the Barrier Islands near Brunswick also proved to be an excellent host for mole crickets. But as long as long-residual insecticides were available, mole crickets really were not a problem. That was true until federal and state laws removed these materials from the marketplace.

Since their initial introduction, mole crickets have gradually spread through the coastal areas of the Southeast from the Carolinas to Texas. They have developed into a major turfgrass pest, with damage and control efforts estimated to exceed \$44 million annually in Florida alone.

Even though state and federal agencies conduct active research on mole crickets, the problem had become so severe in the Brunswick area that Tom Burton, golf course superintendent of the Sea Island Golf Club, spearheaded a private, cooperative mole cricket management and research program in 1987. The project has been funded by the Sea Island Golf Club, the Jekyll Island Authority, and Sea Palms Golf and Tennis Resort.

Dr. Leon Stacey, an entomologist and consultant, was hired to head the project, and through the incorporation of various IPM strategies, a very successful mole cricket control program was developed.

The key to success of this program has been proper timing of insecticide applications. Linear pitfall traps were installed on the golf courses to monitor mole cricket activity. The traps were checked once or twice a week, and females were dissected to observe the stages of egg development. It was then possible to predict when peak egg hatch would occur and the most appropriate timing of control applications. Besides tremendously improving control results, insecticide usage and control cost has been significantly reduced. It should also be noted that work was conducted to determine the most effective control materials.

A great deal of research and work is still necessary in the development of total golf course IPM programs that encompass both turf life cycles and pest control strategies. There is certainly no reason not to take advantage of existing technology. Hopefully, after a review of the IPM mentality, a different perspective on the management of pest problems can be put to beneficial use at your course in the control of the spectrum of pest problems that are an inevitable part of course management.

Drought Resistance Comparisons Among Major Warm-Season Turfgrasses

by **KI S. KIM, JAMES B. BEARD, and SAMUEL I. SIFERS**
Turfgrass Physiologists, Texas A&M University

RESearch at Texas A&M University reveals substantial differences in drought resistances not only among the major warm-season turfgrass species but also among varieties within species.

Drought resistance is the term that encompasses a range of mechanisms whereby plants withstand periods of dry weather. The dimensions of drought resistance are drought escape, drought avoidance, and drought tolerance. A green turf provides an aesthetically pleasing landscape with a number of functional roles, such as evaporative cooling, soil and dust stabilization, safety, and reductions in noise, glare, and air pollution.

Water availability recently has become a major limiting factor in growing turf-

grasses in many areas. Without water, turfgrasses go dormant and may eventually die. A brown turf can add an attractive dimension to landscapes, but its functional roles, such as evaporative cooling, safety, air pollutant absorption, and recuperative ability, are minimized. Furthermore, dead turf areas usually need to be replaced, probably at a higher cost. Thus, selecting the proper turfgrass species and/or cultivar is a key step towards minimizing drought damage.

Conducted under a United States Golf Association Green Section grant, research at Texas A&M University has delineated the comparative drought resistances among 11 major warm-season turfgrass species, and also among 22 bermudagrass,

five St. Augustinegrass, six zoysiagrass, and four centipedegrass cultivars. The drought stress was imposed on these turfgrasses for 48 days before irrigation was reinitiated. The turfs were grown in the field on a 30-inch-deep sand root zone over eight inches of gravel in a random block design with four replications.

Researchers measured a plant's drought resistance by how well and how quickly shoots recovered after stress. Since quality is an important factor in growing functional turfs, leaf firing during moderate to severe drought conditions should be taken into consideration in selecting turfgrass species and cultivars. Significant differences in drought re-

TABLE 1
Warm-season interspecies drought resistance and leaf firing comparisons
representative of the most widely used cultivars of each species.

| Relative Classification | Leaf Firing | Drought Resistance (Shoot Recovery) |
|-------------------------|--|--|
| High | St. Augustinegrass | Zoysiagrass Bermudagrass Centipedegrass |
| Medium | Seashore paspalum Buffalograss Bahia grass | Seashore paspalum Buffalograss Bahia grass |
| Low | Centipedegrass Bermudagrass Zoysiagrass | St. Augustinegrass |

sistance showed among turfgrasses not only in shoot recovery but also in leaf firing (Table 1). Centipedegrass showed surprisingly good drought resistance. There was an opposite relationship between leaf firing and shoot recovery for each species and cultivars. This means that those turfgrasses that turn yellow or brown earlier tend to have poorer

post-drought stress shoot recovery, in other words, poor drought resistance.

Most zoysiagrasses and centipedegrasses showed good to excellent drought resistance with minor leaf firing (Table 2). However, there were very significant variations among both St. Augustinegrasses and bermudagrasses (Table 2).

St. Augustinegrass is regarded as medium drought resistant. Floratam and Floratam, however, exhibited excellent drought resistance and very little leaf firing. In contrast, bermudagrass generally has excellent drought resistance. Santa Ana, Tifway, and Tifway II have only medium drought resistance and high leaf firing.

TABLE 2
Comparative drought resistance and leaf firing among cultivars
within the zoysiagrasses, centipedegrasses, and St. Augustinegrasses

| Turfgrass Species | Relative Classification | Leaf Firing | Drought Resistance (Shoot Recovery) |
|--|--------------------------------|-----------------------------------|--|
| Zoysiagrass (<i>Zoysia</i> spp.) | High | Korean Common Belair Meyer | FC 13521 Meyer |
| | Medium | Emerald | El Toro Emerald |
| | Low | El Toro | Belair Korean Common |
| Centipedegrass (<i>Eremochloa ophiuroides</i>) | High | AU Centennial | Georgia Common |
| | Medium | Tennessee Hardy AC 26 | Oklawn AC 44 Tennessee Hardy |
| | Low | Georgia Common AC 44 Oklawn | AC 26 AU Centennial |
| St. Augustinegrass (<i>Stenotaphrum secundatum</i>) | High | Texas Common Raleigh | Floralawn Floratam |
| | Medium | Tx 8262 | Tx 8262 |
| | Low | Floratam Floralawn | Raleigh Texas Common |

*Photos of comparative shoot recovery/drought resistance following 48 days of drought
and a subsequent 18-day irrigated post-drought recovery period.*

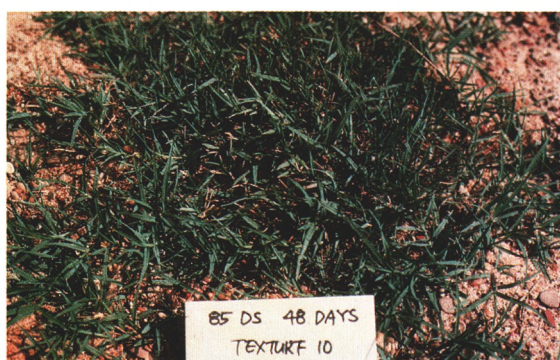
BERMUDAGRASS



Tiffine



Tifgreen



Texturf 10



Tifway



Tifway II

ZOYSIAGRASS

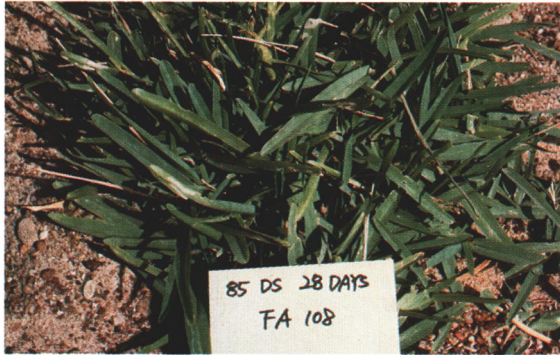


Emerald

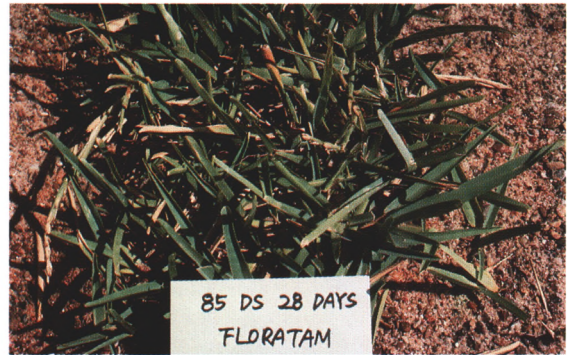


Meyer

ST. AUGUSTINEGRASS



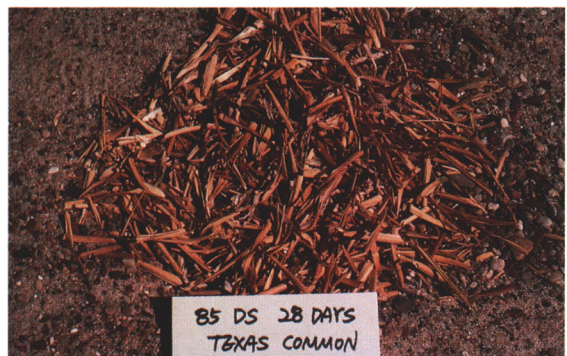
Floralawn



Floratam

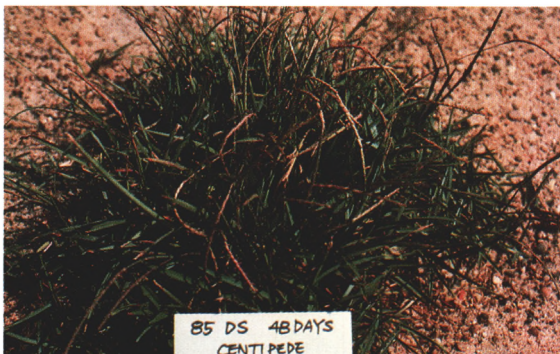


Raleigh



Texas Common

OTHER WARM-SEASON GRASSES



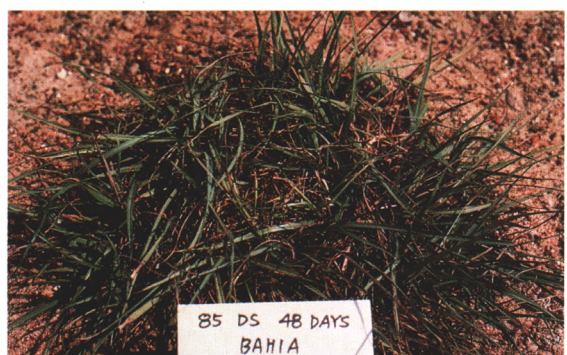
Centipedegrass



Buffalograss



Seashore Paspalum



Bahiagrass

News Notes For Autumn



Turfgrass Advisory Service Fees To Increase Slightly in 1989

The USGA Executive Committee has approved a small increase in Turfgrass Advisory Service (TAS) fees for 1989 to compensate for increased airfare, ground transportation, and other operational costs. As with all USGA activities, the Green Section TAS is offered on a non-profit basis to all member clubs. The Green Section mission is to assist clubs in the development of better turf for golf through direct visits to subscribing courses and direct support of turfgrass research. The 1989 fee schedule is:

One Half-Day TAS Visit:

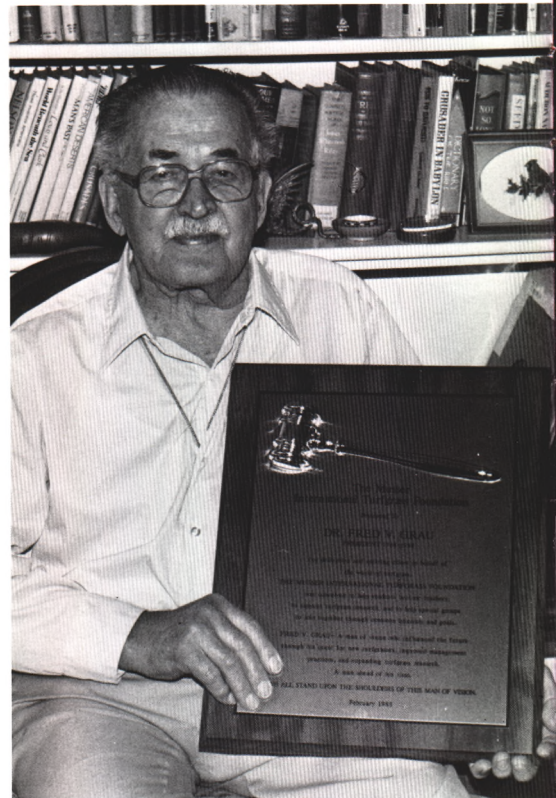
| | |
|----------------------------------|--------|
| If paid by April 15 | \$600. |
| If paid April 16 - July 15 | 650. |
| If paid after July 15 | 750. |

One Full-Day TAS Visit:

| | |
|----------------------------------|---------|
| If paid by April 15 | \$ 900. |
| If paid April 16 - July 15 | 975. |
| If paid after July 15 | 1100. |

Each TAS visit is followed by a written report summarizing the discussions and recommendations of the visit. Additional assistance through telephone calls, correspondence, regional meetings, and at turf conferences nationwide is also part of the total program. Last year, nearly 1,400 golf clubs subscribed to TAS, a new record!

The Green Section staff is comprised of 12 trained and experienced golf course agronomists located throughout the United States. Because they have nothing to sell but service, their views and recommendations are totally unbiased. There is no comparable turfgrass advisory service like it anywhere in the world. And a Green Section visit still costs less than one quarter of one percent of most golf course maintenance budgets today. The Turfgrass Advisory Service can help you to better golfing turf in 1989. It's a bargain you can't afford to miss.



Dr. Fred V. Grau, Honorary Life Chairman of The Musser International Turfgrass Foundation.

Dr. Fred V. Grau Receives Musser International Turfgrass Foundation Recognition Award

Dr. Fred V. Grau has been made Honorary Life Chairman of The Musser International Turfgrass Foundation, having served as its Chairman from 1968 to 1988. Dr. Grau's life has been devoted to turfgrass science and teaching. He headed the USGA Green Section following the Second World War for five years and received the Green Section Award in 1969. Almost every other honor in the turfgrass industry has been bestowed on him. His vision and encouragement of young people to enter the profession is unmatched and his influence on turfgrass management throughout the world will long endure.



James E. Connolly Becomes Northeastern Agronomist

James E. Connolly has become the third new member to join the expanding Green Section staff in 1988, replacing Gary Watschke, who resigned in mid-May.

Connolly brings a wealth of academic and field experience to his new post. A 1978 graduate in Turfgrass Science from Washington State University, Jim has served not only as assistant superintendent and superintendent at courses in the Pacific Northwest, but also as a sales representative and pesticide consultant.

He also has warm-season turfgrass experience, serving as a sales representative in Florida, with emphasis on pesticide use and safety.

Connolly served on the board of directors of the Northwest Turfgrass Association for three years, and was an active member of the Inland Empire GCSA, in Washington State. In addition to his turfgrass management experience, Jim has also been active in amateur hockey organizations — which should put him in good stead in New England. The Green Section is pleased to have Jim Connolly as a member of its staff.

ALL THINGS CONSIDERED

Getting The Priorities Straight

by **STANLEY J. ZONTEK**

Director, Mid-Atlantic Region, USGA Green Section

WHEN THE TIME comes for a club to spend money — big money — for capital expenses, the needs of the golf course itself frequently take on a secondary role to the needs of the swimming pool, the tennis courts, or the clubhouse.

You don't believe it?

Just think of the number of clubs that have completed \$1 to \$2 million or more in renovations to their clubhouses or built tennis courts during times of tight money and recession and compare them to the number of golf courses that have spent the same amount of money on new maintenance buildings, rebuilding poorly built greens, installing up-to-date irrigation systems, or replacing old, worn-out maintenance equipment on a regular, scheduled basis. On a smaller scale, which often comes first . . . repairs to the swimming pool, new carpets or drapes in the clubhouse, or a new tractor? More times than not, equipment for the golf course is deferred.

Are golf course superintendents bad salesmen? Or have today's golf clubs and golf facilities misplaced their priorities?

In my experience, probably a little of both. Of all the physical assets of today's modern and complete club facility, the golf course itself remains the main attraction. Around it centers the prosperity and the reputation of the entire club.

How often is a club really remembered for its great gourmet meals, or for its colorful swimming pool cabanas? Most clubs are remembered for their golf courses . . . how they look, how well they are turfed and manicured, and how well they play.

It truly is a credit to today's golf course superintendents and their hard-working crews that, in many instances, golf courses are in such great condition in spite of modest maintenance budgets, poor irrigation systems, old maintenance equipment, poorly built putting greens, and maintenance buildings that even now lack proper lighting, heat, sanitary facilities, pesticide storage, and equipment repair areas.

Obviously, some golf courses have set their priorities properly and have spent

money when and where it was needed, and in almost every instance their courses reflect this philosophy. Regretfully, other clubs have not.

What to do?

The superintendent must be willing to state his case for needed capital expenditure improvements to his committees, governing boards, and/or administrators. Sell your programs because, after all, as their first priority most people join to play golf. In my opinion, if your case is properly presented (perhaps with the help of your regional USGA Green Section Agronomist), the decision makers will understand that the needs of the golf course must come first.

Perhaps in the future the following scenario will take place at a board of directors meeting: "Gentlemen, the motion is passed. We will replace the old irrigation system, renovate the golf course superintendent's maintenance area, and then replace the carpets, drapes, and furniture in the clubhouse. After all, the golf course is our first priority."

TURF TWISTERS

YES! THE LIBRARY OFFERS

Question: I note with considerable interest the USGA Turfgrass Information File (TGIF) is now available and on line in its home at the Michigan State University Library. But does it contain any information on warm-season grasses, warm-season research, and warm-season management? (Georgia)

Answer: Absolutely yes! The TGIF library has the latest research and reference information on all turfgrasses and related subjects. Write today:

Turfgrass Information Center
Library W — 212
Michigan State University
East Lansing, MI 48824

for complete details. Whether you are in Anchorage, San Juan, Bangor, or Pukalani, TGIF is ready to serve your turfgrass informational needs.

A GOOD CONTACT

Question: My golfers *hate* overseeding time, with all the disruption to the playing surface. Just how important is it to really tear into the thatch and soil when renovating and overseeding a fairway, or any area for that matter? Am I doing more tearing and disruption than I really have to do? (Kentucky)

Answer: No. Research data as well as experience has established the absolute necessity of making good soil-to-seed contact for a good overseeding catch. This small fact oftentimes just is not appreciated as being perhaps the single most important factor in determining the success (or failure) of an overseeding program. Perhaps to better inform your golfers, remind them that with the high cost of seed, fertilizer, water, labor, and equipment necessary in the overseeding process, the better the catch, the less overseeding that ultimately may have to be done, and the less total disruption to the playing surface there may have to be into the future. No one likes the inconvenience, but during the overseeding process it is necessary and so very important to place the seed through the thatch and into the soil. Thus, a little inconvenience in the short term can mean a real long-term improvement in the quality of turf to be renovated and overseeded.

FOR BUNKER SAND INFORMATION

Question: This fall we are replacing all the sand in our sand bunkers. Are there USGA specifications to be followed concerning bunker sand? (Texas)

Answer: Though there are no formal USGA specifications for bunker sand, there are guidelines you should follow when choosing sand.

- (1) Minimum of 65% sand particle size between .25mm and 1.0mm.
- (2) Ideally 100% between this range — .25mm and 1.0mm.
- (3) Sharp, angular sand preferred to round particle shape.
- (4) Light colored, not white sand.
- (5) Minimal amount of silt and clay, determined through soil testing lab analysis.
- (6) Silica sand rather than calcareous sand.