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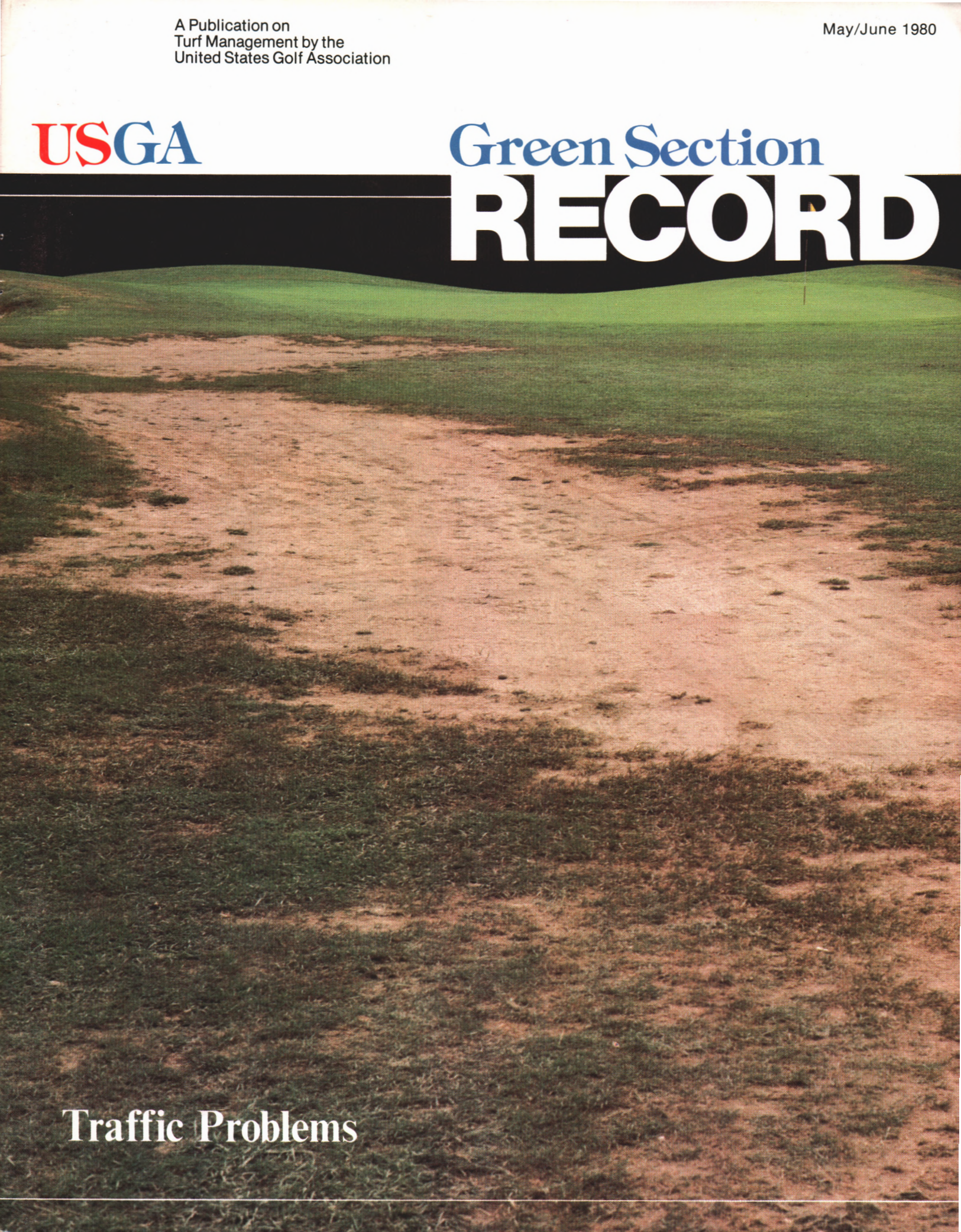

Traffic Problems

USGA

Green Section RECORD

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Cover Photo:
Foot and golf cart traffic on a heavily played public course where areas of turf are bruised, battered and mostly bare.

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Turfgrass damage caused by golfers moving through a confined area.

Bruised, Battered, and Bare

by DONALD D. HOOS,
Director, Western Region, USGA Green Section

WE'VE ALL SEEN them — the large bare areas near the first tee, the scarred turf at the end of a cart path, the deep worn path between bunkers, the cumulative effect of thousands of rounds of golf and of golfers moving over the course by foot and in carts. We all complain about traffic, but can we do anything about it?

Wear injury is the term we now use to describe the effects of concentrated traffic on turf. Bruising of the leaves is probably the most common type of turfgrass wear. Some cells are ruptured, and frequently the leaf blade dies. Bruising can also create points of entry for disease organisms.

Moisture stress increases the potential for turfgrass damage. Dr. Marvin Ferguson, former Green Section Director, cites the example of a tire filled with air to describe what happens to turfgrass plants under moisture stress conditions. A tire with adequate air pressure supports the weight of a vehicle with no harm to the tire. If it goes flat, the tire is soon destroyed. Similarly, a turgid cell (one with adequate water) supports weight without injury, but the flaccid cell (one under moisture stress) does not.

Although bruising of the leaves can cause problems, the grass plant normally recovers from this type injury. Injury to the crown or the roots of the plant caused by concentrated and prolonged traffic (either vehicular or foot) over a small area is of greater concern. When the regenerative cells of the crown are damaged, the plant's ability to recover is lessened. As turfgrass managers, we strive to spread traffic over a wide area and adjust our management practices to prevent permanent damage to the turfgrass plant.

Traffic damage is usually obvious to even a casual observer; damage to the underlying soil, however, may not be as noticeable. Foot and vehicular traffic can press soil particles together and create compaction. On clay soils, compaction reorients the clay particles into flat platey layers that restrict air and water movement. Compaction reduces non-capillary pore space, inhibits water infiltration and percolation and reduces oxygen diffusion in the soil, leading to a buildup of carbon dioxide and other gases that are toxic to the root system. As compaction increases, root growth ultimately decreases.

Soil compaction is influenced by soil texture, soil moisture, the severity and type of pressure applied, and the type of vegetation involved. Finer texture clay soils are more easily compacted than sandy soils. Soil modification in the

upper two to three inches with medium to coarse sands can reduce the potential for compaction. Soil is difficult to compact when it is very dry. The potential for compaction increases as soil-water content increases. For example, a 200-pound golfer exerts less pressure per square inch on turf if he is wearing smooth, rubber-soled shoes or golf shoes with recessed spikes than if he is wearing golf shoes where the points of contact with the ground are reduced to the raised areas around each golf spike. Maintenance equipment with narrow tires also exerts more pressure per square inch than equipment with wider tires. Higher mowing heights and thatched turf can also dissipate some of the compaction because of the cushioning effect of plant mass on the soil.

Traffic is a fact of life for present-day golf courses. Many of our older courses were originally designed to accommodate 250 to 300 rounds of golf a week; today they must handle that many rounds in a single day. Turfgrass wear and compaction will result unless management practices are tailored to counteract the effects of traffic in congested areas. Some solutions to our traffic problems can be achieved by agronomic practices; others must be solved by design and routing changes. The first step is to evaluate the reasons why the problem areas develop, then devise corrective programs to cope with problem areas.

Introduce Tougher Grasses

Certain cultivars are more resistant to wear injury than others. Warm-season grasses (except when dormant) are tougher and more resistant to wear than the cool-season grasses. The bermuda and zoysia grasses will tolerate more traffic than species of cool-season grasses, such as the ryegrasses, the bluegrasses, the fescues and the bentgrasses. Of the cool-season strains, perennial ryegrasses are proving to be most wear-resistant. The more wear-tolerant grasses usually have a tougher, coarser stem, a higher shoot density and a higher lignin content. On northern courses, the use of a perennial ryegrass at the end of a cart path would be a better choice over any of the bentgrasses. In areas where bluegrass is the dominant grass, a perennial ryegrass/bluegrass mixture in high traffic areas is worth consideration. It is beneficial to overseed traffic-worn areas regularly, using equipment that places the seed directly in contact with the soil.

Use Fertilizers Wisely

As the soils in wear areas become compacted, the root system is weakened. Roots are shortened, and the ability of the plant to take up nutrients and water is affected. The plant can no longer reach deep into the soil for the nutrients it needs for recovery. Excessive nitrogen fertilization stimulates rapid shoot growth and produces a soft, succulent growth and makes the plant more injury-prone. An optimum balance of nitrogen to stimulate growth for recovery is needed. This balance is best accomplished with light applications of fertilizer at two- to four-week intervals during the growing months.

(Top) Properly constructed cart paths are turf savers. Leaf rake used to groove fresh concrete on path to help prevent slippage.

(Above) If ball washers and benches are permanently installed, paving, gravel or stone chips are more attractive than bare ground.

Higher potassium levels also seem to increase the wear-tolerance of grasses by increasing leaf turgidity. More frequent application of potassium-containing fertilizers to heavy traffic areas near cart paths, tees and greens may be justified.

Adjust Mowing Heights

Several researchers have documented that soil compaction is reduced when the amount of vegetation is increased. Many courses could benefit from using higher mowing heights in traffic areas that are out of direct line of play — for example, adjacent to cart paths near the tees. The only area that needs to be mowed at a low height is the actual teeing ground. The banks of the tee and areas adjacent to the tee and car path could be maintained at rough height. The added height in those locations could be the difference between a good turf cover and bare ground.

Be Sure to Aerate

Aeration is another means of relieving compaction to provide a better environment for turfgrass growth in traffic areas. The removal of a soil core to a depth of two or three inches encourages better water infiltration and root development. Compacted areas at the end of the cart paths, or adjacent to tees that receive heavy traffic, would benefit from more frequent aeration. If we truly want improved turfgrass in these areas, then more frequent aeration is necessary.

Timing of aeration is important. Soil is most easily compacted when it is wet; therefore, in most areas of the country, compaction is most likely to increase in the spring. Aeration in late spring or early summer is good practice. Also, after a summer of heavy play due to the compactive influence of summer irrigation, aeration would be beneficial in late summer or early fall to relieve compaction prior to winter. On warm-season grasses, aeration is scheduled in summer for best results.

Within the past few years, fiber matting has been introduced for use under turf to protect plants and soils in problem wear areas. This material has been used extensively on athletic fields in Europe, and it is now being tried on a limited scale on golf courses. How extensive its use will become on golf courses remains to be seen.

Judicious Irrigation

The manner in which compacted traffic areas are irrigated will influence the ability of the turfgrass to survive. Once the soil is compacted by traffic, water infiltration rates are substantially reduced. Water should be applied only as fast and as long as it will move into the soil. This translates into repeated short irrigation cycles on compacted turf. If your irrigation system is not designed to accomplish this, then perhaps use of slow-delivery movable sprinklers is warranted. At the Waverley Country Club, in Portland, Oregon, Rich Schwabauer, the course superintendent, makes extensive use of small lawn-type sprinklers on compacted soils with remarkable success. These small, low gallonage sprinklers are moved several times daily by the sectionmen. It has resulted in less runoff, fewer puddles and standing water, and happier golfers.

All of these agronomic practices are time-consuming, of course. The total acreage affected by these practices will be different at each golf course. However, these practices will reduce the scars caused by heavy traffic. If we expect improvement and good turfgrass, then our budget and planning processes must reflect the added expense to accomplish these goals.

Correct Any Design and Construction Problems

We sometimes encounter traffic and compaction problems because of original design features of the course or the way in which cart paths or similar installations are added. There has been much written and said on this subject and many ideas presented in the past are still relevant today. They should be kept in mind if your course is adding, relocating or improving existing cart paths.

Cart paths leading from tees should curve gently away from the intended direction of play into the rough area or trees. This will encourage a dispersion of traffic over a wider area as the golfers realize that the path is not taking them where they want to go. If this doesn't work, then the use of directional signs and barricades can be used to good advantage.

In areas where golfers have a tendency to pull off the path onto the grass, a low curb can be valuable. The turf and soil should be raised to the level of the curb for ease of maintenance. The curb will help stop the breakdown on the side of the path and will keep the soil and turf near the tee protected.

Another common problem is the entrance and exit areas of tees and greens. Every effort should be made in design to disperse the traffic over as wide an area as possible. On tees, use of portable ball washers and benches is helpful in spreading traffic. If immovable washers are used, paving around the washer is helpful. Narrow paths that funnel around greens and between bunkers may require widening by slightly reshaping one or more bunkers to better disperse traffic.

Problems associated with traffic present a constant challenge. To cope with traffic is part of every good management program. Without heavy play, many courses, but especially our public courses, would not survive. Good management includes intelligent fertility, aeration, irrigation and mowing practices to minimize the effects of traffic. Turfgrass plants can survive if we create a healthful growing medium for them.

Curbs at strategic locations can help reduce turfgrass wear.

Bermudagrass surviving in the center of spring deadspot areas forming the ring-shaped spots that develop after the disease has occurred in the same spot for several years.

Spring Deadspot of Bermudagrass

by LEON T. LUCAS, Department of Plant Pathology,
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SPRING DEADSPOT (SDS) is the most serious disease of bermudagrass throughout the north range of adaptation of bermudagrass in the United States. Recently, a workshop was held on SDS, and information was gathered to determine the distribution of this disease. The northern limit of SDS corresponds with the northern range of adaptation of bermudagrass. The southern range of SDS appears to be related to the regular occurrence of freezing temperatures where bermudagrass goes dormant during the winter. The area in this zone includes portions of Maryland, Virginia, North Carolina, South Carolina, Georgia, Kentucky, Tennessee, Alabama, Mississippi, Louisiana, Arkansas, Illinois, Missouri, Kansas, Oklahoma, Texas, New Mexico, Arizona, and California. Published reports and personal communications indicate that the disease has been observed on bermudagrass in all of the above states except New Mexico and Arizona. The disease is not known to occur in Florida and has not been observed in the southern portion of other Gulf Coast states.

The symptoms of SDS were first described in a publication from Oklahoma in 1960, although information indicates that the disease was present in Oklahoma as early as 1936. Symptoms on pure stands of bermudagrass are circular dead areas in the spring as the grass resumes growth from winter dormancy. The spots may vary in size from a few inches to several feet in diameter. Weeds often invade the affected spots and inhibit the growth of bermudagrass into the affected spots during the summer. Even with a good weed-control program, the growth of bermudagrass over the spots is slow, indicating the presence of a pathogen or toxin in the soil.

The bermudagrass usually grows over the SDS areas by the end of the summer in North Carolina; however, reports from drier areas of the country indicate that the spots may remain bare for several years. The affected spots can be seen in fall and winter on taller cut

grass in roughs and on some fairways as areas with shorter grass that remain green later into the fall than the nearby healthy grass. Spots can sometimes be detected on highly maintained shorter cut grass on fairways and greens during the fall and winter as areas with thin turf or depressed areas with very little thatch. Symptoms on overseeded bermudagrass greens often resemble brown patch in the spring. In this case, the dead circular areas of bermudagrass show through the overseeded grass after the surrounding bermudagrass has turned green, giving the healthy turf a darker color.

The cool season grasses will often remain in the SDS areas longer into the summer, and bentgrass used in some overseeding mixtures has been observed in affected spots for several years. Many of the spots occur in the same location for several years and develop into ring or doughnut shaped spots. The spots develop the ring shape as bermudagrass begins surviving in the center of the affected areas.

THE DEVELOPMENT of SDS has been followed over a period of three years at several locations in North Carolina. In one place, 80 percent of the spots occurred in the same place the following year with an average increase in diameter of the spots of about 15 percent. After about three to four years, bermudagrass begins surviving in the center of the spots. Usually, the symptoms of SDS disappear in North Carolina one or two years after the ring-shaped symptoms develop.

SDS was recognized as a problem in North Carolina in the late 1960s. The disease probably was present earlier, but it was not so evident until good winter weed-control programs came into use. The spots are clearly evident on bermudagrass fairways where *Poa annua* and other weeds have been controlled and not in areas with weeds. Many golf course fairways were planted to improved bermudagrass varieties a few years before this time and received high rates of nitrogen fertilizer. The higher level of management and thatch accumulations are factors that have been associated with the development of SDS.

Since the cause of SDS was not known and a good chemical control was not available in the United States, studies were initiated in North Carolina using high rates of several new fungicides in 1973. In these experiments, fungicides were applied once a month for six times in late summer and fall, based on information developed by W. A. Small, of Mallinckrodt Chemical Company, to bermudagrass that had severe SDS the previous spring. Control of SDS was obtained with heavy rates of fungicides containing benomyl, thiophanatemethyl or PCNB but not with several other fungicides the following spring.

Additional experiments were conducted using fewer applications and lower rates of fungicides in which fall applications gave the best control (Table 1). Control of SDS has been obtained in more recent experiments with one application of benomyl at eight ounces per 1,000 square feet in October or November on larger areas on fairways. Additional experiments are in progress to evaluate other fungicides and to obtain information needed to apply for a label to use these fungicides to control SDS.

One of the most significant results of these experiments was the increase in severity of SDS following heavy applications of nitrogen in late August and September to turf that was affected with SDS the previous spring. Extra nitrogen has not caused the disease to develop after three years in areas that have not had the disease. The control of SDS with benomyl may indicate the involvement of certain types of fungi in the disease. *Helminthosporium* species that are not generally sensitive to benomyl are not indicated as primary pathogens in SDS, although these fungi have been associated with the disease. Phycomycetes such as *Pythium* species were not indicated, since these fungi usually are not sensitive to benomyl and the disease was not controlled with a fungicide containing chloroneb.

THE SURVIVAL of bermudagrass in SDS-affected areas was followed during three winters in North Carolina. The bermudagrass in SDS areas and nearby healthy areas regrew equally well when plugs were collected in December and placed in a warm greenhouse for one month. However, when samples were collected in late January or February and placed in the greenhouse, the number of shoots from SDS affected turf was 64 percent less than from nearby healthy turf.

The survival of bermudagrass in SDS-affected turf that had been treated with benomyl in November was the same in January and February as for healthy turf.

Throughout these experiments, lower weights of roots were associated with SDS-affected turf. This information indicates that the bermudagrass in SDS areas is probably killed by cold weather

TABLE 1
Effect of Time of Application of Benomyl on Control of Spring Deadspot in 1976 Experiment at Raleigh, North Carolina

Treatment[1]	Turf Quality[2] 5-11-77	% SDS[3] 5-11-77
Oct., Nov., Dec.	6.3*	7*
Oct.	5.8*	9*
Nov.	5.5*	9*
Dec.	4.8	15
Check	3.5	21
LSD (.05)	1.4	10

[1]Benomyl applied at 10 oz. of formulated product per 1000 ft[2] once a month for the months indicated in 1976 to an area that had severe spring deadspot in the spring of 1976.

[2]Turf quality ratings were 1-9 with 9 being a good uniform turf and 1 indicating all turf was dead.

[3]Percent of area in a plot dead from spring deadspot in May following fall applications.

in January. The benomyl may be controlling a fungus on the bermudagrass or it may be increasing the winter hardiness of the SDS-affected turf.

This fungicide has some growth regulator properties that could affect the winter survival of bermudagrass. Additional research is in progress to determine how the fungicide protects the grass during the winter.

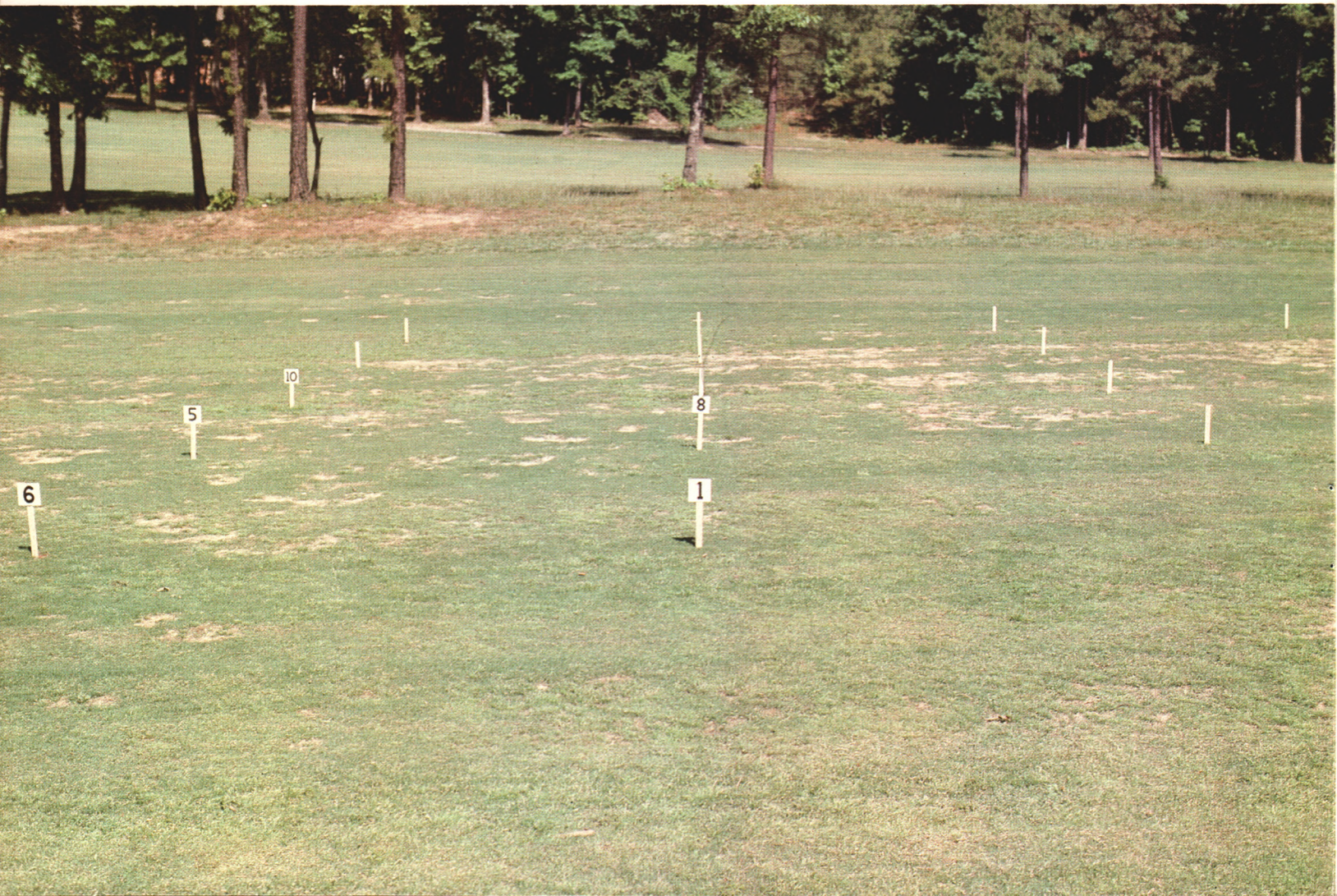
Efforts have been made to associate a pathogen with SDS in North Carolina. The fungus, *Leptosphaeria narmaria*, that has been associated with SDS in Australia has not been isolated in North Carolina. Other fungi have been isolated from bermudagrass but have not been shown to cause SDS.

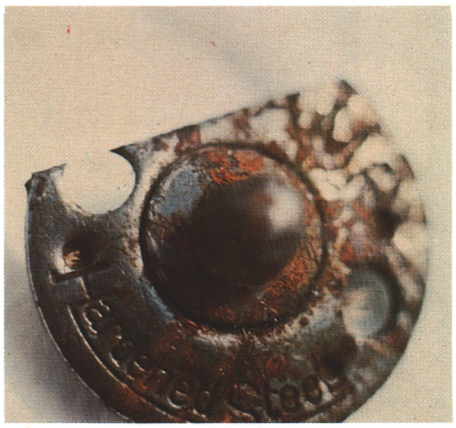
In North Carolina, several different mushroom-type fungi were associated with some SDS-affected areas. Several of these fungi were used to inoculate soil in the greenhouse and affected top and root growth of bermudagrass in greenhouse experiments. These normally saprophytic fungi that decompose organic matter and thatch may be involved in the disease and could produce the small fairy-ring-type symptoms that develop after several years.

At present, a theory for SDS development involves the predisposition of bermudagrass to damage by cold weather in small areas by some type of fungus. Bermudagrass that remains green later into the fall and has a poor root system, as in SDS-affected turf, would be more susceptible to damage by cold weather. Also, the zone in which the disease occurs indicates the involvement of cold weather in disease development.

RECOMMENDATIONS FOR the prevention of SDS include the use of lower levels of nitrogen and good management practices to avoid excess thatch accumulations. Once SDS is present, a good aerification and weed-control program will encourage bermudagrass to grow over affected spots. Heavy verticutting during the summer once the bermudagrass begins to grow over the spots should not be used since it removes the stolons that are growing over the spots and reduces the rate of cover. Reduced levels of nitrogen fertilizer, particularly in late summer, has reduced the severity of SDS the following year in North Carolina. Also, adequate amounts of potassium are recommended where the disease is a problem and should improve the winter hardiness of the turf. Fungicides are not yet approved for control of SDS, but they should be economical to use on tees, greens and small areas in fairways in the fall where SDS was a problem the previous spring.

Spring deadspot was controlled in plot No. 1 on the right treated with benomyl the previous fall. Other treatments ineffective.





The mower found this shoe spike first.

Course Care: Responsibility of the Player Too!

by ALEXANDER M. RADKO
National Director, USGA Green Section

THE THEME OF the Green Section's new film, "The Golfer and the Golf Course," is that the player has an obligation to assist in course care. This doesn't mean that he's expected to rise daily at 5 a.m. to begin cutting greens at 6. This is the job for one of the paid crew, someone who also takes pride in his work! What the worker hopes is that all members too have the pride to do things that will help him do his job better. During the course of a round, the player has a chance to observe the work habits of the crew; likewise, the crew has the opportunity to see how the golfer takes care of the course. What the member does or doesn't do makes an indelible impression upon the attitude and performance of the grounds crew.

The worker expects that the golfer will do at least what the rules of etiquette require. The worker doesn't have the time and the work force isn't big enough for him to do his job and pick up after the player. We've heard a player say on occasion, "I pay to play golf, not to replace divots!" Subsequent inspection of that golf course reflects that attitude. If the members don't care, it's easy to guess how the crew will perform.

The film*, which we highly recommend be shown to all club members, makes several points that should help golfers understand that little things and sometimes seemingly insignificant things will help the golf course superintendent and his crew immensely. A number of good points were made in the film; however, some that were not included and some that need elaboration will be featured here. They are as follows:

(1) Discarding cigarette butts. There were fewer problems before filters were added, because a discarded filterless butt would burn out or decompose in a short time. Filters don't disintegrate easily . . . so this suggestion: after each smoke, tear the filter off, discard the butt and place the filter back in the cigarette packet to be discarded at some convenient receptacle later. When discarding the cigarette, toss it in the rough where it's less visible. Never discard or lay a cigarette on the putting surface.

(2) A caddie or player leaning on the flagstick while others are putting is a common practice that should not be permitted. The proper procedure is (a) lay the flagstick on the green (don't drop it), or (b) rest the base of the stick gently on the turf, or (c) hold the flagstick off the ground in some comfortable, nondistracting manner until everybody's holed out.

(3) Leaning on the putter while retrieving the ball from the hole is another practice that should be taboo. The pressure exerted per square inch is significant, and not only causes soil compaction but also makes depressions around the hole.

To determine the force of this action, place the blade or the grip end of your putter on the bathroom scale and simulate the action of retrieving a ball from the hole. If the scale shows 15 to 25 pounds, this translates into 60 to 100 pounds per square inch.

(4) Don't permit players to use the putter blade to pop the ball out of the hole after putting out. This is not the type of example to set in putting green care, and it may mess up the area around the hole if it is done carelessly.

(5) Golfers should make a conscientious effort to tread lightly by taking shorter steps when walking on greens. A regular street-walking gait tends to plant the sharp back of the heel first, causing slight depressions as the golfer strides across greens. Also, to minimize compaction, it helps to walk on and off each green in the most practical direct route.

(6) If you spot any metal object on the course — be it a spike that came off somebody's shoe, a lost tool, a nut or bolt that came off a tractor, or any other metal object — pick it up and place it in the trash basket on the next tee, at the base of the ball washer stand, or next to the tee marker so the worker is sure to see it when he attends to his tee duties the next day. Metal damages mowers.

(7) How to repair a ball mark properly was covered in the film. However, a step-by-step description of how to repair the ball mark is included here, and it may help to display it on locker room bulletin boards. In addition, we include a photo description of how to repair a ball mark when the turf is ripped and a divot is thrown free of the ball mark.

How to Make Repairs

There is a correct way to repair a ball mark. Simply stated, it is to stretch the turf back over the bruised area, then loosen and raise the compacted soil from beneath so that the bruised turf is able to root again.

To loosen the soil, some strong, sharp-pointed instrument is preferred, such as a ball mark repair tool. The instrument must be sharp enough to penetrate the soil easily and strong enough to cut through soil laterally at a depth of one inch or less.

In stretching the turf back over the ball mark area, move soil with it so the turf is not torn loose. After the soil is loosened and raised, the bruised and stretched turf must be pressed down to make contact with the soil again; otherwise, it may dry and die.

If a divot is taken when the ball hits the green and skids, the divot must be carefully stretched and replaced after the steps outlined above are followed. If the divot is mangled beyond salvaging, work harder at stretching the turf over the scar.

*Rental price $10.00 from USGA, Golf House, Far Hills, NJ 07931.

FIG. 1

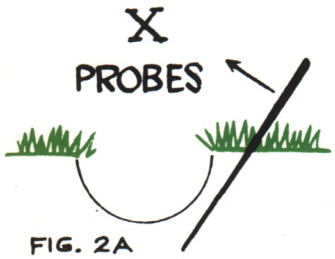


FIG. 2A

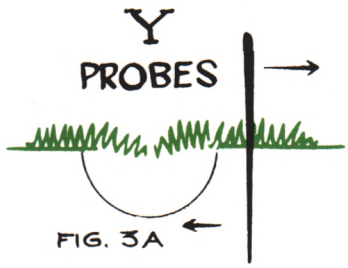


FIG. 3A

FIG. 4

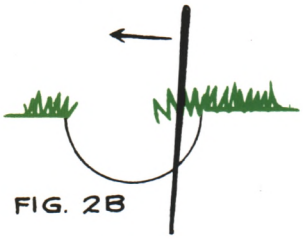


FIG. 2B

FIG. 3B

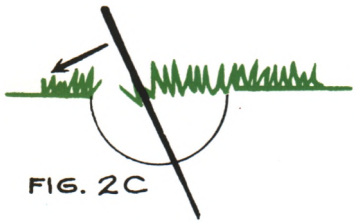


FIG. 2C

FIG. 3C

Figure 1: X marks indicate probe penetration to stretch turf over ball mark. Y marks indicate probe penetration to loosen and raise soil. Figure 4 is result.

Figures 2a, b, c: To stretch bruised turf — place instrument into soil at about 45-degree angle, ½ inch outside perimeter, and stretch turf over ball mark by moving instrument in and down.

Figures 3a, b, c: To loosen soil — place instrument vertically into soil about ½ inch outside perimeter, and press instrument out and down.

Thereafter, firm the turf with putter, palm of hand or shoe (except that on the line of putt you may not step on the damaged area).

The first divot is carefully fitted in place.

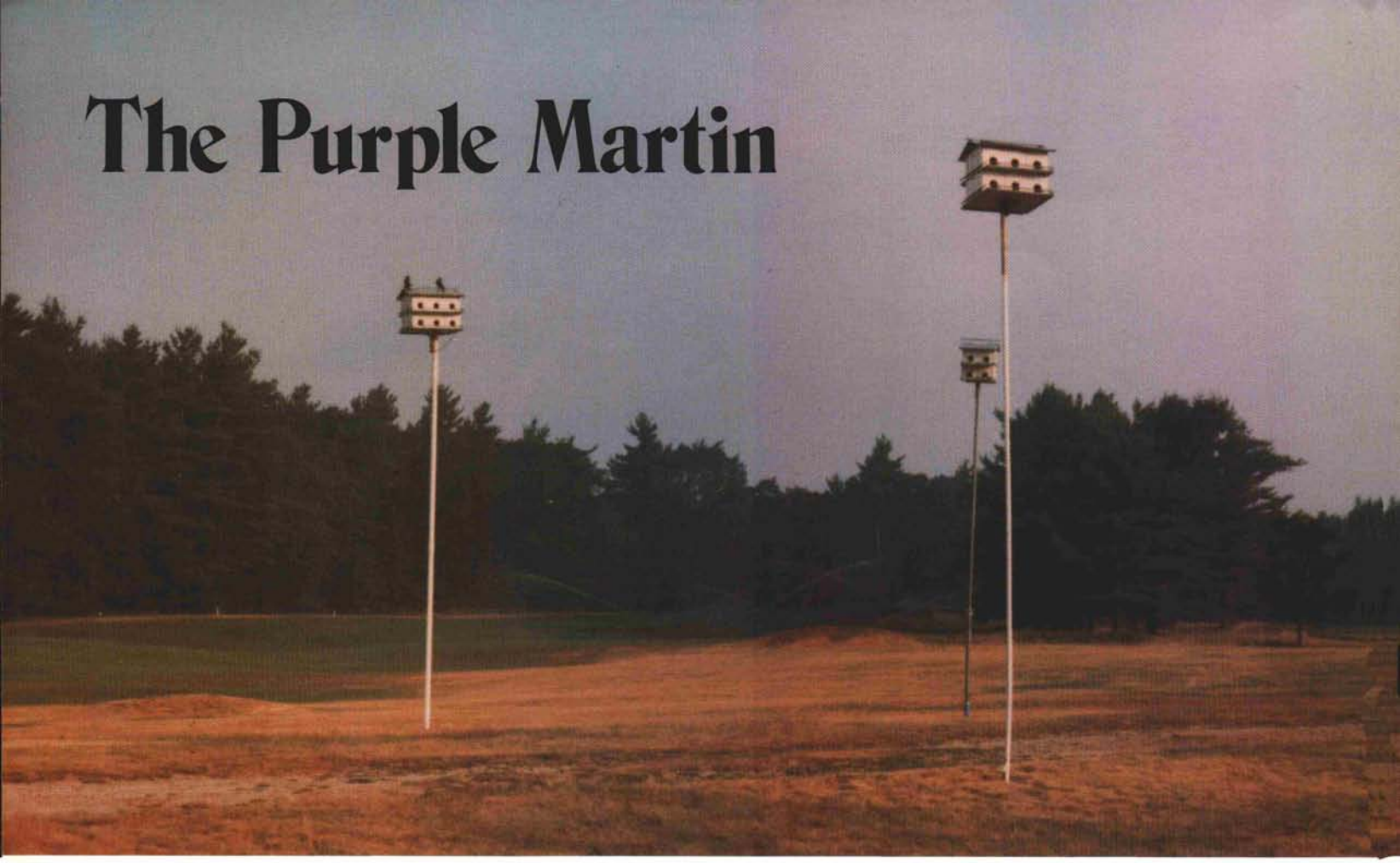
The second divot is similarly replaced . . . with care!

Ball marks and divots.

Ball mark is repaired according to instruction, and divots are carefully stretched.

Once again the putting surface is good as new.

The Purple Martin



To attract martins, place aluminum houses in unobstructed areas.

by JAMES S. O'KELLY, Turfgrass Student,
University of Massachusetts, Amherst, Massachusetts

AS INFLATION and energy crises worsen, as EPA restrictions regulate our every move, and as that projected budget increase in reality turns into a budget cut, an escape is sought to maintain some degree of sanity. At Marshfield Country Club, located on the South Shore of Massachusetts, an effort to relieve some pressure of these problems yielded unexpected and delightful results.

A program of insect control was undertaken, one slightly different in approach. In effect, the program is better, safer, and a far more pleasant way to combat flying insects than the constant fogging of chemicals that envelopes everything in its wake, including humans. How is this possible? The answer, *Progne subis subis*, of course.

The purple martin, *Progne subis subis*, is the largest member of the swallow family. They are migratory birds whose range is one of the widest of all native North American species. The martins spend each spring and summer nesting throughout most of the United States and Southern Canada, and during the winter, they concentrate in the Amazon Valley region of Brazil. During their winter stay, the martins' behavior is unlike that of other birds. They never nest; rather they spend all their time free-flying in the tropical jungle air. Then, sensing the arrival of spring, they return to North America. Martins are very punctual; their arrival can be predicted accurately. An interesting characteristic, proven by bird banders' tests, is that the martin returns to the same house from which it departed in the fall. So, if a colony becomes established, the chances for having them back in succeeding years are good, depending upon such obstacles as severe weather and a scarcity of food during the return flight.

Martins effect a natural insect control program because of their amazing capacity to consume mosquitoes, flies and other flying insects. Experts estimate that one bird can consume two thousand mosquitoes a day, which it instantly snares by means of a sticky oral substance as it darts through swarms of insects in flight. The martin traps flies and mosquitoes, and compresses them into a pellet for its own nourishment or to feed its young. The mosquito's period of greatest activity is just before dusk, and that is when the martin is busiest.

THROUGHOUT HISTORY, the martin has been a friend of man. Indians encouraged the birds to nest in their villages by hanging hollow gourds from poles as birdhouses. The martins were treasured for their appetite for flying insects, keeping villages free of mosquitoes, and for their ability to drive hawks and crows from barnyards

and homesteads. But, rapid development and poor land-use planning has all but devastated the natural habitats of the martin, causing a serious decline in numbers.

Recently, though, efforts have been made to increase the population of this beneficial bird.

In order to attract martins, precise attention must be taken to select the right location and to build a proper house to attract them.

The ideal spot for establishing a purple martin colony is an area where there are no obstructions, allowing air space for them to dart and swoop. Another prerequisite for establishing a colony is to locate the houses in areas likely to be heavily infested with insects (i.e., ponds, low-lying swamp areas). The martins also love to perch on wires.

They like to inhabit man-made houses, and because of their affection for humans, their presence can be cultivated around areas where there is a considerable human activity. Golf courses fit this bill nicely. The martin is an attractive bird, with long and strong blue-black feathers, which, when folded, reach over its short, forked tail. They are skillful and graceful in flight, providing hours of pleasure for bird-watchers.

With the increasing interest in the martin, methods have been developed to provide the most efficient housing possible. This comes in the form of aluminum apartment complexes, ranging anywhere from an established effective minimum of six compartments to the duplex models sporting over one hundred. Wooden houses are not satisfactory because they encourage mites that plague the birds and kill their young. They are also hot. Other obstacles to the martin are the sparrows and the starlings, which are North American habitants year-round, and therefore have first choice of housing in the spring. They love the wooden-type houses. Aluminum houses are cool and clean, and starlings don't like them. Sparrows can be discouraged from moving in before spring by plugging the apartment openings with specially designed covers. Also, innovative telescopic poles are available that permit the house to be lowered to evict the sparrows. Other deterrents involve hanging a loud-playing transistor radio from the birdhouse. Martins love the music, sparrows flee from it.

NOW THAT A location devoid of obstruction is selected in mosquito-infested territory, and an aluminum house has been erected, the anxious wait begins. It often takes two to three years before the martins decide to move in. A close check on these prerequisites is essential. Each is important to the success of attracting martins to any site. Once the martins establish a colony, their homing instinct is so strong that they return year after year. The first sign of purple martin activity is the arrival of a scout, an older male, whose job is to determine the existing food supply and housing for the rest of the flock. If he likes what he sees, the new tenants will move in to stay until the fall when they once again depart for Brazil.

The purple martin is now a permanent attraction at the Marshfield Country Club. They provide an efficient, natural means of insect control that has proven to be an effective and satisfying experience for all privileged to observe their work and graceful flight.

Purple martin at work is a graceful performer.

Measuring and placing the nylon cloth in the bunker base. Its purpose is to keep the new sand from being contaminated with rocks as a result of winter freezing and thawing of the underlying soil.

The finished look!

Bunker Remodeling

by JACK McCARTHY, Golf Course Superintendent,
Old Westbury Golf and Country Club, Old Westbury, New York

THE BUNKERS at our club have been a problem for some time. Sand from their steep faces eroded after even the lightest rains, and stones continuously worked to the surface, creating problems with play, safety, aesthetics and added to labor costs. The mechanical rake, though a great new tool for bunker care, was no help in our case; in fact, it aggravated the condition of surfacing rocks.

Fortunately, at this time of our concern about bunkers, a proposal was presented to the Board of Governors for construction of a new water hole. My chairman presented a plan to tackle both projects on the premise that the soil dug from the pond site could be used to correct our bunker problems. The plan was accepted, and the water hole was dug in the spring of 1976. Excavated soil, according to plan, was stockpiled away from the playing area but close enough that it did not require a lot of trucking. When it was dry, this soil would be screened and used in the bunker remodeling project.

Work on the bunkers began in 1977. The first step was to clean out the old sand. Drainage trenches then were dug through the length of the entire base with a backhoe. Trenches were dug deep enough to reach a permeable strata. The old sand was used to cover the drainage ditches for faster water movement through the bunker.

Almost all the steep faces were removed in remodeling. We were careful to keep the original size of bunkers intact, even though we did alter the faces drastically. We resolved that we would no longer be faced with the arduous task of replacing sand on faces

as before. This was especially important since the innovation of the mechanical sand rake. Sand on shallow faces would less likely be dragged down to the bunker base.

After the bunker was totally reshaped, nylon cloth was laid in the base of the bunker to prevent stones from working their way through to contaminate the sand and to allow the water to drain through and out of the bunker. The nylon mesh cloth is the type used as rug backing. It comes in different widths, but ours was 58 inches wide in rolls of 4,000 square yards. This nylon cloth was selected because it is strong, porous, durable and reportedly doesn't rot.

THE BUNKER WAS graded and shaped in a manner to allow for the nylon cloth to extend two to three feet beyond what was to be the final boundaries for each bunker. The nylon cloth was placed over the area, and then the stockpiled soil was screened and placed over the nylon cloth. After covering the cloth with soil, a small power roller firmed the soil in place.

New sand, which conformed with USGA specifications, was then placed in the bunker to a depth of five to six inches.

It was local Long Island sand, delivered at a cost of $5.50 per yard. No sand was placed on the screened soil around the periphery. This two- to three-foot strip was sodded in order to anchor the nylon mesh cloth firmly in place. We learned the hard way that there are no short cuts to this procedure. One week when rain hampered our soil-screening operation, we gambled on covering the nylon cloth with sand. It didn't work. After a year, the continual use of the mechanical rake caused the sand to shift. Screened soil must be placed on the nylon cloth first in order to stabilize the sand, especially on the bunker face.

The remodeling of bunkers was accomplished in two years entirely by the regular maintenance crew. An average of seven-and-one-half men worked five hours a day on each bunker when the schedule allowed. Weather permitting, the bunkers on one hole were completed in one work-week. At no time was any hole taken out of play. We've been through three seasons with some of these new bunkers, and to date there are no stones surfacing and no shifting of sand. This has made a great difference in maintenance time. Golfers also enjoy stone-free sand in bunkers.

Our next project will be to align and level tees. We look forward to the task. We feel this task is less challenging but every bit as important as the one just completed.

TURF TWISTERS

HERE'S THREE WAYS

Question: Do you have any suggestions for discouraging or eliminating bermudagrass encroachment into my bentgrass putting greens? (Missouri)

Answer: The application of the pre-emergent herbicide siduron, commercially available as Tupersan, at the rate of 13 ounces per 1,000 square feet has been helpful in discouraging some bermudagrass encroachment. Certain varieties of bentgrass, however, are susceptible to siduron or Tupersan; therefore, exercise caution with this method.

It is possible to apply a non-selective translocating herbicide, such as glyphosate, commerically available as Roundup, at the manufacturer's recommended rate. After all the sprayed vegetation has expired, resod the area.

Several golf course superintendents have reported favorable results by sodding six to nine collars every year with bentgrass from the nursery on a two- to three-year rotational program.

TO KILL THE GOOSE

Question: We have an extensive goosegrass problem on our bermudagrass fairways and tees during the summer. People say metribuzin is an excellent control, but we can't use it here. Where is this chemical approved for use on goosegrass? (North Carolina)

Answer: Metribuzin is approved for turf under a 24-C label only in South Carolina, Georgia, Florida, and Mississippi. Excellent post-emergent control is being obtained with the herbicide when used in conjunction with MSMA.

THAT LAYERED THE SOIL

Question: Our golf course lies in a low area that receives heavy runoff from the surrounding housing area. During the heavy winter rains, two fairways were almost completely covered with a silt layer. The silt was removed with heavy equipment and high pressure water hoses. Is there anything else we should do? (Southern California)

Answer: Indeed there is. Even though most of the deposited silt was removed, you can be sure that a layer of silt still overlies your turfgrass and fairway soil. This layer can prevent movement of water and nutrients into the root zone and is certain to cause problems later. A good aeration program to disrupt the silt layer will be required to allow water penetration, to promote good root development and to speed turfgrass recovery.

Celebrating the

60TH ANNIVERSARY

of the founding of the USGA GREEN SECTION

BEFORE

the Green Section, golf courses often suffered huge losses of playing areas . . .

AFTER

Today, 60 years after the founding of the Green Section, ideal playing conditions are common at thousands of golf courses such as Baltusrol Golf Club.

Resolutions Adopted by the United States Golf Association, November 30, 1920

Resolved, That a Green Section of the United States Golf Association be and is hereby created for the purpose of collecting and distributing among members of the Section information of value respecting the proper maintenance and upkeep of golf courses.

The Green Section shall be composed of delegates and permanent members, as herein provided. Delegates may be nominated by any golf club in the United States or Canada, whether affiliated with the United States Golf Association or not, and each such club may appoint one delegate, provided that no person having any direct or indirect financial interest in the sale of any article, material or service used in the maintenance and upkeep of golf courses shall be eligible to membership.

The Green Section shall be conducted by a committee to be known as the "Green Committee of the United States Golf Association," which shall be composed of 25 members, one-half of whom shall be appointed by the president of the United States Golf Association and the other half shall be elected by the delegates and permanent members.

The officers of the Green Committee shall be a chairman and two vice chairmen, who shall be appointed by the president of the United States Golf Association and shall be *ex officio* members of the Green Committee.

The members of the Green Committee shall hold office for one year or until their successors are appointed, and any vacancies occurring in the Committee for any cause shall be filled by the remaining members of the Committee. The number of members of the Green Committee may be increased at any time by a vote of the Committee, and in such case the additional members shall be appointed for the remainder of the year by the Committee and thereafter shall be appointed or elected as herein provided.

Persons who have contributed in a scientific or practical way to the betterment of American golf courses may be appointed permanent members by the Green Committee.

The permanent members and the delegates to the Green Section shall meet at least once a year at the time of the annual meeting of the United States Golf Association or at the time and place of the amateur championship or at a time and place fixed by the Green Committee, and said meeting shall be for the discussion of subjects of interest and the election of members of the Green Committee.

The expenses of conducting the Green Section shall be borne by the clubs which appoint delegates to such section, and the dues of each club shall be fixed by the Green Committee.

60th ANNIVERSARY ISSUE STAFF

The entire staff of the Green Section contributed to this special Anniversary Issue and its success can be attributed to each man as well as Joe Schwendeman, serving as Managing Editor, and Janet Seagle, Art Editor. All of their efforts are appreciated with gratitude.

Alexander M. Radko
Editor

Color cover photo of Baltusrol Golf Club by Leonard Kamsler

Will F. Nicholson, Jr.

The Green Section's Goal . . . the Best Turf Possible

Like so many good things in life, the Green Section of the United States Golf Association is taken for granted. It's always there, season after season, quietly doing the most outstanding job in golf. Also, I must admit, the most underrated job in the game.

During my tenure with the USGA, I was privileged to serve two years as Chairman of the Green Section Committee. It was, indeed, a privilege.

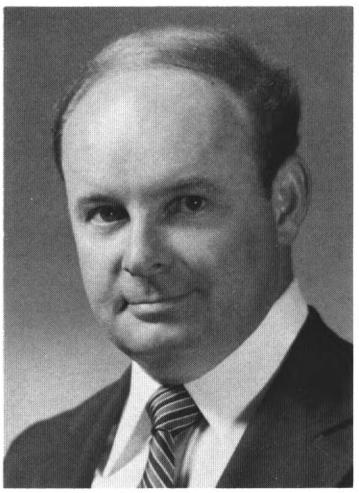
Years ago, I worked one summer mowing tees and greens on a golf course. I also have been Chairman of the Green Committee at the Denver Country Club, at various times, for a total of five years. As a result of those experiences and a lifetime of playing the game, I have become thoroughly familiar with the work of golf course superintendents and agronomists. That background helped me fully to understand and appreciate the work done by members of the USGA's Green Section — those who were then on the staff as well as those who had preceded them. More than once I expressed my gratitude for the high degree of dedication, intelligence and devotion to duty of the Green Section staff. I am happy to do it one more time.

It is the opinion of the USGA Executive Committee that when the Green Section goes to work, the USGA is putting its best foot forward. For 60 years now, no other agency or staff within the game of golf has contributed to the good of so many as has the Green Section. Every golfer, whether he plays on a municipal course or the most exclusive club in the country, owes a very large vote of thanks to the Green Section for the turf on which he plays.

Unknown by virtually every golfer, the knowledge and experience gleaned by the Green Section down through the years has been passed unselfishly along to everyone in the turf-grass trade. It has made no difference whether a club was a USGA member or not; the word was passed — for the benefit of golf and golfers.

We look forward with anticipation to the work of these highly skilled scientists over the next 60 years. Their goal during the next 60 years will be the same as the first 60 — to attain and develop the best turf possible for golf courses throughout the country.

Will F. Nicholson, Jr.
President
United States Golf Association



Melvin B. Lucas, Jr.

Congratulations from the GCSAA

As President of the Golf Course Superintendents Association of America, and a friend and follower of USGA and the Green Section, I wish to send congratulations on behalf of all GCSAA members on your 60th anniversary. GCSAA celebrated its 50th anniversary three years ago.

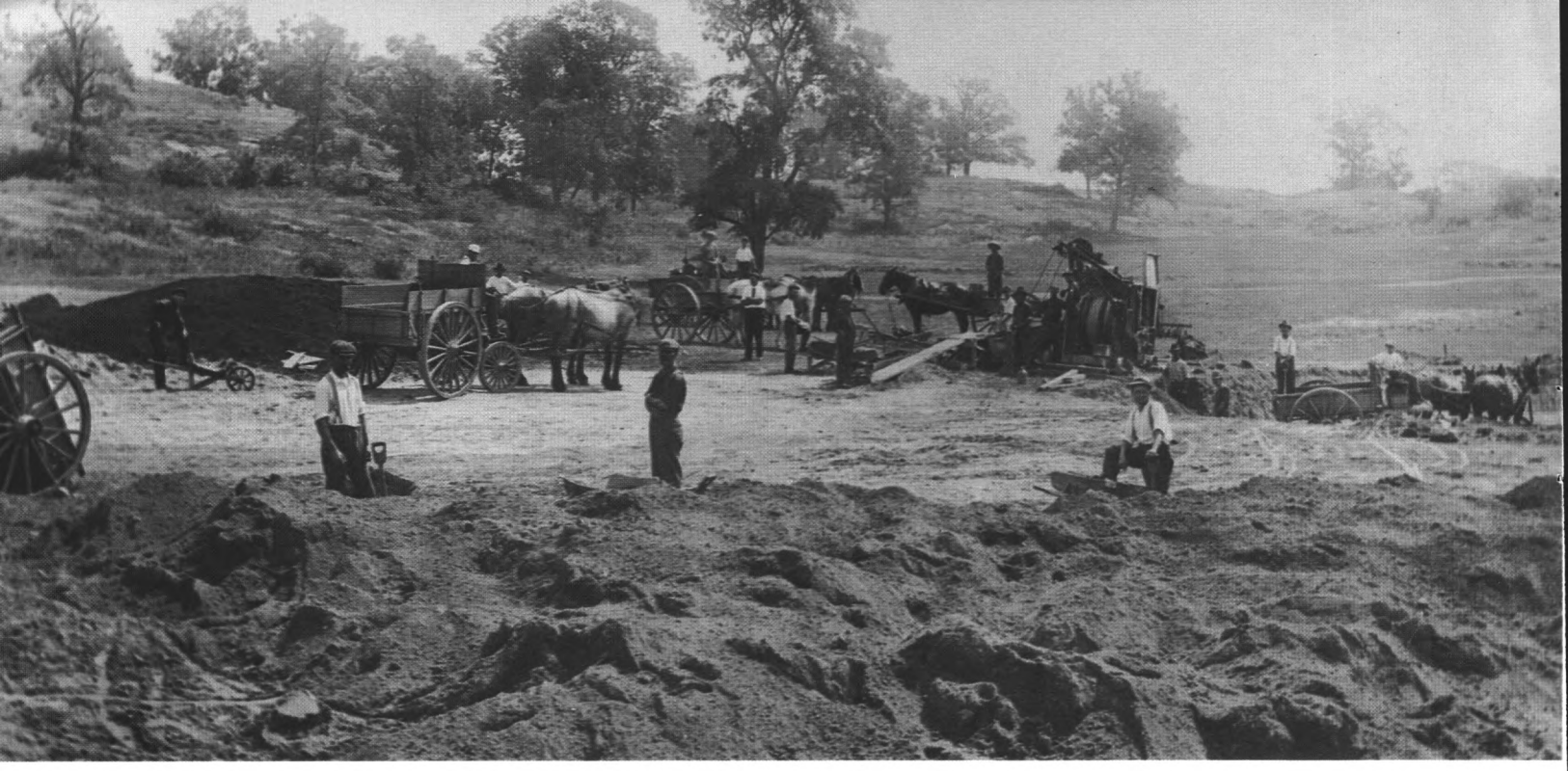
The reflections on our past certainly hinged greatly toward the advances that had been propelled by the start of the Green Section. The art of greenkeeping has advanced to the degree of being a science that now makes a true profession of the position of a golf course superintendent.

The impact that was made upon the golf communities by Messrs. Piper and Oakley in the late Teens and early Twenties dramatized the requirement of a specialized person in the art of greenkeeping. For this we measure ourselves and appreciate the USGA's preceptive leadership in years since.

The forward movement by the Green Section in these times of EPA restrictions, tightening economy and increasing recreational needs of our nation's golfing public is welcome. At this time we cannot afford to sit idly by, with a feeling that we have lost. Our close ties and a united front toward insuring constant research and education in all phases of hybrid grasses, and in monitoring chemicals that will not damage our environment and, most of all, in educating today's golfer of the problems of properly maintaining a golf course will continue to aid this wonderful game in the future.

GCSAA looks toward your direction and your support in our movement.

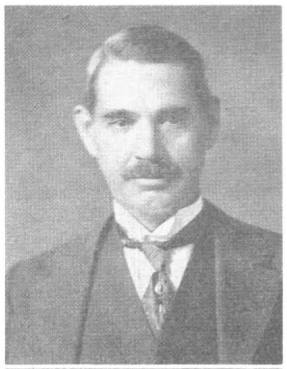
Melvin B. Lucas, Jr.
President
Golf Course Superintendents of America



60 Years of Service to Golf . . .

by **STEPHEN J. HORRELL,** Green Section Committee Chairman

The Story of the USGA's Green Section



(Above, right) Dr. C. V. Piper.
(Right) Dr. R. A. Oakley.

GOLF IS AND HAS always been a dynamic force in the turfgrass industry. This came about because serious problems with the maintenance of golf course turf forced the United States Golf Association to assume a position of leadership in the turfgrass industry in 1920. In November of that year the Green Section was formed and from that day to this it has been the only non-partial, scientific agency working full-time in turfgrass science as it relates to growing grass for golf.

Golf as we know it today had its start prior to 1900 in America. In those early days clubs followed procedures established by the Scots which included minimal maintenance — with grazing sheep to mow the grass, but clubs in this country soon found that sheep were not a satisfactory solution and the search was on for information and help. Meanwhile, golf courses were being constructed at a rapid pace, and nobody had any training in the field of turfgrass science. There was no special equipment, fertilizers or chemicals for grass at that time. The responsibility of upkeep was assumed by club members who tried but were woefully unprepared to cope with the magnitude of the task.

In 1906, according to record, the first golfer to request assistance from the United States Department of Agriculture with putting green problems was Dr. W. S. Harban. There he met Dr. C. V. Piper and Dr. R. A. Oakley, who were receptive

and helped as they could. Each was a rarity of the times: they were scientists with a knowledge of turfgrasses. They soon realized that the existing knowledge on the subject was far from adequate to meet the needs of golf and that extensive experimental investigations were necessary. Unfortunately, no funds were available for this purpose, but in cooperation with many clubs investigations were begun.

IT WAS OBVIOUS also that a great deal more research was needed and in 1915 the Executive Committee of the United States Golf Association called on the Secretary of Agriculture, the Honorable David F. Houston, to request additional help in solving problems of greenkeeping. The committee pointed out that about $10 million a year was being spent on the establishment and maintenance of turf by golf clubs, and it was believed that through ignorance, half the money was wasted. There were no trained greenkeepers at the time and course care was directed by members. As a result of that appeal, the turf experiments were begun at Arlington, Virginia, in the spring of 1916.

In 1920, E. J. Marshall, who was Green Committee Chairman of the Inverness Club in Toledo, Ohio, conceived the idea of forming a Green Section of the United States Golf Association to work in cooperation with the United States Department of Agriculture on turfgrass problems. As a result, the Green Section was established by the USGA Executive Committee.

Dr. Piper agreed to serve as Chairman of the Green Section while retaining his position as Head of the Agronomy Section of the United States Department of Agriculture Research Station. Dr. Oakley agreed to serve as Dr. Piper's associate and assistant. It was the beginning of an organized approach to solving turfgrass problems on golf courses here in the United States. Piper and Oakley lost no time. In January, 1921, the *Bulletin* of the Green Section was born. It fast became known as "The Bible of golf course care." Those responsible for course care at clubs throughout the nation eagerly looked forward to receiving this monthly publication. The *Bulletin* was published through December, 1933, when it was discontinued in the depths of the Depression because of the lack of funds. *The Bulletin of the Green Section of the United States Golf Association*, was published from February, 1921, until December, 1933. *Turf Culture and Timely Turf Topics* shortly replaced the *Bulletin*, and it was continued through 1947. *USGA Journal* combining *Timely Turf Topics* began publication in spring, 1948. In 1950, the name of the magazine was changed to *USGA Journal and Turf Management* and it was continued as a combined publication until the *USGA Green Section Record* became a separate publication.

FROM 1920 TO 1953 the Green Section conducted research, first at Arlington, Virginia, and then at Beltsville, Maryland, and much of the research activity made up the substance of articles in its publications. National Field Days were held to exhibit and discuss research trials, and golf clubs benefited through attendance by their greenkeeper and interested club officials. Many of today's procedures in maintenance "got off on the right foot" as a result of Green Section research. Grasses were tested for golf. Golf professionals were invited to come to Arlington and Beltsville to putt on the new bentgrasses and to play iron shots from experimental fairway grasses such as U-3 bermudagrass, Meyer zoysia, Merion bluegrass and others.

In 1932, Dr. John Monteith, the Green Section Director, published "Turf Diseases and Their Control." Dr. Monteith developed the first effective fungicides for turfgrass use; prior to his research extensive loss of turf to disease was commonplace.

In 1947, Dr. Fred V. Grau played a major role in getting turfgrass recognized by the American Society of Agronomy as a major agricultural industry.

IN 1950, AFTER YEARS of testing, the Green Section, in cooperation with the Department of Agriculture, released Merion bluegrass as an improved Kentucky bluegrass variety. The impact upon the turfgrass industry was phenomenal.

In 1950, the book *Turfgrass Management* by Prof. H. B. Musser was published, and it was well-received by the golf industry. It was sponsored by the USGA. Currently, a new USGA-sponsored book, authored by Dr. James B. Beard, is in the final stages of writing. Announcement of its publication date will be made shortly.

In 1951, Meyer zoysia was released jointly by the Green Section and the Department of Agriculture as an improved cultivar.

After 1953, the USGA Executive Committee decided to change the emphasis of the Green Section's thrust to an extension program of bringing personal agronomic assistance directly to USGA Member Clubs. However, research was not abandoned. From 1953 to the present day, some $750,000 has been allocated to worthy projects related to golf. These funds were derived from a percentage of USGA dues and contributions from the following organizations and individuals, but we especially wish to acknowledge substantial or annual contributions from the following:

Alabama Chapter PGA, Alabama Golf Association, Augusta National Golf Club, Birmingham Golf Association's Foundation, Carolinas Golf Association, Georgia Golf Course Superintendents Association, Michigan and Border Cities Golf Course Superintendents Association, New England Golf Association, PGA's National Golf Fund, Southern Golf Association.

THE FOLLOWING ARE some of the significant accomplishments achieved by the Green Section's research funding program since 1953:

(1) Specifications for putting green construction were developed and published. After 15 years of research, Dr.

The killing action of 2,4-D on dandelion.

Merion bluegrass — the first improved Kentucky bluegrass cultivar, released jointly by the USGA and USDA.

Marvin H. Ferguson, a former Green Section Director, saw the project to successful conclusion. Thousands of these greens are now in existence.

(2) Supported a project in breeding with Rutgers University. Dr. C. Reed Funk tested and released many new varieties of Kentucky bluegrass including Adelphi, Bonnieblue, Brunswick, Touchdown, and RAM I. Dr. Funk is the first scientist to successfully hybridize Kentucky bluegrasses.

(3) Supported the work that culminated in publication of the *Poa annua* bulletin by Dr. James B. Beard. Copies were mailed to all USGA Member Clubs.

(4) The Green Section defined a specification for bunker sand.

(5) The Green Section defined its position on topdressing mixtures for putting green surfaces.

(6) The Green Section conducted traffic studies which resulted in modification of the golf spike and golf shoe.

(7) We are presently supporting a study conducted by Dr. Beard, at Texas A&M University, on wear resistance of turfgrasses.

(8) We supported projects at the University of Georgia that resulted in improved machinery for the industry, a topdressing mixer, an improved thatcher and a machine that will clean gravel and other debris from bunker sand.

(9) We encouraged support of a new technique that may revolutionize spraying chemicals on grasses. It is a process whereby the spray is electrically charged, thus insuring a far greater efficiency of all chemicals sprayed. This new technique is expected to have a positive effect on the environment and on golf course budgets.

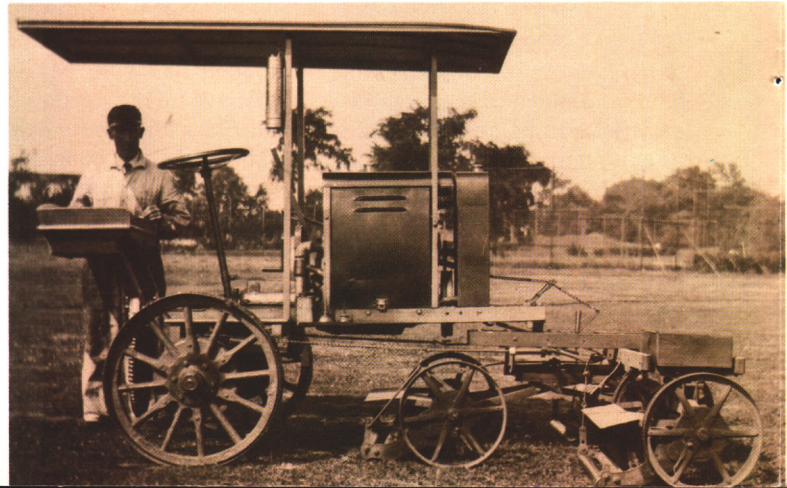
(10) The USGA made available to all golf clubs a device known as the Stimpmeter. The original model was produced by Edward S. Stimpson and was modified by Frank Thomas. The Stimpmeter gives clubs the opportunity to measure the speed of their greens and to select a speed the membership is comfortable with.

(11) The Green Section's research support has not only assisted the industry, but it also has trained leaders in the turfgrass field. Many who received USGA support are now active in research, teaching or extension at leading universities and industry throughout the nation. Individual names are listed on Page 13.

From 1953 through the present day, major Green Section emphasis has been placed upon bringing all its research and extension expertise and experience to benefit USGA Member Clubs. There are 11 agronomists presently employed by the USGA. From 1920 through the present, Green Section agronomists travelled in excess of five million miles making more than 33,000 visits to golf courses throughout the nation and the world and to attend important turfgrass events.

In total, the Green Section's national program continues to encompass all phases of golf turfgrass management. The Green Section's sole mission is and always has been to disseminate the best possible information in pursuit of better turf for better golf.

The most modern fairway mower . . . in grandfather's day.



The Green Section Took A New Direction in 1953

IN ITS EARLY YEARS, the main thrust of the Green Section was research. From 1920 through 1952, direct research, in cooperation with the United States Department of Agriculture, resulted in many improvements in turfgrass.

Better turf at a lower cost — that had always been the primary aim of the United States Golf Association ever since it established the Green Section. This objective had been accomplished mainly by 1) development of knowledge through Green Section research; 2) stimulation of cooperative research by other agencies; and 3) dissemination of results through the printed word, conferences, and a limited number of visits to golf courses.

Then, in the February, 1953, issue of *USGA Journal and Turf Management*, Richard S. Tufts, Chairman of the USGA Green Section Committee, wrote that the Green Section, an instrument of research for over 30 years, would take an entirely new direction — it would emphasize direct service to USGA member clubs and courses through personal visits by the Green Section staff who would advise them on their turfgrass problems.

And so the new program, called the USGA Green Section Regional Turf Service, was established. Mr. Tufts emphasized, however, that continued research and experimentation would be necessary, but in the new scheme of things, the Green Section would give financial and moral support to research by others rather than engage in much research itself. Then, the research results having been produced, the Green Section's own highly specialized staff of trained agronomists would take the results directly to the golf courses.

The plan, as originally conceived, called for the establishment of a number of regional offices so that every USGA Member Club would be within easy reach of a Green Section regional director. Each regional director would be a practical scientist — a trained agronomist who specialized in golf course problems.

Ever since World War II, the Green Section had been decentralizing research activities away from its headquarters and out into various regions where peculiar sectional problems had to be met and solved. The new emphasis on direct service to Member Clubs was simply a continuation of that decentralization.

As originally established, the Turfgrass Advisory Service sought to provide two principle benefits to Member Clubs: 1) Intimate, specialized consultation service on a regular and permanent basis, located to best serve the convenience of the subscribing clubs; and, 2) maintenance and coordination of turf experimentation on a broad scale to bring the greatest possible return to the member clubs.

The keynote of the whole program would be to prevent trouble, not merely to prescribe remedies for sick golf courses.

The first regional office was actually established in June, 1952, at Davis, California, with Charles G. Wilson as Western Director.

Today, the Green Section has six regional offices as well as its national headquarters based at Golf House, Far Hills, New Jersey. Regional directors and staff agronomists, a total of 10 men, travel over 200,000 miles and make 1,300 visits annually to clubs subscribing to the Turfgrass Advisory Service.

Early sod cutting method and a modern machine.

Recipients: USGA Green Section Award

Dr. John Monteith, Jr.

Pioneer researcher. Developed the first effective fungicides for major turfgrass diseases. Directed extensive experimental work on grasses, diseases, weed control, fertilizers, soils and irrigation on turfgrasses. Former Green Section Director.

Dr. Lawrence S. Dickinson

Pioneer educator. Established the first curriculum in turfgrass management at the Stockbridge Winter School at the University of Massachusetts. First to teach golf course maintenance and management.

James L. Haines

Pioneer in greenkeeping during a distinguished career of 40 years at Denver Country Club, Denver, Colorado. Was directly responsible for formation of the Rocky Mountain GCSA. Developed a tree root pruner and leaf rake for golf course use.

Dr. Fred V. Grau

Primarily instrumental in getting turfgrass recognized by the American Society of Agronomy as a major agricultural industry. Associated with development and release of improved turfgrass Merion bluegrass, Meyer zoysia, U-3 bermudagrass and select strains of creeping bentgrass.

Elmer Michael

A leader in the field of greenkeeping at Oak Hill Country Club, Rochester, New York. Distinguished career included golf course construction, design, maintenance and management. Encouraged and trained several men who are now golf course superintendents.

Herb and Joe Graffis

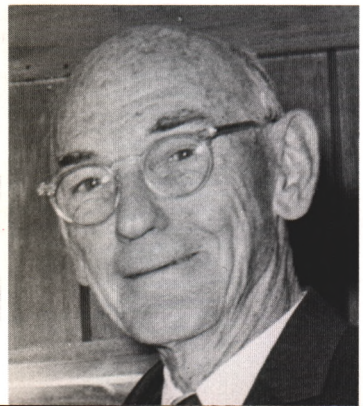
In 1927 founded and published *Golfdom*. Encouraged the testing of turf products in experimental plots throughout the United States. Founded the National Golf Foundation. Prolific writers in golf and the turfgrass industry.

Dr. Fanny-Fern Davis

From 1943 to 1945 served as Acting Director of USGA Green Section. Conducted experiments with 2,4-D which became widely used in broad-leaf weed control. In charge of turfgrass research tests at Beltsville during World War II.

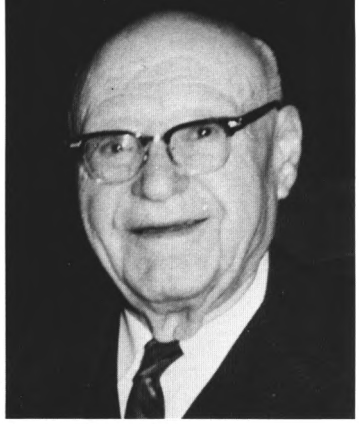
Dr. James R. Watson

Conducted research on grasses, fertilizers, snowmold prevention and covers of various types for winter protection of putting greens. Instrumental in organizing the First International Turfgrass Research Conference, 1969, in Harrogate, England.



O. J. Noer

Premier extension scientist in golf course maintenance and management. Traveled widely to render personal assistance to golf course superintendents. Agronomist and soil scientist, Milwaukee Sewerage Commission.

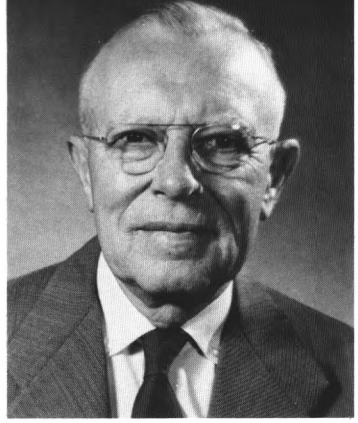


Joseph Valentine

Premier superintendent and pioneer in the field of greenkeeping. During 54 years at Merion Golf Club, he set example of excellence in golf course maintenance. Discoverer of Merion bluegrass, the first improved Kentucky bluegrass.

Dr. Glenn W. Burton

World renowned geneticist at Georgia Coastal Agricultural Extension Station in Tifton. Through selection and breeding, developed the Tifton series of bermudagrasses, including Tifdwarf, Tifgreen, Tifway and Tiflawn.



H. B. Musser

Researcher and educator at Penn State University; developed turfgrass program for students. Encouraged and developed several present-day turfgrass leaders. Authored *Turfgrass Management*, sponsored by the USGA.

Eberhard R. Steiniger

Superintendent of Pine Valley Golf Club, Clementon, New Jersey, for 47 years. Maintains ten-acre research area. Instrumental in selecting Cohansey C-7 creeping bentgrass, a putting green cultivar.

Tom Mascaro

Developed and produced the first practical aerifier for greens and fairways with West Point Industries. Introduced a vertical mower to control grain and thatch on greens. Assisted and supported many state university turfgrass programs.

Dr. Marvin H. Ferguson

Served the USGA Green Section during three periods from 1940 to 1968. Vitally involved in early Green Section research. Primarily responsible for the Green Section Specifications for Putting Green Construction. Authored numerous articles for scientific journals and magazines.

Dr. Howard B. Sprague

Educator and researcher in nutrition and pH factor as pertains to fine turf management. Pioneer in study of and published Bulletin on *Poa annua*. Instrumental in establishing strong turfgrass program at Rutgers University.

Edward J. Casey

Pioneer in golf course care. Superintendent at Baltusrol Golf Club for 22 years. Prepared Baltusrol for four major USGA championships. Active in turfgrass associations. Set an example of excellence in the field of turfgrass management.

Dr. Jesse A. DeFrance

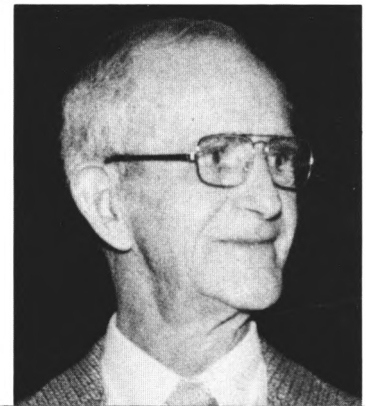
Educator and researcher from 1925 through 1960, including a 24-year period in charge of research at the University of Rhode Island. Developed grasses and mixtures for lawns and golf courses. Advocated descending ratio fertilizers for turf areas.

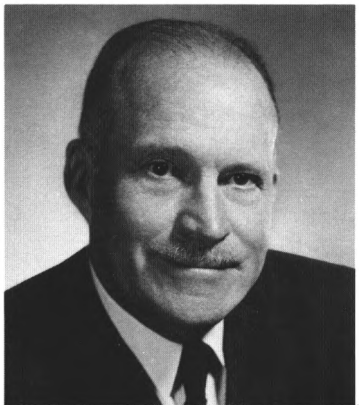
Arthur A. Snyder

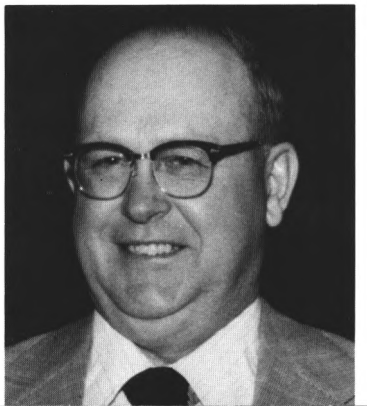
Superintendent from 1927 to 1974. Helped develop turfgrass research program at Penn State University. Discovered a bermudagrass cultivar that is widely used on southwestern golf courses. Instrumental in founding Arizona Cactus Turfgrass Council.

Dr. C. Reed Funk

Developed first hybrid Kentucky bluegrass as research professor at Rutgers University. Developed first turf-type cultivar of perennial ryegrass. Heads testing, selection and breeding project that produced improved bluegrasses, fescues and ryegrasses. Developed first turf-type cultivar of *Poa trivialis*.







The Changing Scene

(Right) "Let's cut the rough today!" was the order and, in 1922, this was the easiest way to do it. (Above) In contrast to yesteryear, today's nine-gang unit includes a hydraulic lifting system.

ALL PROGRESS comes in steps. Those who would make advances in any field must first know what has come before and where things stand at present. Though each step taken is important, some prove more pivotal than others. The following is a selection of developments that have been made in the golf course management field in the 60 years since the founding of the USGA Green Section.

Greens

For many years Dollar Spot and Brown Patch were the most feared diseases, especially of bentgrass greens. And there was but one reliable fungicide, corrosive sublimate, which could quite readily cause turf damage itself. To maintain current standards, more than a half dozen other diseases must be managed as well. Today, however, some 20 distinct control materials, plus many combinations, are available.

"Pushed-up" greens were the norm, generally using unmodified soil scavenged from the site. After 10 years of intensive research, the Green Section published Specifications for a Method of Putting Green Construction in 1960. These have since been refined.

From the first, Green Section efforts were directed to developing improved bentgrasses for greens. By 1924 the Washington and Metropolitan strains had been selected. At the close of World War II, five more Green Section selections were in commercial production, and Dr. Burton Musser's Green Section-supported breeding program was underway at Penn State. This was to produce by the early 1950's the first improved bentgrass that could be grown from seed, Polycross (Penncross) creeping bentgrass. From this same program, now directed by Dr. Joseph Duich, another improved seed-propagated strain was released in 1978, Penneagle.

In 1946 turf research began under Dr. Glenn Burton at the Georgia Coastal Plain Experiment Station in Tifton. This Green Section-supported program developed the bermudagrass hybridization work that has completely changed the nature of southern golf courses — on tees, fairways and roughs as well as greens. The first release in the early 1950's was Tiflawn (Tifton-57), followed by Tiffine (T-419) in 1960, and Tifdwarf in 1965. Work is continuing to develop a fine-textured bermudagrass with greater cold tolerance for the transition zone conditions.

Topdressing in the 1920's was an arduous task, being distributed either by hand with shovels or by manually drawn spreaders. Today's equipment is motorized. With some, 18 greens can be topdressed by a crew of three in a morning. Materials and rates have changed. At one time the Green Section discouraged topdressing because excessively high rates of silt and clay caused layering problems and drastically reduced water and air infiltration. Today's light and frequent applications of materials have been a great help in producing excellent putting surfaces and healthy turf.

Attempts to monitor putting green speeds began as early as 1929 with the Arnott Mechanical Putter, a pendulum mounted on an adjustable tripod. But it was not until the USGA modified a device made by Edward Stimpson, a former Massachusetts Amateur Champion, and undertook to develop it that a reliable way to categorize green speeds existed. With the help of the Stimpmeter, the USGA has been able to help clubs to achieve uniformity in the putting characteristics of all greens.

Tees

In the 1920's teeing grounds were small, often only several hundred square feet in size, and wet sand from tee boxes was mounded up as a perch on which to tee the ball; now we have wooden pegs for tees. We also have much heavier play; consequently today's tees are built much larger.

Standards of tee maintenance have drastically changed. In former years tees at many courses were cut by the fairway mowing units. Today most are cut with green-type mowers, and otherwise managed with nearly the same intensity as are putting surfaces. One of the steadily growing practices is the periodic overseeding of divot scars on tees. Many different grasses are used.

Fairways

Fairways used to be established mostly with common bermudagrass (south) or with common Kentucky bluegrass and some fescue. No more. The Tif-series of bermudas now

provide the measure of excellence in fairway turf, but they cannot be grown everywhere. The first improved grass for northern fairways was Merion Kentucky bluegrass. Today nearly 50% of this country's fairways have Merion or one or more of the 50 elite bluegrasses that have since been developed.

Along with the inferior grasses in use before 1950, weed problems were tremendous. In the 1920's crabgrass was even considered by some as desirable in fairways. Many cultural manipulators were researched by the Green Section in those early years to maximize the competition ability of the turf in this unending battle with aggressive weeds. These investigations achieved considerable improvements in turf culture, and formed the scientific foundation from which have come today's techniques in areas such as mowing, turf fertilization, and pest control. Perhaps of greatest significance was the recognition in 1944 by Acting Green Section Director Dr. Fanny-Fern Davis of the potential for selective broad-leaf weed control in turfgrass of the chemical 2,4-D, being investigated as a growth regulator at the time. Within just a few short years it was no longer necessary for golf courses to fight their worst enemies, dandelions and plantain, with an assortment of chemicals almost as likely to "burn out" the turf as the weeds.

It took a while longer to mount a successful campaign against crabgrass. Even though many courses were doing well with cultural programs, establishing better grasses and pest control to minimize crabgrass germination opportunities, it was not until 1952 that investigation of pre-emergence control materials began in Ohio and at Purdue under Dr. William Daniel, who was only the second man to have earned a Ph.D. degree in turfgrass management. (The first was Dr. James Watson, from Penn State in 1949.)

In the early 1950's, Dr. Fred Grau, then the Green Section Director, once commented that to grow good turf the insect pests must be controlled and that "with the excellent insecticides available . . . there is no excuse for permitting insects to bring crabgrass into otherwise good turf." He was speaking primarily about mole crickets in bermudagrass, chinch bugs in many areas, cutworms, sod webworms and the rapidly spreading Japanese beetles. The insecticides were lead arsenate, DDT and chlordane — none of which are any longer available for use on turfgrass. Today's turf insecticides are predominantly organo-phosphates, which in general have a higher acute mammalian toxicity, higher cost and shorter effective life span than their predecessors.

In the manufacturing boom which followed World War II, machinery specially designed for golf course use began to appear and by 1947 a machine for "tubular time forking" and the "motorized caddie cart" had made the scene. The first was badly needed for improving rootzone aeration and the penetration of water and fertilizer and for relieving the surface compaction that was already a serious problem. Today most courses have at least one aerifier.

Roughs

In the early 1920's roughs often grew up to three feet high in the spring and it was common for them to be cleaned of accumulated organic debris through controlled burning every couple of years. In order to ease maintenance and stem the complaints about lost golf balls, roughs began to be cut more often and shorter through World War II. Today most roughs are predominantly an "improved" turf species, usually receive some irrigation, occasionally are fertilized or limed, and are mowed regularly.

Undoubtedly the changing nature of roughs has been greatly influenced by developments in various aspects of turf management, most especially in mowing equipment. The first tractor-drawn mowers replaced horse power for fairway mowing in 1921 but were not, for a time, able to cope with the roughs. Today multiple gang units cut most turf areas. For higher heights of cut and improved maneuverability, heavy-duty riding rotary mowers have come into use.

Irrigation & Annual Bluegrass *(Poa annua)*

These subject areas are linked together here because, in reviewing the history of turfgrass management, the development of irrigation is strikingly paralleled by the development of annual bluegrass problems. The earliest fairway irrigation systems date from 1931, long after supplemental watering for greens was utilized. Discussions of annual bluegrass problems then begin to appear some 10 years later. In 1946, O. J. Noer is quoted as saying, "Lessons learned during the war indicate that fairway watering in the future will be less frequent to avoid excessive encouragement of clover and *Poa annua*." In 1948, Fred Grau observed, "It is obvious that the demands of golfers to have green turf have greatly encouraged *Poa annua* by virtue of the large quantities of water applied to turf . . . . Once a water system is installed, the tendency is to use it to excess. Green Committee Chairmen have been known to say, 'Why do we have this $30,000 water system if we don't use it?' This is the first step to a *Poa annua* turf . . . ." The first Ph.D. program in turf management involved a study of irrigation and compaction. In discussing Dr. Watson's thesis results, Professor Musser in 1950 summarized, "We cannot escape the task of re-examining our watering programs in the light of the capacity of our soil and the rate at which it can take the water we apply. At least we will recognize that good watering practice must be based on something more than the capacity of our system and the size of the sprinkler heads."

Today irrigation systems are considerably more sophisticated and may easily cost 10 times more, but the more things change, the more they remain the same. The anonymous conclusion to a May 1946 treatment of this subject in the Green Section's *Timely Turf Topics* is probably still accurate: "There is no simple, direct answer at present to the problem as a whole." As Professor Lawrence Dickinson, of the University of Massachusetts, is reputed to have said many years ago, "When we do learn how to control *Poa annua*, we will have to learn how to grow grass." The Green Section has been helping people to do just this for 60 years and looks forward to continuing to play a vital role in the future.

Golfers Today Are Reaping the Benefits of the Green Section

by ARTHUR A. SNYDER

IT IS HARD FOR ME to realize that I have been connected with the game of golf for all but 20 years of its history in this country. The first permanent golf course in this country was built in 1887. I started to caddie in 1907 when I was nine years old. Three years later I was working on the golf course at every opportunity when I was not in school.

I loved all phases of the game. I served ten years as a combination pro-greenkeeper, but golf course maintenance was my choice for a career. Today a young man who makes that choice will attend a school where he will major in turf culture, but in my younger days no such courses were available.

Many changes have taken place in my lifetime, both in playing golf and in course maintenance. The golf ball as we know it today came into existence five years before I began to caddie, yet many gutta percha balls and "silk pneumatic" balls were still in use as practice balls.

MAINTENANCE BUILDINGS and equipment differed greatly from those in use today. A stable to house the horses needed on a course was a necessity. It also was used as the headquarters for the maintenance crew.

Mowing greens was the hardest job on the golf course until power mowers were introduced in the 1930s. The early greens mowers were quite heavy, having two large steel wheels which drove the reel. A strong man could mow only six to nine greens a day.

Fairways were cut with horse-drawn three-gang units. The driver walked alongside all day and was in danger of being struck by a ball every time a player came by.

Topdressing materials were scattered over the greens with a shovel, then raked into the turf by hand. A large crew was needed for this job.

The rough was mowed two to four times a season by a horse-drawn sickle-bar mower. Grass clippings were cleaned up by a horse-drawn hay rake or raked by hand.

Banks and ditches were mowed by men using scythes. Good scythemen were an important part of the grounds crew for there were no rotary mowers of any kind until after World War II.

EARTHWORMS WERE a serious pest of putting greens. They brought huge mounds of moist soil to the surface of the green during the night. It was necessary to whip each green with a bamboo pole before mowing to prevent the smearing of the worm casts over the surface of the green. But whipping did not completely eliminate the smearing and the surface was often marred by the remains of the cast.

To rid the greens of earthworms, corrosive sublimate (bichloride of mercury) was applied to the surface of the green and washed in with great quantities of water. A swirling mass of worms soon appeared on the surface where they were swept into piles, then shovelled into wheelbarrows and hauled away.

Prior to the start of the USGA Green Section's work at Arlington Experimental Station, fertilizers in most common use were various manures such as sheep, chicken, horse, and cow, also dried blood, tankage, ground bone and cotton seed meal. Early work at Arlington proved that inorganic materials would do as good a job as the organic fertilizers then available and at a much lower cost.

HOWEVER, THE PHYSICAL condition of the inorganics often presented problems. Ammonium sulfate, for example, came in burlap bags with a 200-pound capacity. The condition of the burlap deteriorated rapidly from the action of humidity on the sulfur which created a mild form of sulphuric acid. Unless the material was used quickly, we were

Mixing up chemicals for insect and disease control treatments in 1926.

Miracle of the Green Pastures

by HERB GRAFFIS

WHAT YOU HAVE READ and heard about the Green Section of the United States Golf Association in its 60 years of extraordinary and vast service compares with the publicity about the playing of golf like a needle lost in the grass of the 1,290,000 acres of this nation's golf courses.

Yet the Green Section has had a more positive, beneficial effect on American economic and aesthetic life than any other element of American sports.

THE LITTLE-KNOWN public service role of the Green Section is a magnificent story that reaches beyond golf. For instance:

Who pioneered the roadside grass planting that reduced accidents and made the journey prettier? The Green Section.

Who gave Americans pride in having lawns more beautiful than those of the stately homes of England? The Green Section.

Who encouraged and helped the wonder-working turfgrass research efforts of state agricultural research stations into one of the most useful showings of turf technology? The Green Section.

Who gave agricultural schools impetus in developing procedures for landscaping and other satellites of the golf course maintenance basic work? The Green Section.

Where did the work start that converted factory areas into parks, beautifying the communities and establishing a more pleasant, productive atmosphere for the workers? The Green Section.

Where did the picture of better grass for the playgrounds and parks to the graveyards really begin? The Green Section.

The pioneer greenkeepers and pro-greenkeepers were artists who loved the land. There are volumes of untold stories about their sensitivity, their devotion to the land, their capacity for working wonders with little money and their foresight as environmentalists.

VETERAN GOLFERS have seen many fairways where sticks signalled bird nests for mowers to avoid. Any sign of danger to the natural life was heeded instantly by those practical pioneers in protecting the eye-pleasing and soul-saving and future of the so-called environment.

Most other sports need only a broom or a tape measure to provide its playground, but golf needs and uses God's greenery and unbounded beauty. And so, maybe, God alone knows the Green Section.

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left with a mixture of disintegrated burlap and ammonium sulfate. To make matters worse, the fertilizer became rock hard as it dried. The only way to make it fit to use was to dissolve the fertilizer in water, then screen out the burlap and other impurities, then apply it to turf in solution.

If the fertilizer was used before the burlap disintegrated, it was caked in the bag so badly that it could not be applied dry without being broken up and run through a fine screen. The Ford Motor Company put on the market in the mid-1930s the first ammonium sulfate that could be broadcast after being poured directly from the bag into the spreader. It was given the trade name NAGA, which stood for the first national organization of golf course superintendents, The National Association of Greenkeepers of America.

I could go on and on, telling of how we mixed calomel and bichloride of mercury with sand or Milorganite, breaking up the lumps of mercury with the aid of the family rolling pin. The mixture was then applied to the greens with a cyclone seeder for the control of fungus disease. Or how we handled DDT and 2,4-D dust until our faces were coated with the powder. Old-time greenkeepers did many things in a reckless, haphazard way, but it was because no better way was known.

One thing that we did know, though, was that more and more turf research work was needed. The Green Section played the principal role and we were most grateful. With time, the universities and agricultural stations became involved. We fought hard for it and supported it in every way possible. Today golf course superintendents, as well as golfers, are reaping the benefits.

Turfgrass Honor Roll

Leaders in the turfgrass industry who have received graduate level financial support from the USGA Green Section Research and Education Fund include:

Mohammed K. Ahmad, Post Ph.D.
R. C. Anantheswaran
James B. Beard, Ph.D.
James E. Bogart, Ph.D.
Andrew D. Brede
Cecil Brooks, Ph.D.
Lloyd M. Callahan, Ph.D.
Scott Cameron
David R. Chalmers
David E. Crews
Michael Dale
William H. Daniel, Ph.D.
R. R. Davis, Ph.D.
Elwyn E. Deal, Ph.D.
William K. Dickson
Cindi E. Donoho
Albert E. Dudeck, Ph.D.
Joseph M. Duich, Ph.D.
Charles M. Feldake
Marvin H. Ferguson, Ph.D.
James R. Fulwider
Fred V. Grau, Ph.D.
Sang Joo Han, Ph.D.
John C. Harper III, Ph.D.
Thomas K. Hodges, Ph.D.
Leon Howard
Don Johns, Jr., Ph.D.
Edward Jordan
Raymond J. Kunze, Ph.D.
David Kopec
W. C. LeCroy
David P. Martin, Ph.D.
Justin K. Mathias
Gregory Mazur
Kevin J. McVeigh, Ph.D.
Wallace Menn
Miles S. Nelson
George A. Niles
G. W. Pepin, Ph.D.
A. Thomas Perkins, Ph.D.
Sim A. Reeves, Ph.D.
Terrence Riordan
B. P. Robinson, Ph.D.
Charles Rumberg
Robert F. Samson
Richard E. Schmidt, Ph.D.
Robert C. Shearman, Ph.D.
Robert Spartnicht
James R. Watson, Ph.D.
Donald J. Wilson
Gary Wilson
Charles B. White

The Green Section Today

INVERNESS CLUB, in Toledo, Ohio, is the birthplace of the Green Section of the United States Golf Association. In 1920, E.J. Marshall, who at the time was Green Committee Chairman at Inverness, brought the United States Department of Agriculture and the United States Golf Association together because of the urgent need for scientific information in golf course care. During this time, the Green Section has been totally involved in golf course maintenance and management.

From 1920 to 1953, the Green Section was actively engaged in research that developed scientific management practices. From 1953 to the present, the emphasis has been upon personal extension services to the USGA Member Clubs. Although some extension services were performed from inception, it was not until 1953 that primary emphasis was placed upon extension.

From 1920 through 1979, Green Section agronomists travelled in excess of five million miles, and they have personally made in excess of 33,000 visits to golf courses throughout the nation. In addition, the staff attends turfgrass conferences and field days at which universities throughout the nation display their turfgrass tests and discuss research results. The Green Section conducts educational meetings and an annual Educational Conference emphasizing the fine points of turfgrass maintenance and management and how they affect the play of the game.

In total, the Green Section national program encompasses all phases of golf turfgrass management. The program is coordinated through a national director. The Green Section's sole mission is better turf for better golf. Its staff stands ready to serve you.

Alexander M. Radko
National Director

William G. Buchanan
Director, Mid-Atlantic Region

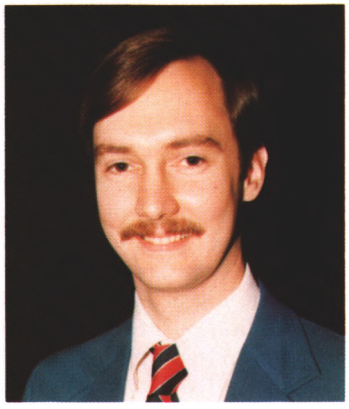
Patrick M. O'Brien
Agronomist, Mid-Atlantic Region

James B. Moncrief
Director, Southeastern Region

Stanley J. Zontek
Director, Northeastern Region

William S. Brewer, Jr.
Agronomist, Northeastern Region

James T. Snow
Agronomist, Northeastern Region



Charles B. White
Agronomist, Southeastern Region

Carl H. Schwartzkopf
Director, North-Central Region

Dr. Douglas T. Hawes
Director, Mid-Continent Region

Donald D. Hoos
Director, Western Region

Ten Best TURF TWISTERS

Question: Does the USGA have a ruling as to cup locations and how close a cup may be placed to the edge of a putting green? (Washington)

Answer: While many factors can affect cup location, the use of good judgment should be the first consideration. Ensure fair conditions, not tricky locations. For an area at least two or three feet in radius around the cup, the putting surface should be in good condition without any steep slopes or, if possible, any changes in the degree of slope. In other words, the green in the holing-out area should be as nearly level as possible and of uniform grade, but it does not have to be exactly level.

Next, the USGA tries to start, if possible, at least five paces away from the edge of the putting green. However, other factors must also be considered: bunker locations, the holding quality of the green, length of the shot to the green, design of the hole, etc. In no case should cups be located in tricky places or on sharp slopes where a ball can gather speed.

July/August 1966

Question: How much harm can we do by playing the regular greens this winter? (Massachusetts)

Answer: Weather conditions change so rapidly that it is difficult to give an unqualified answer. If the ground is frozen solidly or thawed beyond the depth of one inch, there is no cause for alarm as far as soil compaction is concerned. However, some grass blade damage may occur as foot traffic crushes the frozen blades. Real injury occurs when the ground thaws at the surface but not below one inch. Traffic then causes severe soil compaction, a tearing of roots from the plant and a squeezing and displacement of the soil, causing very uneven putting surfaces. The decision to play or not to play regular greens must be flexible and must rest with the superintendent, the Green Chairman and his Committee. And it may have to be changed within a few hours on any given winter day.

January/February 1968

Question: When greens are patched the new sod remains prominent seemingly forever. Is there any way to mask the fact that greens have been sodded? (Connecticut)

Answer: Yes. Follow nature's example and try to make the sod appear to be one strain growing in a circular pattern. In other words, lay the sod in the usual square or rectangular pattern and then round off and match up the outside strips in order that the new patch appears to be one continuous circular patch growing naturally. Grasses never grow in a sharp square or rectangular pattern and so this is always a dead giveaway that the green has been patched.

May/June 1971

Question: We have a steep bank, one almost too steep to mow safely, which is in an out-of-play area but in close proximity to the clubhouse, so we would like to keep it in a grass cover that will not require mowing. Is there any grass that will grow 8 to 10 inches tall, that will grow dense enough to retain the sharp slope and not look unsightly? (Maine)

Answer: Try Merion, Pennstar or Fylking bluegrass sod or seed. It will meet all these requirements. The only time that it may be a problem is when it produces seed in May; the seed stalks will grow taller but will eventually taper off again and will hardly be noticeable in the fall. While these grasses grow more than 10 inches long, they lodge (lay over) and so appear to be less than 10 inches tall.

May/June 1972

Question: What is the average shelf life of the various types of chemical pesticides? Are there any tests I can perform to check their condition? (Rhode Island)

Answer: With proper storage, pesticides can generally last one to two years. They should be stored dry and warm, not frozen. Here are some tests you can perform to determine if the chemicals have deteriorated.

(Continued on page 15)

(Continued from page 16)

1) Emulsifiable Concentrates — When milky coloration does not occur by adding water, when sludge is present, and when any of the components separate, the product has deteriorated.
2) Oil Sprays — When milky coloration does not occur by adding water.
3) Wettable Powders — When excessive lumping occurs and the product will not suspend in water.
4) Dusts — Excessive lumping.
5) Granulars — Excessive lumping.
6) Aerosols — These are generally effective until the dispenser no longer sprays.

November/December 1972

Question: We plan to increase our rough area and reduce fairway widths this year. When is the best time to "contour cut" fairways and what height of cut would you suggest for the roughs? (Utah)

Answer: There will probably be a lot more rough on American golf courses this year than ever before. The best time to start fairway contour mowing for the grass as well as yourself will be this spring, just before growth starts. As to the height of cut for roughs, we would suggest somewhere between 1½ inches and 3 inches depending on density, type of grass, rate of growth, etc. Within this range, you should be able to get back to it (probably on a weekly basis) before a jungle or lynch party forms.

March/April 1974

Question: We are planning to rebuild several greens to the Green Section Specifications. As Green Committee Chairman I had heard that the sand layer was no longer necessary in their construction. Our Greens Superintendent disagrees . . . who is right? (New York)

Answer: The Green Section Specifications for Putting Green Construction are an exacting, scientific method of building a golf green. All parts of these Specs are well studied and tested, and all must be included as outlined until such time as our staff and our researchers tell us otherwise. If not, then the green is not a Green Section Specification green and its performance may not be good. It is therefore essential that all steps in the procedure be followed, including that of the coarse sand layer between the drainage stone and the topsoil mixture. Who is right? . . . your superintendent.

July/August 1974

Question: What are the major mistakes made in automatic irrigation installations today? (Texas)

Answer: 1) Spacing sprinkler heads too far apart.
2) Main lines not "looped" to insure uniform pressure.
3) Too many heads under the control of one control station.
4) Sprinkler heads under the control of one station not placed at or about the same elevation.

September/October 1976

Question: I have Tifgreen bermudagrass throughout the golf course and have difficulty in developing a good uniform rough. Any ideas? (Texas)

Answer: In preparing for the U.S. Open Championship in Atlanta, Ga., last year, gibberellic acid was used in the spring at 10 grams per acre. It stimulated early growth and uniformity was best at a 3-inch height. A good fertilization program will also be important.

May/June 1977

Question: What is the maximum recommended slope or pitch that can be designed into a putting green for good surface drainage and for fairness in putting? (New York)

Answer: Generally, the maximum recommended slope is 3 percent. This is not to say, however, that some fine and challenging greens do not have slopes that exceed 3 percent. There are always exceptions to every rule, and there are those who will defend greens exceeding 3 percent to the very end . . . that's what makes the 19th hole so interesting!

September/October 1979