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Focusing in on
Golf Course Maintenance

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Definitely pleasing, definitely costly.

Focusing in on Golf Course Maintenance – 1986

by **LARRY W. GILHULY**

Director, Western Region, USGA Green Section

"When against one's will, one is highly pressured into making a hurried decision, the best answer is always say no, because no is more easily changed to yes than yes is changed to no."

Charles E. Nielson

LIKE HIBERNATING bears in their TV dens, the nation's golfers watched, since early January, magnificent shots hit from nearly perfectly conditioned golf courses from Waikiki to Augusta. Now it is late spring, and summer is half a step away. They have seen the best (in living color), and they look for the same conditions on

their home courses as they have seen on TV. It's easy to overlook that those tournament courses have been groomed and pampered for a year or more and brought to their peak for this one week.

The condition of any golf course is determined as much by the money the club is willing to invest as by the talent that goes into managing the expenditures. Obviously, clubs with higher budgets can afford walking mowers for putting greens, tees, and walking aerifiers and triplex mowers for fairways — equipment that will certainly help the current and long-range course conditions. But what happens to the golf course superintendent who cannot afford these machines and yet is pressured by the mem-

bership to produce equivalent results? Is there any way to convey this dilemma more effectively to a broad portion of the membership? Yes, he can.

Successful golf course superintendents of the past have effectively used photographs and 35mm slides to tell their story to the green committee and club officials. Now the time has come when the use of a portable VCR can be even more valuable to the superintendent in communicating with club officials, the membership, and the members of his own maintenance crew. Let's explore how this new electronic tool can be used to accommodate current and fast-changing trends in golf course maintenance.

Greens

The main area of concern and emphasis in any maintenance operation must be the greens. The ultimate goal is to provide the best putting surfaces possible given the soil, turf type, manpower, and irrigation system, but what does the word "best" mean? To some it may mean greens as fast as possible. To others, consistency and smoothness may be equally as important as speed. Still others are completely satisfied with slower greens that are smooth and covered with dense grass. It is in the area of putting green speed that pressure has been and continues to be felt.

The Stimpmeter, a new and accurate tool, was introduced by the Green Section in 1976. Its purpose was to establish a standard for judging green speeds for championship and regular play. In 1976, the average speed of putting greens was six feet six inches. The slowest greens were found to be approximately four feet eleven inches while the fastest were in the eight feet six inch range in the western United States.

When one looks at these readings and compares them to green speeds today, it is easy to see the effect the Stimpmeter has had on putting green maintenance requirements. There is general agree-

ment that regular putting green speeds of eight feet (plus or minus six inches) are desired by most players and consistently producible through good management by most superintendents. Few golfers would now accept the six foot six inch average speed of ten years ago. At the same time, the Speed Wars between neighboring clubs for the fastest greens in town, common a few years ago, have proven to be detrimental to quality putting surfaces. They cannot be sustained week after summer week with any assurance of success in holding the turf. Championship speeds are possible (10 feet six inches, plus or minus six inches) for short periods of time, but nature's grass plant can only take so much.

Tees

Close-cropped, firm teeing surfaces are common today. For years, high-budget clubs have treated their tees as much as possible as they treat greens: aeration, topdressing, weed control, and overseeding. Divot repairs have been traditional; it has become increasingly so on fairways as well. If there is a manpower shortage on the course maintenance crew, however, the membership might be encouraged to fill divots with a soil/seed mix from individual buckets placed

on golf carts or at each tee. A short videotape, displayed repeatedly on a screen in the golf shop, could instruct players how to do this job and how to repair ball marks on greens properly.

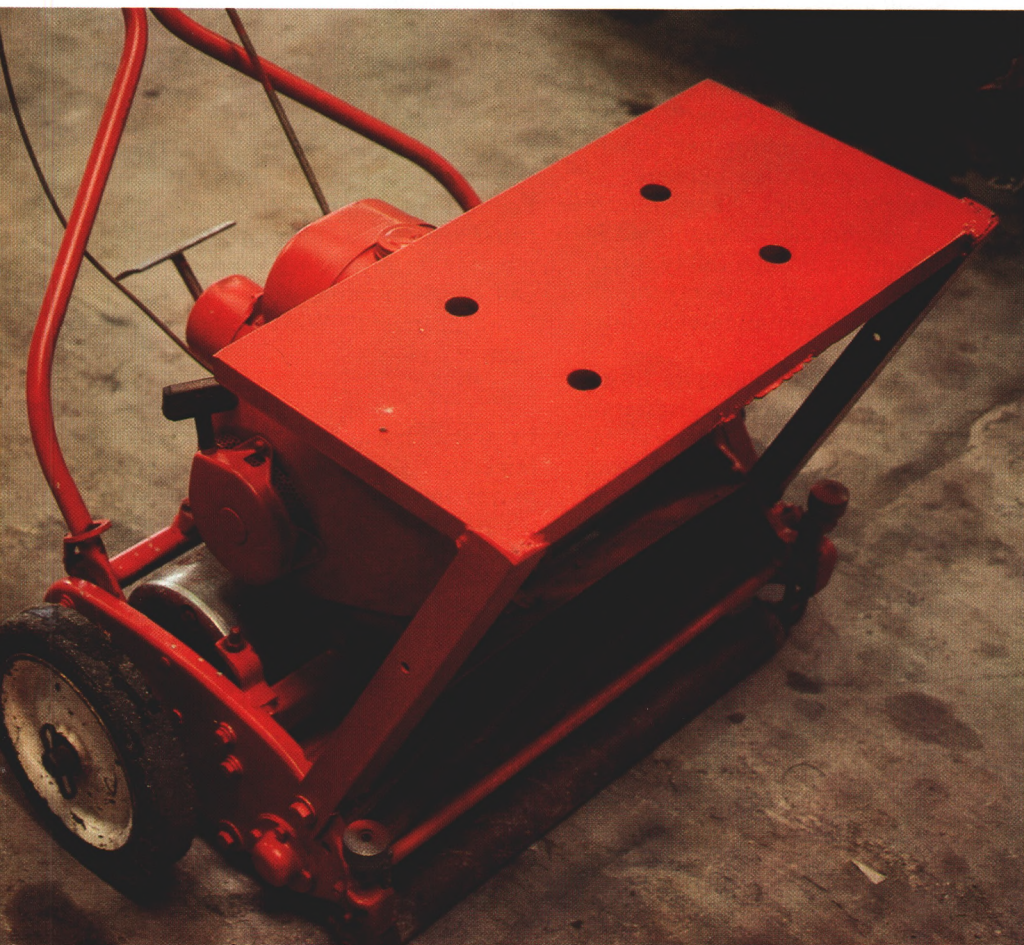
Fairways

In a perfect par round of golf, one-quarter of all shots are hit from the teeing surfaces, one-quarter from the fairways, and half are made on the putting greens. Since fairways are so much larger than tees, they have not in the past received the intensive care as have tees. However, this is now changing. Today, many clubs are mowing fairways with triplex mowers set at 1/2-inch to 3/8-inch and removing the clippings. Bentgrass populations have benefitted. Even putting green aerifiers are being used on fairways to relieve compaction and achieve topdressing at the same time. Results have been very good, but these practices are labor and equipment intensive. Not every club can afford them. Those that choose to do so must either increase their budgets or permit other high-maintenance areas (bunkers and approaches to tees and greens) to suffer.

As an alternative to cutting fairways with triplex mowers, an increasing

Hand mowing is not cheap.





(Top) The VCR and the irrigation system — complexity simplified.

(Left) A "roller" for greens to increase speed. Aeration will be next — and the cost of maintenance climbs.

(Above) Recording equipment inventory.

number of clubs are going to the faster five-gang mower concept with nearly equally good results. Many believe the five-gang unit is the answer to the smaller triplex and heavier seven-gang units of the past. With reduced fairway size and contour mowing, the five-gang unit can effectively produce the same results as triplex mowers in half the time.

Mowing Frequency and Height of Cut

It wasn't too long ago (perhaps a quarter century) that most courses mowed greens three times a week. A quarter century from now we may look back in wonder at mowing so seldom. When fairways are cut at $\frac{3}{4}$ -inch or higher, they must be mowed three times a week in order to prevent flyer lies. As the trend continues toward even closer fairway mowing, $\frac{1}{2}$ -to $\frac{3}{8}$ -inch, increased frequency will be necessary to maintain the playing standard. The closer the cut, the greater the intensity of management. Irrigation, fertilization, aeration, disease and pesticide controls — every part of the management program moves up a notch or two.

The golf courses most affected by the new, intensive trends in golf course management will not be the high-budget clubs. Indeed, they are setting the trends. Instead, it is those courses, green committees, and superintendents having moderate to modest budgets who are most likely to be affected adversely. When their members play one of the high-budget courses and then return to the home course, disappointment and even unrest may set in. They don't realize they are comparing kiwi fruit to zucchini. It is up to the superintendent, using whatever means he has, to put the story into perspective. Golf courses cannot be compared and no golf course is in *perfect* condition every day of the year.

The Use of a VCR in the Maintenance Operation

Although these are only brief thoughts, each must be explained to the golf membership. Communication with the membership has taken the form of articles in the club newsletter, bulletin boards, or other means. A portable VCR, however, can take communication one step further. The use of a VCR in golf course maintenance operations is limited only by the imagination of the user.

For management operations, the following areas offer intriguing possibilities:

1. Green Committee — Any operation that is done on the golf course can easily be captured on videotape for display later. This is particularly important where green committee members change often. As an educational tool for the entire committee, the use of a VCR recorder could prove invaluable. Continuing maintenance programs are the lifeblood of the superintendent's operations, and they must be explained, sold, and updated constantly.

How often do members not rake bunkers, fix ball marks, drive carts too close to greens? These and other very costly practices could be captured on film (while not implicating individuals) to show the green committee some of the problems of course management. Or, how can you (the superintendent) explain why the fairways are so wet in the winter and so hard in the summer? A tape of a putting green aerifier bouncing across a fairway would certainly be helpful in this regard.

2. Crew Training and Safety — While the VCR can be useful for membership education, its greatest use may be with crew training and safety. Rather than spending all of his first day on the golf course, a new employee might spend part of the day reviewing safety films about equipment operation and the inherent dangers of working on a golf course. Another portion of the day might be spent learning basic golf course etiquette and proper skills for particular operations he will be asked to do. This could also be done as a regular refresher course in golf course maintenance operations for existing employees. By demonstrating the right and wrong way to operate equipment, rake bunkers, fix ball marks, change cups, the golf course worker's thoughts can be channeled in proper directions. From a safety standpoint, employees need constant reminders about the safe operation of maintenance equipment.

3. Equipment and Building for Insurance Purposes — In case of a disaster or theft, it would be useful to have a visual recording of the maintenance building and equipment owned by the club. This could provide a complete account of the clubhouse and golf shop inventory and buildings.

Relating to equipment, how many times has a green committee or board of directors denied needed equipment replacement on your golf course? Perhaps they need more information about the equipment or to actually see the problems and condition of present equipment. Presenting a visual display (with

close-up views) could be a most useful tool in improving the equipment inventory in a prudent manner.

4. Mechanical Instruction Aid — The important operations of grinding, back-lapping, proper mower adjustment, and other programs accomplished by the mechanic should be on film for training a new mechanic, assistant mechanic, or regular crew members. Finding a good golf course mechanic can be difficult. The superintendent and club should pass on as much information about proper equipment maintenance and repair as possible for future golf course operations.

5. The Irrigation System — Because every irrigation system is different, it would be invaluable to have on film how the irrigation system on your course operates so that in cases of emergency or employee turnover you can explain the basics of your particular system to the green committee. For example, what better way to explain the need for a new irrigation system than a video showing 10 to 15 heads, at different elevations, all connected to one station with wet and dry areas immediately adjacent to one another? A picture may be worth more than a thousand words in that case!

6. Before and After Shots — "I remember when" has long been uttered by the membership or maintenance staff concerning the way the golf course was in the old days. A complete video of every hole, including all of the architectural features, trees, putting green contours and fairway contours, could be a useful tool in providing a reference map.

If the club wishes to rebuild and retain exact contours, what better aid than a video of the area before reconstruction? For a green committee meeting, what better way than a video tape of showing a particular problem or portion of the golf course needing work and what is being proposed? What better way to show the facts?

Summary

In every endeavor it is important to remember the past as one plans and moves into the future. Extraordinary progress has been made in the care and management of golfing turf in the past half a century. It is safe to predict that even greater progress will be made with the grass plant of the future, but we must all recognize and remind ourselves that some limitations always exist in nature, and nature is an essential part of golf. As Hanna More once said, "The world does not require so much to be informed — as to be reminded."



A thatchy bentgrass fairway. Thatch accumulation is the Achilles heel of bentgrass fairway turf.

Answering the Most-Asked Questions About Thatch

by **STANLEY J. ZONTEK**

Director, Mid-Atlantic Region, USGA Green Section

WITH GOLFERS' increasing expectations for closely cut fairways, tees, and greens, creeping bentgrass use in this country and around the world has never been greater. From time to time, it is important to re-acquaint ourselves with management factors of bentgrass and bermudagrass and thatch development. Thatch control is one of the more important ones.

QUESTION: What is thatch?

In the Dictionary of Golf Turfgrass Terms, published by the Green Section, thatch is defined as a "tightly intermingled layer of dead and living parts (roots, stolons, shoots, stems, leaf tissue, etc.) that develops between the green vegetation and soil surface.

QUESTION: How much thatch is too much?

Generally, some degree of thatch is necessary and desirable. It depends. A modest layer of one quarter to half an inch helps the soil to retain moisture, the turf to resist wear, and provides resiliency in the sod. Concern arises when the accumulation exceeds one half to three quarters of an inch.

QUESTION: What factors contribute to thatch accumulation?

Several primary ones. Basically, thatch accumulates and becomes a problem when it develops more rapidly than natural forces decompose it. Factors like 1) frequency of mowing, 2) height of cut, 3) amount of traffic over the area, 4) excessive growth from fertilization, 5) type

of mower used, *i.e.*, floating versus rigid mowing heads, 6) type of grass, 7) use of certain pesticides, 8) clipping removal, 9) topdressing, aeration, and vertical mowing practices, 10) irrigation and drainage factors. There may be other reasons for thatch accumulation, but these are the primary ones.

QUESTION: Why is excess thatch undesirable?

A number of reasons. Excess thatch harbors insects and diseases. It also ties up pesticides, especially herbicides and insecticides, which should move down into the soil profile for maximum effectiveness. While a little thatch helps the soil retain moisture, too much (especially when it dries out) impedes the movement of water into the soil, contri-

buting to such problems as isolated or localized dry spots. Grass growing in deep thatch is much more shallow rooted, which contributes to a number of problems ranging from increased winterkill, reduced drought stress, and a tendency for the grass to become fluffy, puffy, and prone to scalping by mowers.

The importance of deep rooting is well-known, but it was brought into clear focus last season in some eastern states where severe restrictions were placed on water use for golf course fairway irrigation, brought about by an extended drought. Thatchy fairway turf suffered most. Fairways with less thatch and with deeper rooting survived very well, surprising even the most optimistic turf managers. Bentgrass fairways survived well enough and provided golfers with outstanding playability, even though natural rainfall was the primary moisture source throughout the season. It was found that as long as thatch was not a problem and lightweight three- or four-gang fairway mowers were used (along with some type of clipping removal program), very little grass was lost, even with no irrigation. On the other hand, thatchy bentgrass turf suffered badly. The key seemed to be the depth of the thatch, the general health of the grass, and the depth of the rooting system.

At the same time, let's not forget playability. Thatchy turf does not play well. Soft, spongy turf does not hold the ball up for a proper golf shot, and footprinting is annoying on greens. Therefore, besides the agronomics of growing turfgrass, controlling excess thatch should be a priority item on every golf course.

QUESTION: If I have too much thatch, how do I control it?

One can bring a number of cultural practices to bear on this subject. If you will refer to the earlier question on the causes of thatch accumulation, you'll find at least 10 clues on how it might be controlled: increase frequency of mowing, lower the height of cut, avoid excess fertilization. Item 9 on that list, "topdressing, aeration and vertical mowing," receives particular mention here.

Research supported by the Green Section some years ago found that a combination of aerations and topdressings can reduce thatch over a time. Intermingling topdressing and/or soil cores in the thatch area increases microbial activity, which in turn decomposes the organic material. Aeration helps break up the thatch mat, improving such things as air

and water movement within the thatch and soil zones, encouraging deeper root systems, and overall creating a better, healthier, dynamic microbial environment.

Another effective biological means, often overlooked and neglected, is the light and frequent use of hydrated lime in thatch control. The presence of free calcium is important if not essential to soil microbial activity. Most thatch areas are naturally low in pH and free calcium is scarce. Hydrated lime carries an abundance of free calcium (it does not have to weather before it becomes available). By applying hydrated lime at the rate of two pounds per 1,000 square feet (100 pounds per acre) in the early spring, late spring, and early fall, marked improvement in natural thatch decomposition will be noted within a year or two. The presence of free calcium stimulates the soil microbes, and they in turn attack and decompose the thatch. Hydrated lime should be mixed with topdressing soils or sand for use on greens and tees or applied with a drop spreader on fairways. It will work miracles under most thatchy situations.

QUESTION: What about vertical mowing?

The old practice of deep, infrequent, severe vertical mowing has contributed very little to long-term thatch control. In too many cases, it has contributed to a short term for the golf course superintendent! Bentgrass greens subjected to this treatment take weeks to recover (sometimes months).

Vertical mowing nevertheless can play a major role in any thatch reduction program. By carrying out light, frequent, and double vertical mowings on bentgrass greens (perhaps every two or three weeks during active growing periods), thatch can be checked and eventually reduced.

The vertical mower should be set so that the rotating blades of the machine just make contact with the blades of grass and do not cut into the crown of the plant or the soil itself. At this very light setting, bent greens may be double cut (at a 90° angle) every few weeks during the active growing season, however, but not during periods of very high temperatures.

QUESTION: What are the best methods of controlling thatch on bentgrass or bermudagrass fairways?

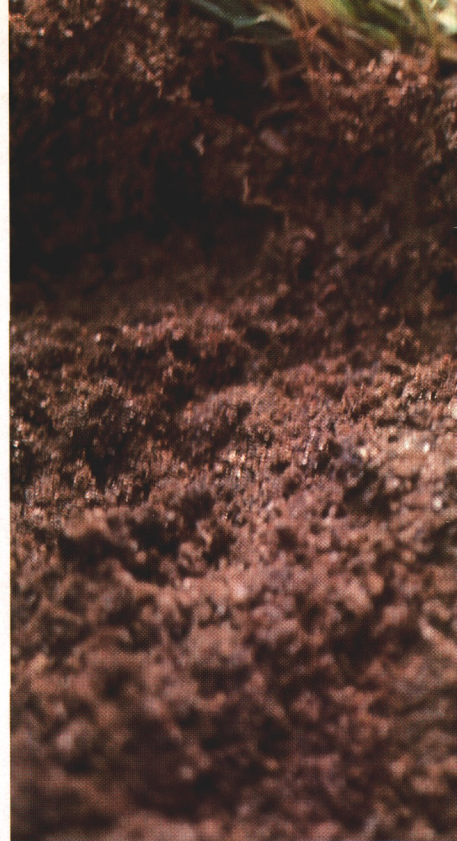
Certainly the use of lightweight mowers (triplex or five-gang units) and the re-

moval of clippings will help considerably in improving fairway quality. The very same practices and procedures used on greens and tees for thatch control will also work on fairway turf, but of course the scale must be much larger.

An aggressive fairway aeration program will break up the matted turf, relieve compaction, and bring up fresh soil cores that will serve as topdressing material. The more soil brought up the better. This is why more and more golf courses are using hollow-tine putting green-type aerators on fairways. It is slow and expensive, but it does the required job. Of course, conventional fairway aerifiers will do a good job if they're used often enough. Several new pieces of fairway aeration equipment have been developed in recent years. Perhaps this is a sign of the times and a realization of the importance of fairway aeration and its resulting topdressing in thatch control.

Again, the use of hydrated lime several times a year (during cooler periods) at 100 pounds per acre will significantly contribute to thatch reduction. Mowing and fertilization practices, pesticide use, along with other measures, are all elements in the same game.

Vertical mowers on fairways are also of increasing importance. Indeed, deep vertical mowing of fairways does have a





place, particularly in the South, where it is used not only to slice through the mat and bring up fresh soil, but for preparing winter seedbeds as well.

In summary, thatch control on greens, tees, and fairways is within today's realm of turfgrass management. It requires an aggressive, persistent and planned program. The problem will not be corrected overnight, but like most problems in this business, it will yield to the experiences of the past, modern research, and the development of new, innovative equipment. Thatch — be gone.

(Top, left) In contrast, a turf with little or no thatch.

(Top, right) Grinding up the soil cores for fairway topdressing.

(Left) Traditional fairway aeration, two times over. Large holes that are slow to heal. Nevertheless, a necessary program.

(Above) Intensive springtime fairway aeration with putting green equipment.

Bermudagrass Management to Reduce Winter Injury — Pay Now or Pay Later

by **DR. DAVID R. CHALMERS**

Extension Agronomist, Turf, Virginia Tech, Blacksburg, Virginia

WINTER INJURY is the most limiting factor in using bermudagrass on golf courses from the mid-South up into areas of its northernmost adaptation (the transition zone). It is not a problem every year, nor is it a problem that affects all bermudagrass turf to the same extent. Many of the areas covered in this article involve strategies or practices that need to be developed during the growing season to prepare the turf against winter injury.

To deal effectively with winter injury, one must first realize that the term is a catch-all phrase that can include a number of factors that act alone or in combination to injure dormant bermudagrass. While injury to actively growing turf is readily discernible and its cause relatively easy to determine and correct before the damage becomes severe, injury to dormant bermudagrass only becomes apparent in late spring, at the time bermudagrass turf begins to break dormancy and regrow. In years of significant injury, the golf course superintendent is left with the decision of whether to: 1) encourage the remaining bermudagrass to spread into damaged areas; 2) repair the area by sprigging, sodding, or plugging; or 3) try to maintain the overseeded grasses.

To maximize the winter hardiness of any bermudagrass turf, the golf course superintendent is faced with factors that he can control and factors he cannot. Controllable factors, those that allow the golf course superintendent to have a positive influence on bermudagrass winter survival are cultivar selection, traffic, the use and timing of cultural practices, and the ability to repair or reestablish damaged areas. Those factors that the golf course superintendent has traditionally been unable to control are low temperature, the length of dormancy, and moisture availability over the winter.

Temperature

For a dormant bermudagrass turf to survive the winter, the reproductive

plant parts (crowns, stolon buds, and rhizome buds) present at the end of the growing season must survive the dormant period. Exposure to low temperatures is the primary concern of winter injury, since it is the most limiting factor in the use of bermudagrass in the United States. Most recently the winter of 1976-1977 exemplified the magnitude of cold temperature injury in the Southeast. Not only were temperatures greatly below normal, but they lasted a long time as well.

It is difficult to control winter temperatures unless one is fortunate enough to have a good snow cover or is willing to use natural topdressing like straw or synthetic covers on bermudagrass to protect the viable plant parts. From a cost standpoint, use of covers appears most feasible, especially on greens and tees and possibly in other isolated problem areas, like low spots and north-facing slopes that don't receive much winter sunlight. On areas that cannot be covered, one does not want to do anything that might make the bermudagrass more susceptible to injury. For example, late fall vertical mowing or aerification, extremely short mowing heights going into winter, or excessive traffic can contribute to the loss of soil moisture and to low-temperature exposure.

Consideration should also be given to the age and condition of the turf in relation to its susceptibility to low-temperature injury. A bermudagrass turf entering its first winter after being sprigged or seeded will have very little if any rhizome development. Therefore, the crown and stolon buds must survive the winter for the turf to survive. By being located at the soil surface (crowns) and above (stolons), these plant parts are more vulnerable to low-temperature injury and desiccation.

A young turf has yet to build up an acceptable thatch layer as well and will not be as wear-tolerant or able to resist cold temperatures as well as a mature sod. This is why it is so important to treat a newly sprigged or seeded turf with extra care to get it through its first

winter. Included in this would be to establish the area early in the growing season to allow the turf to reach its maximum development before winter. With more extensive rhizome formation in the second year, the turf will gain another parameter in winter survival. Since rhizome buds are beneath the soil surface and are more protected against low temperatures, a turf that is severely injured above ground can eventually recover due to regrowth from rhizome buds.

Winter survival can be periodically checked throughout the winter by removing sod plugs and bringing them inside to warm and regrow. In this way, one could be certain of what to expect in spring and to plan accordingly.

Cultivar Selection

Not all bermudagrass cultivars are equal in their inherent ability to survive low temperatures. Therefore, the best long-term insurance for bermudagrass survival is to select cultivars that have a track record of surviving damaging winters based upon their genetic cold tolerance.

Current observations of the bermudagrass cultivars used most commonly in the transition zone of the United States indicate the winter cold hardiness from most cold hardy to least cold hardy to be as follows: Midiron (P-16) > Vamont > Tufcote > Tifway (419), Tifway II > Common, Tifgreen. Of these bermudagrasses, only common bermudagrass can be seeded; the others have to be established vegetatively by sprigs, plugs, or sod.

Growing vs. Dormant Seasons

Management of any bermudagrass cultivar can also depend on the length of the growing season and/or dormant period. In the Southeast, bermudagrass is managed under growing seasons ranging from six to nine months. The shorter and cooler the growing season, the more difficult it becomes for bermudagrass to grow enough under normal management regimes to persist as fine turf.

Conversely, shorter growing seasons translate into longer dormant periods. Even though a bermudagrass plant is dormant, it is respiring and using up stored food reserves. The stored food reserves that remain at the end of the dormant period are used to initiate new roots and shoots. Abnormally cool spring temperatures or excessive competition from winter weeds (annual bluegrass, chickweed, parsley-piert, speedwell) or overseeded grasses can inadvertently act to lengthen the dormant period, causing the plant to further deplete stored food reserves and weaken its spring regrowth potential.

Traffic Control

To prevent extensive damage, human and vehicular traffic control is essential during the dormant period. It is most important in areas of concentrated trampling (greens and tees) and holds true for bermudagrass areas whether overseeded or not. Strict adherence to cart paths with a 90° rule for crossing fairways, use of winter tees, and frequent cup changing can help reduce traffic related damage.

Overseeding

Overseeding bermudagrass turf with perennial ryegrass also delays bermudagrass growth in the spring. This holding back of bermudagrass is most severe in a cool, moist spring in overseeding the improved types of perennial ryegrasses. These newer perennial ryegrasses are persisting with increased vigor in late spring and early summer, which interferes with bermudagrass growth by competing for light, nutrients, and water. This further shortens the period when bermudagrass can grow, thus weakening the stand. This is usually more of a problem in the upper South and when a newly sprigged stand of bermudagrass is overseeded the first fall after it is established.

The alternative is to go to lighter overseeding rates on tees and fairways or not overseed at all. Some superintendents have overseeded fairways with annual ryegrass to reduce spring competition but then found it objectionable in appearance and in the increased mowing requirements during the dormant period.

Herbicides

Delays in spring growth have also been attributed to application of preemergence herbicides and dormant applica-



(Above) Bermudagrass survival can be checked by breaking open a plug to examine rhizome appearance. (Below) Viable rhizomes will usually be flesh colored and snap in two, revealing a whitish-colored center.



tion of broadleaf herbicides. However, such effects vary with year, herbicide, and bermudagrass variety. Such induced delays in regrowth puts another stress on bermudagrass during the spring transition period.

Some superintendents recognize this and have shifted from preemergence herbicides to postemergence herbicides for summer annual grass control in early spring. In such a program, the preemergence herbicide application is targeted to the period of goosegrass germination, which is traditionally four to eight weeks later than crabgrass germination and after dormancy break. Until that time, any crabgrass that germinates can be easily controlled with postemergence materials. The net result is the removal of one possible stress to the bermudagrass plant while at the same time encouraging more of a stress to the overseeded grasses, which can speed the spring transition.

Disease

Spring dead spot is recognized as a winter-related problem of bermudagrass and appears limited to areas of the South that regularly experience freezing temperatures. As such, spring dead spot is not a problem in Florida or the southern parts of the Gulf Coast.

Excessive thatch appears to favor development. Areas having a history of spring dead spot experience more severe spring damage following excessive late summer and early fall nitrogen fertilization. It is not clear whether the disease acts directly in damaging bermudagrass or acts to predispose the turf to low-temperature injury.

Reducing the effect of spring dead spot involves managing the turf for maximum winter hardiness and the use of more resistant cultivars. Control has been obtained with fall applications of some fungicides. However, no fungicides are yet labeled for spring dead spot control.

Fertility

Bermudagrass fertilization practices should be structured to encourage bermudagrass growth without predisposing the turf to winter injury. Where maximum growth is desired, nitrogen fertilizers that have a large part of their nitrogen in a readily available form are preferred over slow release materials. This is especially important where the growing season is short or the turf needs to recover from winter injury.

Excessive top growth stimulation from high amounts of nitrogen in late summer to early fall should be avoided, because it could reduce winter hardiness. Application of potassium has long been recognized as beneficial in maximizing bermudagrass winter hardiness. Maintenance of high levels of potassium fertilization throughout the growing season should be a standard practice where winter injury is a concern.

Soil Compaction and Drainage

In addition to surface wear, soil compaction is a by-product of excessive traffic. Compacted soils have a greater potential for heat exchange, and as a result they cool faster than noncompacted soils. This translates into greater potential for low-temperature injury. In a similar way, poorly drained areas or low spots

where water tends to settle are also more susceptible to winter injury. This is related to high tissue water content at the time of exposure to cold temperature, resulting in direct kill of viable plant parts from excessive freeze damage.

Traffic control, a strong aerification program, and adequate surface and internal drainage will reduce low-temperature stress as well as enhance bermudagrass vigor during the growing season.

Thatch and Mowing

Thatch control is important to prevent the elevation of crowns and rhizome buds into an excessive thatch layer. If this occurs, these plant parts become more removed from the soil's buffering capacity against desiccating conditions, rapid temperature fluctuations, and low-temperature exposure. A sound thatch control program, whether it is curative (vertical mowing) or preventive (topdressing, lower nitrogen rates, frequent aerification with return of cores, use of hydrated lime, etc.), besides improving bermudagrass resistance to winter injury, will greatly enhance establishment of a fall overseeding of cool-season grasses.

While vertical mowers are commonly used on greens and tees, very few golf courses have made the commitment to purchase equipment specifically designed to vertical-mow fairways. However, if thatch is a problem, vertical mowing fairways yearly should become a part of the management program.

A common practice in the transition zone and the upper South, going into mid to late fall, is to raise the mowing heights of bermudagrass fairways, tees and greens so that the added leaf tissue helps insulate the viable plant parts and give more resistance to traffic during the dormant period.

Repair and Reestablishment

Should winter injury occur, repair or reestablishment should be done as early in the growing season as possible in order to allow the turf to become well established before winter. Maintenance of a bermudagrass nursery can greatly facilitate the repair process.

There is no guarantee that bermudagrasses will survive a winter period. However, a well-structured bermudagrass management program can make a difference in bermudagrass survival, which in turn makes for quality bermudagrass playing surfaces during the growing season.

The first sign of spring! Bermudagrass breaking dormancy.



Green Committees

by DONALD STEEL

Golf Course Architect, London, England

Editor's Note: The following article appeared in the British Association of Golf Course Architects Newsletter, No. 6, 1985. It is reproduced here with permission of the author.

ONE OF THE FLAWS in golf course architecture is that, once the architect has signed the final certificate of the contractor and perhaps, if he is lucky, been invited to the opening of the course, he ceases to have any influence in the way his course is maintained and cared for. He has no wish to interfere with the important and separate job of the greenkeeper, but condition does have a direct bearing on whether the strategic elements of the architect's plans are being fully observed.

In too many cases the greenkeeper himself may be overruled by the majority vote of a green committee that is invariably made up of poor and inexperienced players who see golf only through their own eyes. Their inability to play properly has led them to use their position in office to ensure that courses are prepared with them in mind. Their motto is that there is no point in hitting a good shot when a poor one will do just as well. In order to accommodate them, they have been guilty of gross overwatering and overfeeding of greens and invariably of fairways as well.

They like to see grass sprouting everywhere, oblivious of the fact that grassy fairways make it far harder to hit proper golf shots and oblivious of the neat definition of Peter Thomson, who believes the art of greenkeeping is not in getting grass to grow but in how to keep it down.

Thomson was the master of British conditions, showing by his approach and skill that golf is a game of maneuverability and control, not of raw muscle. In many ways golf has a lot in common with billiards, where the key lies in playing every shot with the next one in mind. With the proper control of the cue ball, the next shot is that much easier, but at golf it is a weapon that is blunted when greens are so soft that they will hold shots from neighboring fairways or pitches that may be skimmed.

The billiards analogy can be taken a step further. Billiards is only half a game

on a slow table with dead cushions, and golf is the same without true, fast greens. Much thought goes into an architect's green designs — the shaping, the angling, the contouring, and the bunkering. On plain ground it can be the main way of providing challenge. The best holes are those where there is a definite side of the fairway that opens the best line to the flag.

Not that green committees are the only people who like to twist the arm of the greenkeeper. Professionals are not slow in speaking up if they find conditions that do not suit them, although some of them are also inclined to believe every shot to a green should stop where it pitches.

MY ANSWER is to do away with green committees as outmoded as the penny farthing, a view echoed by Bill Campbell, a former President of the United States Golf Association, in an address to the Golf Course Superintendents, in 1983. "Communication is important in any endeavor, but it is crucial for golfers to develop a close relationship with their golf course superintendents," Campbell said.

"Under the ideal situation, there would be a key person, and only one person who would represent all golfers at a club and communicate with the superintendent. The key person should be respected by his fellow members and should be knowledgeable enough to understand what a superintendent may explain.

"The key person ought to be honest in his dealings with the superintendent, meet frequently with him, and be practical in his suggestions. At a private club, the key person will be the Chairman of the Green Committee, but frequently the chairmanship changes every year. If the club has a green committee chairman who is really effective, really trusted, and works well with the superintendent, the club ought to keep him in that position for as long as it can."

I have sat through enough green committee meetings to know the futility of them. There is no sense having an expert agronomist to advise if a green committee is going to start questioning every point of policy they put forward. Far better for all concerned to let them

get on with it, give them all the encouragement possible, and allow their policies to be judged over three or four years.

Golf courses in Britain have to be made as playable as possible 12 months a year. What you do, or do not do, in June will influence the condition of a course in December. It is not too difficult to get good greens for two or three months in summer; the secret lies in having them good all year round — those forever on temporary greens in winter, please note.

MEMBERS ALLOW their clubs to be run on the lines that they would never allow for their businesses, but Tom Simpson, a late lamented golf course architect and great character, was fond of quoting Disraeli on the subject:

"It is much easier to be critical than to be correct"; or the words of Napoleon to his brother, "It is the greatest of all immoralities to engage in a profession of which one is ignorant."

The outspokenness of Simpson, who designed many masterpieces in Ireland and on the Continent, was legendary. Indeed, it set the tone of an obituary which the British journalist Henry Longhurst wrote before Simpson's death, because Simpson complained once that he would never see what Longhurst said about him. Given guaranteed immunity from legal actions, Longhurst immediately stressed Simpson's love of the unconventional, which made him the bane of so many golf club committees.

"His life has been one of unwavering hostility to government by committees in any shape or form and of ceaseless endeavor to get one-up on them. His first move when invited to design or alter a course was to win the first hole by turning up in a Rolls Royce, it thus being tacitly understood from the start that, if they did not like the result of his labors, they could do the other thing."

Not many in any walk of life can afford to adopt such a belligerent stance, but why, when they are quite happy to take a doctor's, lawyer's, or stockbroker's word on things, do golfers always think they know better than greenkeepers or golf course architects?

RESEARCH

A World of Information Awaits Your Call

by **WILLIAM H. BENGEYFIELD**

National Director and Research Committee Chairman, USGA Green Section

IF YOU'RE in research or extension teaching, or are a graduate student or a golf course superintendent and you're looking for specific turfgrass information references, try dialing (517) 353-7209. A world of information is awaiting your call.

Over 8,000 references are now in the computer at the USGA Green Section's Turfgrass Research Information Library, at Michigan State University. Funding of the research library by the Green Section was initiated early in 1983. Michigan State was the ideal site, since the O. J. Noer Memorial Turfgrass Library has been housed there for many years.

Dr. Richard E. Chapin, Director of Libraries at MSU, and Peter Cookingham, his associate at the Turfgrass Information Library (W-212 Library, Michigan State University, East Lansing, MI 48824), are preparing a descriptive brochure

that will explain the project and the available services. The brochure will also explain how to acquire and use software to access the file with an IBM-compatible personal computer.

The Research Library is one of many present USGA/GCSAA research projects devoted to the development of minimal-maintenance turfgrasses for the future of golf. The ultimate goal is a 50 percent reduction in water use requirements and a 50 percent reduction in overall course maintenance costs by 1992. By the end of this year, the USGA Turfgrass Research Advisory Committee will have spent \$1,250,000. Members of the Committee now include Dr. V. Gibeault, University of California; Dr. P. Rieke, Michigan State University; Dr. J. Watson, The Toro Company; W. Bengueyfield, National Director, USGA Green Section; Marion Farmer, USGA Executive Committee; J. Faubel,

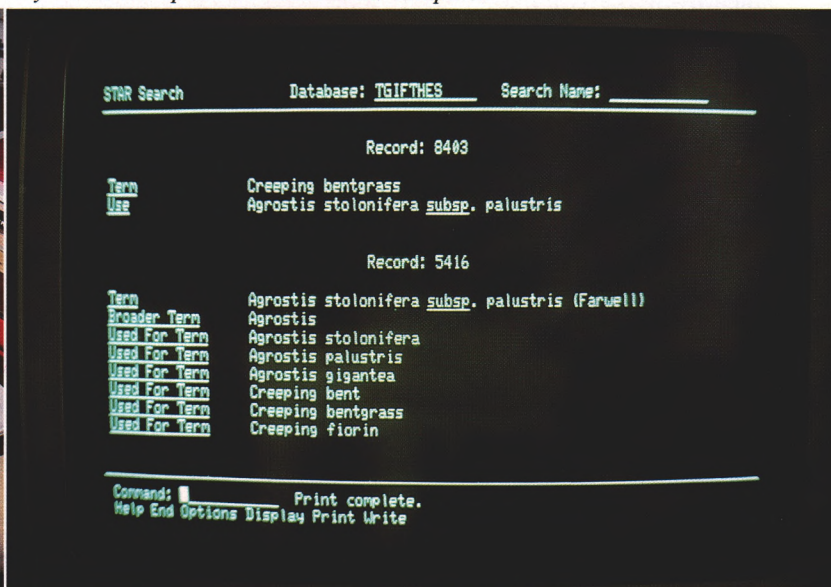
GCSAA Executive Committee; Frank Hannigan, Senior Executive Director, USGA; James Moncrief, Green Section (retired); J. Prusa, Associate Executive Director, GCSAA; and C. W. Smith, USGA Administration.

THE USGA/GCSAA research projects for 1986 include, in addition to the Library at MSU, breeding in zoysiagrasses, native grasses, *Poa annua*, colonial bentgrasses, creeping bentgrasses, bermudagrasses, and ten cultural practice studies. George M. Bard, a former member of the USGA Executive Committee and Chairman of the Green Section Committee, has said, "The key to the future of this research program rests in results, progress and fund raising. Those donating and raising funds must have a sense of security about spending this kind of money (now about \$400,000 annually)."

The Turfgrass Research Information computer.



Key words call up search results in the computer.





The Turfgrass Research Information Library is at Michigan State University.

A Research Report Summary for 1985 was published by the Committee last December. Copies have been made available to those who donate to the research fund and to other interested parties. Anyone who reads the report will find substantive assurances regarding the direction of the program and individual research progress. The earliest tangible evidence of forward movement in the entire undertaking can be found in the Turfgrass Research Information Library at Michigan State. In just three years, this information source is open for business. New references are added to the computer data bank almost daily. For the present, there is no charge for any of the library services, including subject matter reference printouts. The library can save anyone tens or even hundreds of hours of search on any subject relating to turfgrasses.

As is already taking place in medicine, the day will come when superintendents with a particular turfgrass problem will be able to enter with specific information into their computer, such as the type of grass, temperature, weather, and soil conditions, symptoms they observed, and wait briefly for a diagnosis. The computer will sift through thousands of symptoms and notes in its data base and print out a list of possible causes and control recommendations. The computer may even request more specific information or pertinent facts. This type

of quality library computer service is more than a dream; it's becoming a reality.

A TURFGRASS Information Bulletin Board may someday offer timely, general, practical guidelines for seasonal maintenance operations, including aeration, topdressing, irrigation, and overseeding. Of course, the latest research and field information on any given subject can be made immediately available. Through this USGA/GCSAA project and the golf course superintendent's office computer, the possibilities for growing better turf seem endless. The Turfgrass Information Center will also strengthen and enhance the on-site consultations of the USGA Green Section Field Agronomists. There will never be a substitute for experienced superintendents and consultants actually on the scene observing conditions as they actually exist. Technical communications, however, will improve with the nationwide, quality resources of the Turfgrass Information Library.

What does the future hold? The accomplishments of turfgrass research in the next decade certainly will directly influence the play, beauty, and enjoyment of everyone in outdoor recreation for the next half a century. The USGA/GCSAA projects are contributing to the quality of our lives and in helping **Golf Keep America Beautiful.**

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Texas A & M University

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TURF TWISTERS

DON'T CHANGE GREEN CHAIRMAN SO OFTEN

Question: My green committee chairman changes every year. Just as it seems we are communicating effectively, the process begins all over again. How can I convince my membership of the necessity for changing this practice? (Texas)

Answer: This is a serious problem encountered quite often. The best proof of the desirability of longer tenure for the chairman (at least three years) is found by examining the arrangement at the most successful turf programs across the country. Invariably, the chairman and the superintendent have worked together for many years to improve their facility.

DON'T TRADE A SURE THING FOR AN "I DON'T KNOW."

Question: We can get a very good quality sand for topdressing our greens. What do you think about adding about 20 percent peat? (Minnesota)

Answer: Why trade a sure thing for an "I don't know"? Peats are naturally quite variable and may introduce enough silt, clay, or very fine sand to block non-capillary pores in a mixture. If your rate of topdressing approximates the rate of grass growth, you will generate an adequate organic supply on your own without adding peat and without the danger of contamination.

PLEASE DON'T COMPLICATE MY LIFE ANY FURTHER

Statement: In the September/October, 1985, RECORD, there was a suggestion that different colored flags be used to assist golfers in determining where the holes are located on a green. I don't care for this idea, and here are my reasons:

1. Yellow flags are best for visibility and depth perception.
2. Finding, training and inspiring hole cutters is difficult enough. Complicating their lives (and mine) with three different colored flags every time the hole is changed (forward, middle, rear) may push many of us over the brink.
3. The logistics, theft of flags, and added expense almost assures it.
4. There are still purists who love the game for what it is. Yardage indicators of any kind deserve questioning. (Pennsylvania & Idaho)