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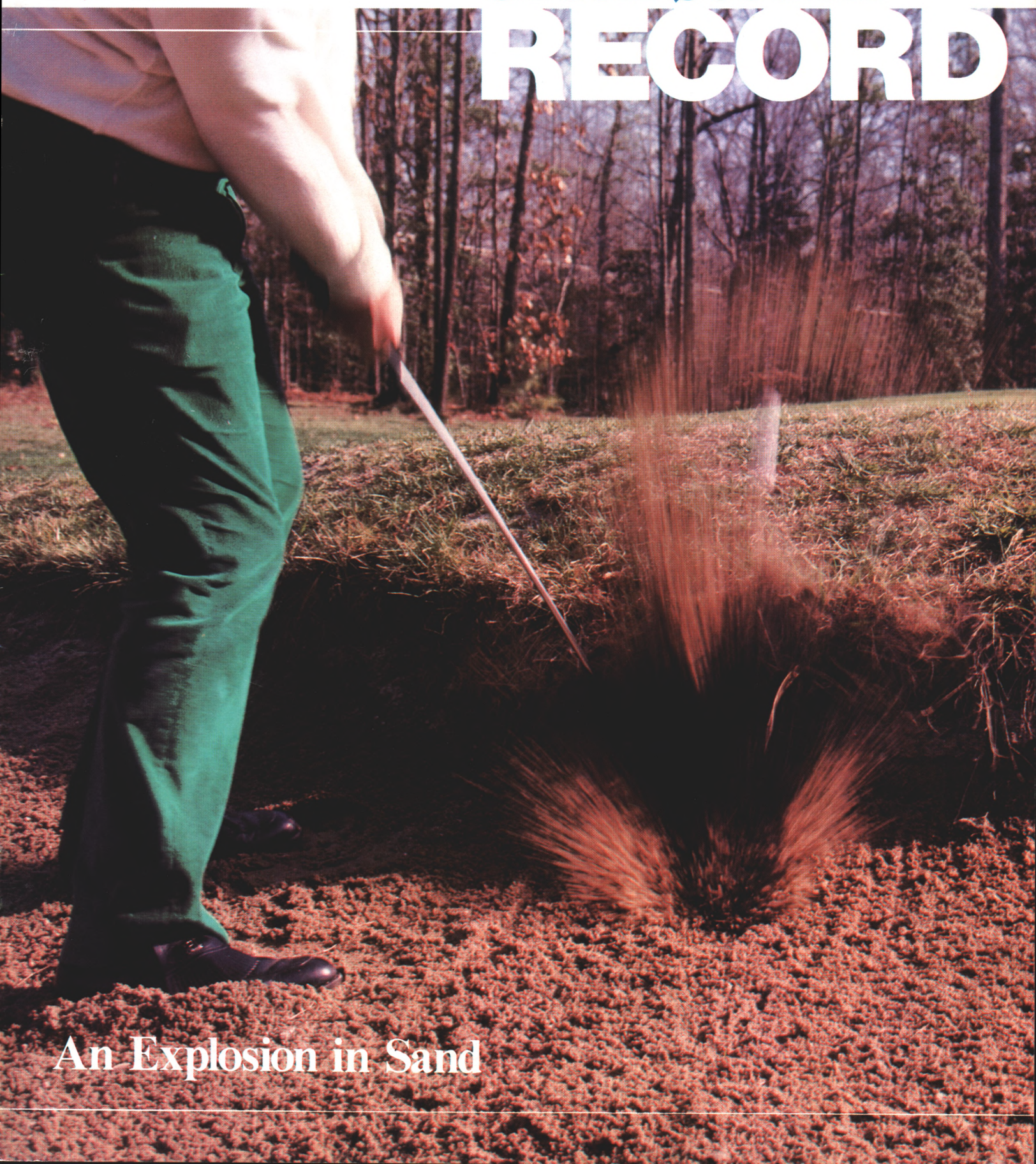

An Explosion in Sand

USGA®

Green Section RECORD

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An explosion in sand.

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The Church Pews of Oakmont Country Club, Pennsylvania.

Selecting and Handling Sand

by PATRICK M. O'BRIEN
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DR. MARVIN H. FERGUSON
President, Agri-Systems of Texas, Inc., Bryan, Texas

"WHERE DO I find a good bunker sand?" This question is frequently asked of USGA agronomists by golfers and golf course superintendents.

No wonder! Finding and selecting a quality bunker sand on your own is not easy. Furthermore, opinions vary about the playing qualities and appearances of different sands. The decision requires plenty of investigation.

Historically, golf courses often purchase a local inexpensive sand for bunkers. This sand, unfortunately, is not always suited for the purpose. All sands are not alike; they vary in size, shape, composition, color, and purity. This variability makes it possible to find almost anything in bunkers. Even today, many clubs simply cannot afford the high transportation costs of a more desirable sand. In some areas, particularly in the western states, good bunker sands are not always available.

Fortunately, the sand itself is usually inexpensive. It is found just about everywhere. In fact, there is such an incalculable amount of sand in the world that geologists have a hard time accounting for it all. Trucking costs generally determine the final price.

Today, purchasing sand for bunkers is routinely done, whether for replacing old contaminated sand, for new bunkers, or for dressing up a bunker with a thin layer for a tournament. Whatever the reason, several points should be considered before making a purchase:

1. A one-gallon sample of each bunker sand under consideration should be sent to a physical soil testing laboratory. Although there are no consistent methods as yet developed for evaluating bunker sands, a few precise evaluations can be made.

2. The handling of a new bunker sand is important. Each delivery should be inspected for contamination. Upon acceptance, proper, clean storage of the sand is important.

3. Bunkers should be prepared to accept the new sand. The old sand should first be removed. The new sand will become contaminated, otherwise, and lose its desirable properties.

Bunker sand guidelines were developed by the Green Section, in 1974. Since 1948, considerable experience with testing sand for putting green construction and topdressing has been achieved. The bunker guidelines were released in May, 1974, in GOLF JOURNAL and again in September, 1974, in the

GREEN SECTION RECORD. The guidelines are based on laboratory tests, practical work, and experience. The size, shape, purity, color and composition of bunker sands are emphasized. An experienced laboratory can evaluate these qualities.

Judging Sand

Size. Size is one of the most important properties of solid materials. Determining the particle size distribution of a representative sand sample is fairly precise. Sand particles between ¼ to 1 millimeter are recommended for bunkers. Larger or smaller sands have disadvantages in playability and maintenance.

The playability of a sand is significantly determined by its particle size. The correct particle size distribution gives the golfer the option of playing either an explosion or pick shot in dry conditions. Sand of this size will provide a variety of lies, depending on the incoming trajectory, velocity, ball angle of entry, and moisture content of the sand. In general, low incoming shots, which have a high velocity, tend to bury. High shots, which enter at near perpendicular angles, will produce "fried egg" lies; *i.e.*, the ball penetrates into the sand and leaves a ring of sand around itself. Most importantly, when playing the bunker shot from either fairway or greenside bunkers, sand in this particle range gives the golfer the sensation of feel and finesse. The same particle-size distribution in each bunker is important to uniform playability.

The sand range recommended is identical to the sand specified for putting greens and topdressing if the very fine sands (below ¼ millimeter) are screened and removed. This alleviates many maintenance problems. Sand is frequently blasted onto putting greens, especially at courses where bunkers are closer than 12 feet to greens. This sand will filter through the grass blades and be out of sight, except when it is wet and the particles stick together. This helps speed play, since less time will be spent brushing sand from the line of putt. Also, explosion shots will, in effect, topdress the green with the same range of sand particle size as that recommended for construction and topdressing, thereby eliminating dissimilar sands on the surface.

Laboratory testing is essential to ensure proper particle size distribution. Even if a specific sand grade such as "mason," "brick," "glass," or "concrete" sand is used and is supposed to contain ¼ to 1 millimeter size particles, it may also contain other particle sizes smaller than ¼ millimeter or larger than 1 millimeter. On a broad scale, these sand names are absolutely meaningless because of their great variability in particle sizes.

The names may only be important locally if there is good quality control and the particle size range has been determined.

Never consider a dune sand for bunkers. The particle size distribution is too narrow. Dune sands in all parts of the world tend to be in the ⅛ to ¼ millimeter mean size or range. Only very fine sands are easily windblown.

Ideally, a minimum of 75 percent of the bunker sand should be in the ¼ to ½ millimeter range. In fact, some experts prefer all the sand particles in this range. However, particles between ½ and 1 millimeter are included to help prevent wind erosion and compaction. A mixture of different size particles appears to set up better than those of uniform size.

There are areas, however, where wind velocity is a severe problem and a higher

(Opposite page) Not all bunkers are filled with sand. Saucon Valley, Pennsylvania. (Left) The infamous friend egg. (Below) Drainage — a critical factor in bunker management.

percentage of larger and heavier particles (between 1 and 1½ millimeters) are recommended. Common sense must be used in this instance. This is the only exception in the particle size guidelines.

Purity. A good bunker sand is clean. It will not contain impurities, such as silt, clay, coarse sand, or gravel. Usually bunker sands are washed to remove silt and clay, and screened to remove large particles. The presence of only 5 percent silt and 3 percent clay in a sand can impede drainage. A laboratory can precisely test for purity.

Shape. Angular sands, rather than round sands, are preferred for bunkers. Angular sand will shift less frequently under the weight of a golfer. Fortunately, most golf courses are now receiving angular sands. The majority of sand for golf courses comes from beaches, river beds, and igneous and sedimentary rock deposits.

Desert sands are most likely to be rounded. Wind-borne sand particles scud along the ground colliding with each other, bouncing off obstructions, and wearing off their rough irregularities. Eventually, smoothed and rounded, they approach a perfectly spherical shape and may keep it without further wearing for millions of years. It was once believed that sand grains were rounded while washing down river beds, but laboratory experiments showed they are too lightweight to abrade each other in water. Evidently, most of the rounded sand grains in the world have been exposed to wind abrasion at one time or another. There is relatively little reason to believe that sand extracted from a river bed would be rounded, and a lab test can provide complete assurance. The laboratory determines shape subjectively by feel and visually with a microscope.

Composition. Sand composition varies greatly. Most sands, however, contain quartz, the most common form of silicon dioxide, or silica. A hard, quartz sand is preferred in bunkers, since quartz resists weathering and retains its original shape permanently.

Many clubs select sands based on appearance without considering composition. For example, some clubs select limestone sand because of its brilliant white color, even though limestone sands are subject to weathering and the fine particles released during weathering affect the playability and the maintenance of the sand. Limestone sand surfaces are too firm for explosion shots. This firmness is caused by the cementing action of the softer grains. The fact that many cart paths are constructed of limestone material attests to the strength of the cementing action. However, this is not nearly so much of a problem today because bunkers are raked more frequently by mechanical power rakes. More frequent raking keeps limestone sands from becoming firm. Dolomitic limestone sand is less subject to weathering, but still it should not be considered if a quartz sand is available.

Some clubs use manufacturing sands in their bunkers, such as those used in glassmaking. An example is a glass sand from the Devonian Oriskany Sandstone deposit, located in West Virginia and Pennsylvania. This sand is 99 percent quartz, with a desirable white color. Nevertheless, it is just as important to have these sands evaluated as any other to ensure proper particle size.

Color. The contrast of white sand with green grass creates a scene of great beauty. A white sand is preferred, particularly for television and for golf courses that hope to attract players who are passing on nearby highways. White sand surely attracts the eye but, on a sunny day, the reflection of light from a brilliant white sand can affect the golfer. It is harder to find and hit the golf ball with the glare from brilliant white sand. This is especially true for golfers with eye problems. Light tan sand is considered by many to be more natural and better from a golfer's viewpoint.

Angle of Repose. Every material has an angle of repose. This is the angle with the horizontal at which a material will stand when piled. The angle of repose will vary with particle size distribution, particle shape, and moisture. The angle of repose may help predict sand behavior on flashed bunker faces, the probability of fried egg lies, and retention of footprints.

This test, as of yet, is not done on bunker sands. Research is currently underway with this new variable and may be included in future bunker sand evaluation methods.

Handling Sand

Once the sand is selected, it should be inspected for contamination upon arrival. Many times a delivery truck will bring sand to a club immediately after hauling a load of coal or another substance.

If the sand is not directly placed in the bunker by the delivery truck, provide for proper storage. Dump the new bunker sand onto a concrete or asphalt surface, if possible, and thereby avoid soil and debris from entering the sand when loading from bare ground.

Traditionally, sand is hauled to bunkers with maintenance trucks from the storage area. Oftentimes the trucks cannot move in and out of certain areas, and it becomes necessary to shovel the new sand from the trucks. Moving sand into bunkers by truck or shovels causes a soft sand. It usually takes between 90 and 120 days and plenty of water (rainfall or irrigation) for the sand to set up properly so that golf balls will not become buried in it. A faster and better method of transferring sand is with a gunnite machine. This machine blows sand under high pressure through a hose up to several hundred feet into the bunkers. The force is such that it compacts the sand during the placement and eliminates the problem of a buried lie.

Removing Poor Sand

Avoid placing a good bunker sand over a poor bunker sand. It is always best to start from scratch. If a bunker sand with a particle distribution of ¼ to 1 millimeter is placed over a larger sand, the old sand will shortly come to the surface with raking. The finer sand will filter through the coarse sand, producing the original condition.

On the other hand, many older clubs have bunker sands that have become contaminated with silt and clay. These sands become hard if they are not raked frequently. Water will not move through them to drain lines. If the bunkers constantly fill with water, silt and clay will continue to work up into the sand, causing it to become increasingly dirty. Under these circumstances, it is always a good idea to replace the sand and clean out or install new drains.

Add fresh sand to bunkers whenever the sand depth has decreased below a minimum of four to six inches on the base or two inches on the face. This is usually required every three to five years. Redistributing the sand from low areas to high areas will often suffice.

Summary

Many existing bunkers are filled with a poor playing quality sand. Through laboratory testing, proper handling of the new sand, and removal of the old sand, better appearance and playability of bunker sands will result. Good bunkers are an asset to any golf course. Investigate for best results!

Should You Change from Triplex Green Mowers to Walking Green Mowers?

by **ROBERT RANDQUIST**
Superintendent, Southern Hills Country Club, Tulsa, Oklahoma

AT SOUTHERN HILLS Country Club, the winter before we were to host the 1982 PGA Championship, we made a significant change in our putting green maintenance operations. We switched from triplex putting green mowers back to single walking green mowers! It was not a hasty decision; the green committee had studied the economic, agronomic, and aesthetic factors involved for several months.

Dr. Douglas T. Hawes, Director of the Mid-Continent Region of the USGA Green Section, has noticed a similar trend throughout his territory. I would recommend that anyone interested in or contemplating such a change should take careful consideration of the factors outlined below.

The first factor we examined was cost. How much money is really saved by using triplex green mowers? We were using two triplex green mowers on greens and replacing the units every three to four years. Two of these units cost about $18,000 to $20,000 (without trade-in). To accomplish the same work, we felt we would need eight 22-inch walking mowers. Each crew member could mow three greens, with one mower for the practice greens and one mower for collars or for use in case of a breakdown. Eight 22-inch mowers cost about $17,000 to $19,000. Since there is only a minimal difference in original equipment costs, the comparison of equipment costs becomes a comparison of life-span maintenance costs. After consulting with several golf course superintendents, we determined that:

1. The projected average life-span is three to five years for triplex green mowers and eight to 10 years for walking green mowers;

2. Average yearly costs for repair and replacement parts for two triplex mowers is about $1,000 to $1,200, and for eight walking mowers it is about $800 to $1,000 (this slight difference in repair costs is due to replacement of parts in the hydraulic system);

Among many superintendents and green committees, the walking putting green mower is regaining popularity.

3. Labor for maintaining either two triplex mowers or eight walking mowers is about $3,500 to $4,000 a year.

We can see from these figures that the reason why we have an appreciable difference in equipment costs between walking mowers and triplex mowers is because the average projected life-span of the walking green mowers is double that of the triplex green mowers. Over an eight- to ten-year period, equipment costs for using walking mowers will be about $2,000 a year less than for using triplex green mowers.

WE NEXT EXAMINED the savings in labor costs from mowing with triplex green mowers. At most we mow greens six days a week for 10 months a year and twice a week for two months. Our greens average 5,000 square feet, and it takes two triplex mowers one-and-a-half hours each to mow greens. At a cost of $5.50 an hour for hourly wages and $8.25 an hour for overtime wages, it costs us $5,313 a year to mow our greens with triplex mowers. In comparison, we can mow our greens with walking mowers, using six men for one-and-a-half hours each. Using the same mowing frequency and hourly wages, it cost us $15,394 a year to mow with walking mowers. On the surface it appears that triplex mowing of greens saves us about $10,000 yearly in labor costs. However, other labor costs are associated with triplex mowing that are not necessary when walking green mowers are used.

At Southern Hills we have bermudagrass tees, fairways, collars, and roughs. Our greens are creeping bentgrass. It has been my experience that during the dormant period for bermudagrass, areas around the greens suffer heavy damage caused by turning triplex green mowers. This condition is especially noticeable in areas of tight bunkering around the greens. We tried wider turning radiuses and slower turns, but the damage problem persisted. It became a matter of resodding 1,000 to 1,500 square feet of bermudagrass around each green every year. At a cost of 13¢ a square foot, this was costing us $3,000 to $3,500 yearly.

We also had problems with bentgrass thinning out in the cleanup circle around the perimeter of our greens. Alternate day mowing did not solve this "triplex ring" problem, and we began mowing the cleanup circle with a walking green

(Opposite page, top) Hard to avoid the fact that triplex green mowers do reduce mowing time and have been used for championships. (Opposite page, bottom) Hydraulic leaks are the most dramatic problem encountered in triplex mowing. They are not uncommon but preventive shop maintenance will greatly reduce them. (Above) Triplex mowers weigh a good deal more than the walking green mower and their turning patterns have been blamed for damage to collars on several golf courses. Zoysia and bermudagrass collars have shown damage early in the spring due to turning of triplex mowers on them.

mower. This increased the cost of triplex mowing — one crew member, three days a week at $5.50 per hour for six months a year = $1,000.

Another cost that may be considered is repairing the damage caused by hydraulic leaks. This cost can be minimized, however, by good preventive maintenance, and we did not include it in our cost analysis.

CONSIDERING ALL these figures, it cost us about $3,500 to $4,000 more a year to mow with walking green mowers than to mow with triplex green mowers. This figure for other golf courses would be higher or lower, depending on several factors, including green size, labor market, mowing frequency, length of season, *etc.* For example, a golf course with large greens, no wear problems around the greens, and a long growing season might realize a savings of $15,000 to $17,000 yearly by using triplex green mowers. On a golf course with small greens, tight bunkering around the greens, and a short growing season, using walking mowers could be less expensive than using triplex mowers.

Other factors that influenced our decision included changes in cultural practices over the last few years because of problems associated with triplex mowing. Vertical mowing, topdressing, and brushing frequencies had been dramatically increased because of increased problems with grain and thatch accumulation. Weed control around the greens became more difficult and expensive from thinning of turf caused by wear and compaction of the triplex green mowers. It is difficult to place a price on not having the best possible turf in these critical areas.

Should you change from triplex green mowers to walking green mowers? The answer for Southern Hills and many other golf courses is a resounding "yes!" The added cost of $3,000 to $10,000 out of a labor budget of $100,000 to $200,000 a year is a small price to pay for improved putting quality, better turf around the greens, and elimination of unsightly hydraulic spills. Using walking green mowers for the past two years has confirmed our original analysis, and I encourage you to consider making this change if your overall conditions warrant.

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I certify that the statements made by me are correct and complete.

Robert Sommers, Managing Editor

Close up of leaves of Manhattan ryegrass being colonized by Corticium red thread pathogen.

Recent Insights on the Nature and Control of Corticium Red Thread

by DR. HOUSTON B. COUCH, Department of Plant Pathology,
Virginia Polytechnic Institute and State University, Blacksburg, Virginia

CORTICIUM RED THREAD has the distinction of being the first reported foliar disease of turfgrass. The fungus that incites the disease was first observed on ryegrass in Australia, in 1854. The next account of an outbreak of red thread came from England, in 1873, where it was reported to be causing severe damage to ryegrass. The disease was first identified in the United States in 1931. At the present time, Corticium red thread is known to occur on bentgrass, bermudagrass, Kentucky bluegrass, creeping red fescue, and perennial ryegrass in the cooler humid areas of North America, Europe, and Australia.

Since the first description of the disease, all the symptoms associated with outbreaks of red thread have been thought to be caused by a single species of fungi. In recent years, however, research has shown that there are at least two fungus species that can cause similar symptom patterns on the grass they are infecting, and that they can occur simultaneously on the same stand of grass. Although both of these organisms produce pink mycelia and are in the same major taxonomic group of fungi, they are clearly distinguishable from each other. Also, while the symptom patterns of the diseases they inflict on turfgrass have features in common, they also have certain key features that distinguish them from each other.

One of the components of what was formerly grouped under the blanket title of red thread is now known to be caused by the fungus *Limonomyces roseipellis*. Based on the primary features of its symptom pattern, this disease has been named Limonomyces pink patch. Only perennial ryegrass and creeping red fescue are known to be susceptible to pink patch. The disease is confined to the above-ground portions of the plant. Symptoms are usually seen first along the margins of the leaves where they

appear as small, irregularly shaped blotches of pink color bordered by light green to yellow bands of discolored leaf tissue. Eventually, the entire width of the leaf takes on a distinctive pinkish cast. When this occurs, a light brown to tan tip dieback of the leaves then develops.

On stands of grass that are mowed frequently and grow under optimum nitrogen fertilization, affected areas seldom reach more than 20 inches in diameter. Also, the severity of the disease within these individual locations is minimal. Consequently, under these management conditions, Limonomyces pink patch is generally regarded to be of minor importance. However, on turf that is mowed infrequently and that grows under low nitrogen fertilization, damage from pink patch may be severe. In these instances, the affected areas assume a distinctive pinkish tinge, after which all of the above-ground parts may become completely blighted.

From an economic viewpoint, the red thread component of this total syndrome is by far the most important. Corticium red thread affects a wider range of grasses than does Limonomyces pink patch, and it has a much greater potential for the destruction of large areas of turf.

A recent research report on the nature of the fungus that incites Corticium red thread has recommended that its name be changed from *Corticium fuciforme* to *Laetisaria fuciformis*. The rationale for this change appears to be a valid one; therefore, the proposed new name for the fungus will probably receive general acceptance. However, for the sake of continuity in written and oral reports on the nature and control of the disease, its present standard name, Corticium red thread, should not be changed.

THE PRIMARY diagnostic feature for Corticium red thread is the presence of fine, thread-like, coral pink structures 1/16 to 1/4 inch in length at the terminals of the leaves. These structures are never present in cases of Limonomyces pink patch. However, many of the other signs and symptoms of the two diseases overlap. Therefore, in field diagnosis, one can usually state with a reasonable degree of certainty that only Limonomyces pink patch is present. However, in the instances of positive diagnosis of the presence of Corticium red thread, one cannot be certain through field examination only that Limonomyces pink patch is not also present. This can only be determined by laboratory-based procedures. Whether or not only one or both of these diseases is present is more than just an academic question, for it could be the basis for deciding whether or not a spray program should be initiated and what fungicides should be included in it.

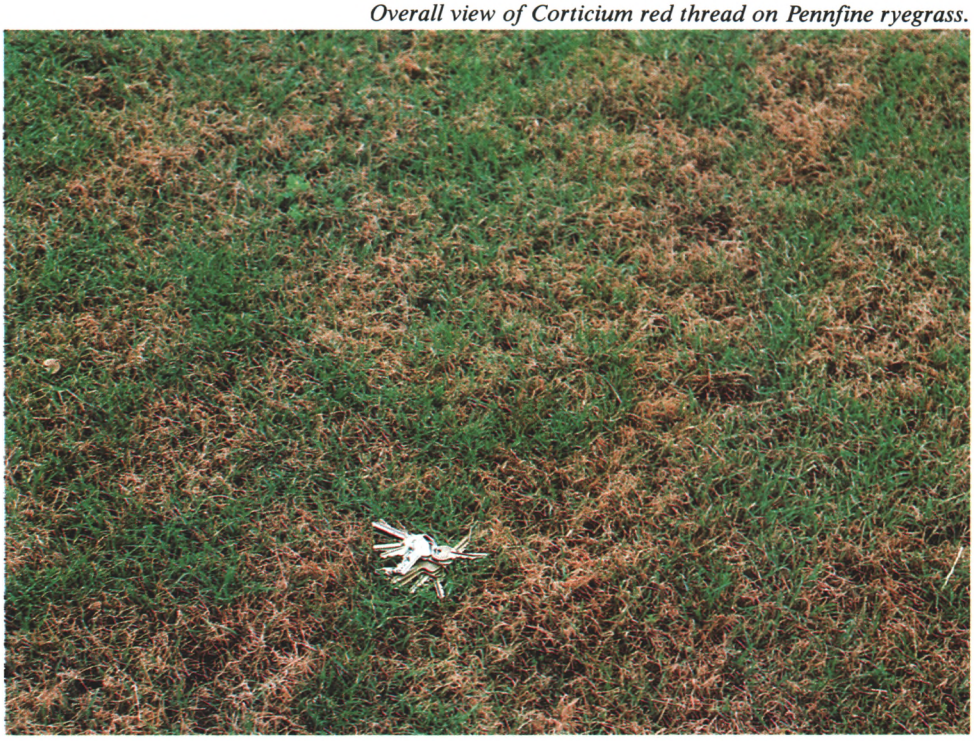
Although the creeping bentgrasses have been known for years to be susceptible to Corticium red thread, the probability of the occurrence of the disease on putting green managed grass has not been given much consideration. One of the reasons for this is that the bentgrasses are one of the more resistant species to this disease. Also, outbreaks of red thread are most common when bentgrass greens are at their highest nitrogen levels and thus less prone to injury by the disease. In addition, in years past, the organic and inorganic mercury-based fungicides were a mainstay in greens management. These compounds are very effective in the control of Corticium red thread; consequently, the probability of the appearance of the disease was preempted as a side effect of standard fungicide application practices.

With the cessation of the use of mercury fungicides for control of diseases that occur during the growing season and the general trend toward lower nitrogen fertilization, the incidence of red thread on bentgrass greens has increased. In these instances, the disease has not been of any major consequence. However, it is capable of doing some damage to both the grass and the superintendent's confidence in his ability to control what he considers to be dollar spot.

Under close mowing conditions, the symptom pattern for red thread is somewhat different from that of taller cut grass. The affected areas range from two to six inches in diameter and are irregular in outline. The affected leaves are tan, and a cursory examination of the area can result in a misdiagnosis of the problem as being a case of fungicide-resistant atypical Sclerotinia dollar spot. In the instances of occurrence of Corticium red thread, however, close examination of the leaves will usually reveal the presence of a light reddish tinge to the sheaths. Also, although the frequency levels will be low because of the close mowing, the characteristic red threads typical of this disease can be found in these areas.

The optimum weather conditions for the development of Corticium red thread are air temperatures in the 68°-75° range, coupled with prolonged periods of rainfall. With creeping red fescue, soil moisture stress effects on the suscep-

Overall view of Corticium red thread on Pennfine ryegrass.



(Top) The positive diagnostic feature of red thread is the presence of fine thread-like, coral pink structures at the terminal portion of the leaves. (Above) Corticium red thread on Penncross bentgrass under putting green management. Note that the characteristic pink coloration produced by the red thread pathogen is present even under close mowing conditions.

tibility of plants to the disease appear to be related to the variety in question. Rainier red fescue, for example, is more susceptible to red thread under conditions of low soil moisture content, while the susceptibility of the variety Pennlawn does not appear to be affected by soil moisture levels. Plants grown under calcium deficiency are more susceptible to red thread than those grown at adequate calcium levels. Of the various management practices, nitrogen fertilization has the most pronounced effects on development of this disease. The incidence of Corticium red thread is usually much lower when the plants are growing under a program of high nitrogen fertilization.

OF THE CULTIVATED turfgrass species that are susceptible to Corticium red thread, perennial ryegrass, creeping red fescue, and Kentucky bluegrass are most vulnerable. Within these species, there is a wide range in the degree of susceptibility among certain varieties; therefore, comparisons among species need to take this into consideration. However, as a general rule, the perennial ryegrasses rank at the top of the susceptibility list, with red fescues second. Kentucky bluegrasses, as a group, hold down third place. The increasing use of the fine-leaved perennial ryegrasses in recent years, then, has introduced a new dimension to the potential for outbreaks of red thread in areas where the disease has been known to occur but has not been considered to be of major importance. The eastern seaboard of the United States is a good example of this phenomenon. The past history of Corticium red thread in this region has been marked by occasional outbreaks of the disease, but not of sufficient magnitude to cause any general concern. However, with the steady increase in the use of perennial ryegrasses has come a higher frequency of reports of localized but severe outbreaks of red thread.

During 1982-83, in certain locations of Virginia, the disease was active in stands of ryegrass throughout the winter and continued to be in high incidence until late June. The year, then, was a particularly good one for comparative evaluation of the susceptibility of perennial ryegrass varieties to Corticium red thread. In the ryegrass variety trails at the Virginia Tech Turfgrass Research Center at Blacksburg, red thread was both severe and uniformly distributed over the plots for an extended period of

time. Comparative ratings of these plots were made for relative disease development, using an incidence-severity scoring system. The results were subjected to statistical procedures that identified the following comparative disease resistance groups:

	Red Thread Resistance Group*	Perennial Ryegrass Variety
Most Resistant	I	Linn Citation
	II	Derby Eaton Epic Yorktown
	III	Game Ensorta Pelo Diplomat
	IV	Pennfine Omega
Most Susceptible		Manhattan Caprice

*The numerical values used to establish each of these rankings were subjected to analysis of variance, and the differences between groups are statistically significant at the 5 percent level of probability.

IN THE PAST, cadmium- and mercury-based fungicides were the principal compounds used for control of Corticium red thread. Although certain of the newer, organic fungicides have been shown in field tests to control the disease, from time to time reports of their performance does not correspond with the expected control level. The reasons for this could be such factors as differing levels of resistance to the modes of action by local strains of the red thread pathogen, or the possibility that the user is unknowingly dealing with both Corticium red thread and Limonomyces pink patch and the material in question is not active against one of the two pathogens. In any event, there is a clear and present need for an expanded program of field screening of candidate fungicides to search out those that are highly effective in control of red thread.

In the 1983 Virginia Tech field tests for red thread control, we included several fungicides that are presently commercially available for use on turfgrass, as well as recently developed compounds that are still in the early screening stage of development. Within the group of recently developed materials, we found that certain of the ergosterol inhibitors show good promise for the control of this disease. Chevron's experimental sterol inhibitor XE-779 gave complete control of the disease. DuPont's DPXH6753 also gave a high level of disease control. The ergosterol inhibitors that are currently labeled for turf use [Elanco's RUBIGAN (fenarimol) and Mobay's BAYLETON (triadimefon)] also gave good disease control. Bayleton is presently labeled for red thread control.

Other compounds that gave very good control of red thread were Mallinckrodt's CADMINATE (cadmium succinate) and VORLAN (vinclozolin). Mobay's DYRENE (anilizine) and Ciba-Geigy's BANNER (propiconazole) were also very effective in control of the disease.

The future possibility of having a fairly wide selection of materials to choose from for red thread control looks very good. In the meantime, however, in view of the possibility of varying performance patterns in different localities and local regulations concerning fungicide usage on turfgrass, one should seek the advice of an established advisory service before initiating a spray program for the control of Corticium red thread.

Effect of nitrogen fertilization on the incidence of red thread on Kentucky bluegrass. Left, low nitrogen; right, high nitrogen.

FOR GREEN CHAIRMEN, SUPERINTENDENTS, CLUB OFFICIALS:

The Green Section 1984 Educational Program

Thursday, February 2, 1984, Las Vegas Convention Center, Nevada

For the fourth consecutive year, the USGA Green Section's Annual Educational Program will be a part of the week-long Golf Course Superintendents Association of America International Turfgrass Conference and Show. It presents an opportunity for the golf course superintendent, his green committee and the other club officials to attend the world's greatest show on turf!

"The Business of Golf Course Management" will be presented on Thursday morning, February 2, from 7:45 a.m. to 11:25 a.m., at the Las Vegas Convention Center, Las Vegas, Nevada. Registration to the USGA Green Section Program is free. It admits the attendee to the Green Section Program and the GCSAA Trade Show all day Thursday. The event has no equal in the world of turfgrass management.

Advance registration (free) is suggested and should be made through the GCSAA, 1617 St. Andrews Drive, Lawrence, Kansas 66044.

The Business of Golf Course Management

7:45 - 8:00 Welcome and Introductions

George M. Bard, Chairman, USGA Green Section Committee, Rolling Meadows, Illinois

8:00 - 8:20 Fresh from the Drawing Board

William H. Bengeyfield, National Director, USGA Green Section, Placentia, California

8:20 - 9:00 Business Tips for the Golf Course Superintendent

A panel moderated by *Charles White, Southeastern Director, USGA Green Section, Athens, Georgia*

Budgeting & Purchasing — *Bruce R. Williams, Superintendent, Bob-O'Link Golf Club, Highland Park, Illinois*

Hiring Practices — *James T. Snow, Northeastern Director, USGA Green Section, Far Hills, New Jersey*

Lead, Follow or Get Out of the Way — *Donald E. Hearn, CGCS, Weston Golf Club, Weston, Massachusetts*

Monitoring Operations — *Wm. G. Buchanan, Mid-Atlantic Director, USGA Green Section, Richmond, Virginia*

Money is not the Problem — *John W. Monson, CGCS, Broadmoor Golf Club, Seattle, Washington*

I Need a Secretary! — *Dr. Douglas T. Hawes, Mid-Continent Director, USGA Green Section, Dallas, Texas*

9:00 - 9:20 Who Sets the Standards for Play on Your Golf Course?

Robert W. Osterman, President, GCSAA, CGCS, Connecticut Golf Club, Easton, Connecticut

9:20 - 9:35 Break

9:35 - 10:35 The Image Game. Are You Playing? Do You Know the Rules? Will You Win?

Bobby Gee, Speaker and Consultant, Laguna Niguel, California

10:35 - 11:00 Golf Keeps America Beautiful!

B. P. Russell, Chairman and CEO, Crum & Forster, Inc., Morristown, New Jersey

11:00 - 11:25 Some of the Qualities of Great Golf Course Superintendents

James R. Hand, USGA Vice-President, Ossining, New York

11:25 Closing Comments and Adjournment

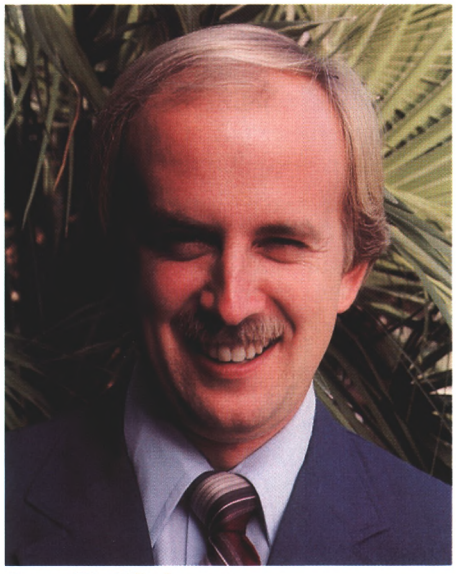
The main focus of the GCSAA Conference and Show is upon continuing the professional education and development of golf course superintendents. It is an event worth every attention of superintendents and club officials alike. If you wish further Conference information, call toll-free 1-800-GCA-SUPT. Plan to attend!

News Notes at Year's End

Don Hoos Resigns. Larry Gilhuly Appointed Green Section Director, Western Region

Donald D. Hoos, Western Director of the USGA Green Section from 1978 to 1983, announced his resignation on September 23, 1983, to accept the position of Superintendent at The Golf Club of Oklahoma. From Don's many friends, particularly throughout the western and southeastern states, comes a unanimous "well done" and good wishes for the future.

Larry W. Gilhuly, of Bothell, Washington, has accepted the appointment as Western Director of the Green Section. He brings with him more than eight years of practical experience from Seattle Golf Club, Seattle, Washington. He is a graduate of Washington State University, where he attended as an Evans Scholar. Larry is a member of the GCSAA, Co-Editor of the Northwest Superintendents Newsletter, and he was active in the Turfgrass Association there. He is a 5-handicap golfer and brings with him not only a knowledge of cool- and warm-season turfgrass management practices, but also a knowledge of the game. Larry and Peggy Gilhuly have two children. The Green Section's Western Region address, 200 N. Bradford, Suite L, Placentia, CA 92670, remains unchanged.



Larry W. Gilhuly

1984 Turf Advisory Service Fees Remain Unchanged! New All-Day Fee Introduced

A new full-day visit fee will be introduced in 1984 at the request of many TAS subscribers. The new offering enables TAS subscribers to obtain a full day of Green Section agronomic services at approximately half the cost of a regular second visit. This holds a special advantage for courses having 27, 36, or more holes of golf. The All-Day visit fee is $750 if payment is received at Golf House, Far Hills, New Jersey, by April 15, 1984. After that, the All-Day fee is $800.

A dramatic increase in USGA Member Clubs subscribing to TAS in 1983 was noted. Over 970 paid visits supported the program in 1983 (at the present rate structure), and all indications are that this figure will be exceeded in 1984! Everyone associated with Green Section operations thanks you for your support and interest in better turf for more enjoyable golf.

Those clubs not subscribing to TAS in 1983 should not miss this invaluable agronomic consulting service in 1984! Contact Golf House or your Regional Green Section Office (see inside front cover) for all the details. There is no better buy in turfgrass management: for the Superintendent, for the Club, for the Golfer.

The Spiked Golf Shoe is Older than We Thought

Aficionados of golf shoes will be interested to learn that the 1893 date suggested as the earliest evidence of spike shoes for golf ("Golf Shoe Study II," GREEN SECTION RECORD, September/October, 1983, issue) has been bested by at least 36 years!

Joe Murdoch, of the USGA Museum Committee, has uncovered earlier evidence of golf shoes with spikes. In "The Golfer's Manual," published by Cupor, Whitehead and Orr, in 1857 ("An Historical and Descriptive Account of the National Game of Scotland"), there appears the following passage on page 54:

> Let the novice invest in a pair of stout shoes (boots constrain the ankles too much), roughed with small nails or sprigs, and he will march comfortably and safely over the most slippery ground that can be burned out by a meridian sun in the dog-days.

The 1857 author of "The Golfer's Manual" is listed as "A Keen Hand" on its cover. No mention is made of how keen his eye.

TURF TWISTERS

YOU ARE THE ONE!

Statement: I just want you to know that many of your readers believe the RECORD is the best magazine in the golf course - turfgrass maintenance business. Keep up the excellent work that goes into the RECORD. It is appreciated. (Missouri)

Reply: It's nice to be liked, and we do thank you. But truly, it is *YOU* and every one of the superintendents and USGA Member Clubs who support the Green Section and the Turf Advisory Service that make it all possible! *YOU* make it possible for our agronomists to visit courses throughout the country and to write basic and hopefully informative articles and report on the new ideas and techniques *YOU* have developed. And we welcome superintendents and club officials to write articles about the things they are doing to improve their own golf courses.

Without the support of approximately 1,000 clubs in the United States, the Green Section agronomists would not be available for visits, speaking engagements at turf conferences, letter or telephone consultations or writing articles for the RECORD.

Indeed, without you, there would be no USGA Green Section and no Turf Advisory Service. Appreciation, it seems, works both ways!

INSIDE OR OUT

Question: What is the USGA Ruling, or policy, in regard to the placement of rakes in bunkers? Do they belong within the perimeter of the bunker or outside it? Should they be upright or lying flat? These questions are inevitably raised before every big tournament at our course! I've heard all kinds of answers. (Texas)

Answer: Here's the right answer and the policy of the USGA. Bunker rakes are to be placed outside the bunker, lying flat and to the rear of the bunker (or positioned to least likely affect play). Of course, not all golfers return the rakes to their proper place after use. By day's end, they may be found almost anywhere.

BUT NOT QUITE SO FAST

Question: We do not want the so-called "championship quality putting green speed" at our club. What is a good average speed for daily play? (Delaware)

Answer: From our travels, it appears that most golfers prefer a daily Stimpmeter speed of between 7′ 6″ and 8′ 6″. The USGA Green Section, of course, does not suggest putting green speeds for clubs. This is determined by the golf course superintendent or by the membership. A table with speed categories for regular membership play can be obtained from your Regional Green Section office (see inside front cover).