JANUARY 1978

USGA GREEN SECTION RECORD

A Publication on Turf Management
by the United States Golf Association

Par-3 Hole at Mauna Kea.

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VOL. 16, No. 1 **JANUARY 1978**

Cover Photo:
A beautiful par-3
at Mauna Kea, Hawaii.

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The Numbers Racket

by WILLIAM S. BREWER, JR., USGA Agronomist

TODAY'S GOLF COURSE superintendents are being called upon to do more and more with less and less! Would you agree? At least this is the consistent impression I receive after attempting to contribute to effective turfgrass management programs and trying to solve some golf course operational problems. And it is very much to the superintendent's credit that, in the majority of cases, he has been able to beat the squeeze play! It is also to the good fortune of the golfer and the game.

"The golf course never looked better," is a comment often heard over the past two years. The people who make such remarks sincerely believe what they say, based upon what they have seen. Meanwhile, the superintendent manages only a weak smile and a mumbled, "Thanks," in reply. He is waiting anxiously for the other shoe to drop. He knows there is a great deal that the golfers do not see, that the squeeze play being put on him is making his behind-the-scenes operation shaky.

Some examples? Labor turnover is very high, in some cases 100 per cent a year; and, the size of the crew is decreasing. This means operating with fewer men who have fewer skills. Yet the work volume and the demand for quality may actually have increased. At least a part of the reason for this trend is an unreasonably low wage scale. It is increasingly difficult to find good men to work the odd hours, often under less than comfortable conditions, for what often approaches minimum wage. Mistakes and damage to the course and equipment are on the rise because even experienced men make mistakes in trying to outdo themselves.

Equipment inventories are beginning to look more and more like a collection from Fred Sanford's junkyard. "You can get another year out of those 1959 fairway units, can't you?" "See if you can rebuild that 1967 triplex." "It's too bad that the old aerifier keeps breaking down, but maybe you can borrow one next year."

Renovation programs are often thrown out the window. A top-dressing program is judged too expensive. The labor budget won't permit a full crew for giving everything a thorough aeration. The money is not there for overseeding.

The materials budget gets the treatment too. I have actually been asked, "We have not fertilized fairways in two years. Do you think they need it this year?" And, "That brown patch, it doesn't seem to be doing all that much damage, does it?" Or, "The last time we had the pH tested several years ago it was 5.5. That's not too bad, is it?" Or, "How much can a little cutworm eat anyway?"

All of this is by way of preface to some arithmetic exercises which, to my way of thinking, indicate there is no justification for giving the golf course superintendent the short end of the stick. The one central assumption one must make is that the golf course is basic to the existence of

The Shop — the hub of maintenance.

the club — it was the reason for the founding of the club; it continues as the club's most important activity; that, without the golf course, the club itself would cease to be.

None of the figures to follow are real in the sense that they represent actual figures from a club's balance sheet, but they are of the proper order of magnitude for the majority of clubs now confronted with a maintenance squeeze. If your club's numbers differ significantly, there may be a very good reason, but it may also indicate the source of a problem needing attention. For instance, the golf cart is an important element in this thesis. If your club is one of those dwindling few where the golf cart is being resisted, this article has less to do with reality in your case.

The figures we need to know more about are: Golf Course Maintenance Costs; Golf Course Expenditures for Capital Improvements; and The Revenue Properly Attributable To Golf Course Operations.

MAINTENANCE COSTS

From the annual national survey of clubs conducted by the accounting firm of Harris, Kerr, Forster & Company of New York, comes the figure of $9,000 per hole as a nice round number within reason as an ideal operating budget for most clubs in most areas of the country. Certainly there will be deviations from place to place — slightly higher in metropolitan areas and perhaps significantly lower where cold weather limits the golfing season.

Nine thousand dollars per hole represents expenditures for labor (including payroll taxes and employee benefits), course supplies, contracts for other than capital projects (for example: tree maintenance, bulk lime application, etc.), and routine repairs to equipment, buildings, and the irrigation and drainage systems. It does not include improvements of a capital nature (enlargement of tees, rebuilding greens, extensive drainage, tree planting, development of improved water resources, etc.). Nor does it include property taxes, expenses incurred by the golf shop, or golf cart connected costs.

Old equipment and still going.

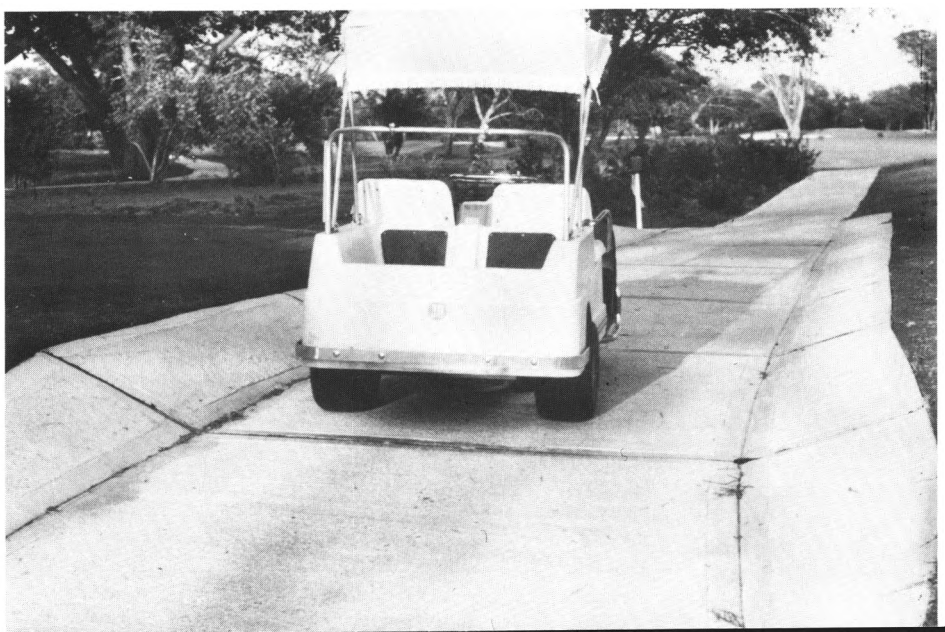
Multiplying $9,000 per hole by 19 holes (to include the practice facilities) gives $171,000 with which to maintain a golf course for one year in its present condition, allowing for routine renovation programs.

CAPITAL EXPENDITURES OF A CONTINUING NATURE

A sum equal to 15 per cent of the maintenance budget is an appropriate amount to be spent annually on the equipment inventory and in handling minor building and construction projects such as tee enlargement, the refacing of bunkers, and the erection of a topdressing storage area). Add this $25,650 to the $171,000 for a total course budget of $196,650. But let us round this off to $200,000 as a figure that might hold for a year or two into the future. Other numbers in this article have also been rounded off since it is not our aim to be excessively precise.

REVENUES — DUES, GREEN FEES AND CART RENTALS

Information from various sources suggests a golfing membership of 300 as probably representative of what is or easily could be the case at a majority



Concrete cart path.

More old equipment still being used.

of private clubs. And, to enable revenue estimates to be generated for play on private, semi-private and public courses alike, $15 a round (including both the green fees and cart rentals) is suggested as a reasonable number to work with in spite of the fact that actual charges for non-members at a private club frequently are much greater. (Let us divide this $15 per round as $10 for a green fee and $5 per person for a cart rental. At any particular course the distribution may differ, but the total of $15 is probably reasonable for those taking a cart and paying on a per round basis.)

What to do with these numbers? At our hypothetical private club with 300 members, to generate sufficient income in support of the golf course budget of $200,000 and cart fleet expenses of $50,000 (see later), the average member must spend $833 per year on the golf course. At $15 a round, this means each member (including his family and guests) would need to account for 55.6 rounds a year. Even over the course of a six-month season, most clubs (public and private) can certainly expect to generate the 16,680 rounds of golf these figures would demand as a break-even point in support of golf course maintenance and the cart fleet.

How about working this problem in reverse? Take the figure of 30,000 rounds per year that is by no means unusual on golf courses today. Determine to arrange the charges so that the average is $15 of revenue per round. What would such a course bring in? $450,000!! Subtracting $50,000 for cart maintenance and $200,000 for the golf course budget, such a golf course would realize $200,000 of profit. That excess income will build a lot of cart paths, even rebuild some greens and pay for a new maintenance building complex, etc., over the years. Perhaps also a portion of it would be properly applied toward paying the club's property tax assessment annually.

Someone is surely saying, "I look at my club's financial report and it doesn't look that way at all." Am I naive? I guess I am for I certainly have found no club which prepares its annual report to reflect this type of golf course income. Nor have I been able to find a club charging $556 in dues for golf (the allotted 55.6 rounds x $10 a round green fees) and providing in return a superbly conditioned course, the kind which can be reasonably demanded of a superintendent who is given a $200,000 budget, with extra funds for major capital expenditures.

Perhaps many courses do not charge enough for golf? If they worked the equation:

$$\frac{\text{Golf Course Profit} + \text{Golf Course Budget} + \text{Cart Fleet Expenses}}{\text{Rounds of Golf per Year}} = \text{Average Charge per Round (including Dues,* Green Fees and Cart Rentals)}$$

*Percentage of dues allocated to the golf course, that is.

they would likely come up with much less than $15. Chances are very good therefore that the golf course is not getting its proper share of golf course generated income. Dues may not be apportioned so as to ensure adequate support of course maintenance. Golf cart profit may not automatically go to the golf course. Or, to look at the situation another way, in the cases wherein the maintenance budget does not approach what has been suggested as ideal, members may not be fully supporting the golf course, the very reason for its existence. When that other shoe does drop, as it already has for a number of clubs this year, who then will be at fault?

THE GOLF CART

We've worked the golf cart into the foregoing discussion as if it were commonplace for it to be considered as a revenue producer for the golf course. This is generally not the case at present. Although the annual industry surveys in *Golf Business Magazine* document a trend away from retention of golf cart income by an individual, and, although we have found that two or three per cent of the clubs we visit do allocate a small percentage of cart revenue toward cart path construction, we have yet to discover a club which acknowledges that the golf cart has very little to do with any facet of the club operation other than the golf course and that, therefore, the profit from the cart fleet should be utilized first in meeting the needs of the golf course operation.

The initial application of funds from this source might best be spent for having carefully planned and well-built cart paths and maintenance roads installed. Profit from a single season may well be enough to have professionally constructed 8' to 10' wide roadways installed. It is important to recognize that, once this system has been installed, the golfing season (thus the revenue for all departments) will be increased, perhaps as much as 10 to 15 per cent, without overly risking damage to the course. In fact, course conditions will almost assuredly begin to improve due to the decrease in traffic over the turf.

Just how much money may be involved? Even in the cool Northeast, it has been possible for clubs to realize a yearly profit of $1,000 or more per cart. Let's illustrate this with a return to our hypothetical 30,000 rounds-per-year golf course. Over a 30-week season (1,000 rounds per week) assume as little as 70 per cent of the play to be from golf carts, all doubles. Thus each cart in our 50-cart fleet must go out seven times a week. Three hundred fifty cart rounds a week for 30 weeks amounts to 10,500 cart rounds a season. If our club charges $10 for each double round, the total revenue would be $105,000 for the year or $2,100 per cart. Earlier a figure of $1,000 a cart was suggested as sufficient to cover annual expenses. The breakdown in Table 1, purposely estimated on the high side, works out to $1,030 a cart. Thus, the bottom line reads $1,070 profit per cart ($53,000 for the fleet)!

Although a fleet not used to its maximum potential would tend to show a lower profit-expense ratio, a number of factors can be manipulated to keep the profit realization high. For instance, one authority noted the appearance of higher cart rental fees. Another made the observation that, "cars are a luxury, and should be priced accord-

TABLE #1

Per Cart Yearly Expenses[1]

$ 510	Ownership Costs	Five-year loan on $2,000 cart [includes down payment (25%), principal and interest (12%) averaged over five years].
15	Personal Property Taxes	
15	Physical Damage Insurance	Assume liability coverage under clubhouse or course policy.
75	Batteries	Replacement of three batteries per year.
25	Parts	Estimated average over five years.
60	Electricity	An actual figure. Theoretically should be about half as much (approximately 210 charges at 13.6¢ each).
100	Administration Expenses	Includes apportioned salary for handling rental transactions, billing and recordkeeping (about $50 per cart) as well as a management fee for the club employee charged with overseeing the entire cart operation.
230	Cartman & Assistant	A) Cartman at $5/hour x 40 hours/week x 30 weeks ($6,000 per season) plus benefits at 40% of salary rate ($2,400 F.I.C.A., unemployment insurance and tax, vacation and sick pay, health insurance, pension plan). Total of $8,400 per season, about $170 per cart, unless also the fleet administrator. B) Assistant(s) at $3/hour x 30 hours/week x 30 weeks ($2,700 per season) plus benefits at 10% of salary rate ($270 F.I.C.A., unemployment insurance and tax only). Total of $2,970 per season, about $60 per cart, unless also involved with rental transactions.
$1030	TOTAL	

[1]Average for 50-cart fleet operating 30 weeks a season.

Modern equipment; part of the total operational cost.

ingly." A further possibility would be to make fuller utilization of the cartman by assigning him the fleet administration duties. He may also have time to help out with the maintenance of golf course equipment, particularly during the off-season.

Is anyone going to be the loser should the cart fleet and its revenue be handled in this way? At one time it might have cut seriously into the revenue of the golf shop, but, as noted earlier, once clubs became aware of the amounts of money involved, they began to shift toward depositing cart fleet profits into a general fund. In effect, then, we are suggesting that the profits go instead back onto the golf course. The course will benefit from the increased budgetary support and the decrease in turf traffic once paths are installed. Every department will gain when there are fewer days when the course must be closed because of adverse weather and its effect upon cart traffic over rain-saturated ground. As the effects of a more ideal budget and decreased turf traffic become felt on the course, its prestige and the demand to play it will also continue to grow.

We have tried to show that at most clubs, public and private, the money is both needed and available for the golf course. One can also look to the Industry Survey published in 1974 by *Golfdom Magazine* for some interesting data. Using their figures, it can be shown that golf courses earned in green fees and cart rentals about twice the amount spent for maintenance. Even with the property tax assessment included in the maintenance budget, golf course revenue exceeded expenditures by a factor of 1.6. Compare this with the clubhouse figures where 2.4 times more was spent than was recorded as income. Compare the figures for capital improvements. The clubhouse outdistanced the course by better than three-to-one in this category. Compare management salary levels. Less than 1/10 as many golf course superintendents as clubhouse managers were paid at least $20,000 a year!

It would appear that golf course profits are keeping membership costs within bounds. However, should the course be permitted to decline, it is more than likely the amount of play will drop. Revenue in all departments will be down. Dues will have to rise. Membership will fall off. As any number of clubs can attest, it is a longer and more costly process to bring a golf course back after a period of neglect and more difficult still to restore a tarnished reputation.

A very successful daily fee course owner once told me that it is a mistake to undercharge a golfer for a day of enjoyment. Golfers are willing to spend the necessary amount, but you must give them their money's worth by ensuring that due emphasis is continually placed on the golf course operation. The philosophy that "these golfers don't deserve anything better" leads only to trouble and a dead end.

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Water Conservation at Oakland Hills Country Club

by TED W. WOEHRLE, CGCS and President of the
Golf Course Superintendents Association of America

FOR MANY YEARS the water used to cool the air conditioning units in our massive clubhouse was not recycled; instead, it was simply dumped into the storm drain which flows from our property. At peak use we were using and wasting 300 gallons per minute. In the past this was not a concern because of ample water in our wells and inexpensive electricity. As the cost of utilities increased and the water levels in the wells continued to drop, the club became concerned and investigated methods of conserving these valuable resources.

In 1973 we proposed a plan that would allow us to reuse the water being discarded from the air conditioners. We intercepted the discharge line with an underground sump (4' x 8') containing a 7½-HP submersible pump. The pump is controlled by a float that turns it on and off as the supply increases and decreases.

The installation was begun in 1974 with the laying of a 4-inch underground PVC line. The distance from the clubhouse to our irrigation pond was around 1,600 feet. We installed 1,300 feet of pipe to a hill behind our 16th Hole. There the water was pumped into a holding pond at the top of the hill. Because the water is quite warm after being used to cool the air conditioners, we decided to pass the water over a few small rocks and falls to cool it to air temperature. Once at the bottom of the hill (some 130 feet), we installed another holding pond before allowing the water to complete its journey to its eventual destination; the irrigation pond. The water temperature is dropped from the mid-80-degree range to the upper-60-degree range. This temperature is often cooler than the lake on a hot summer day. We have eliminated the danger of upsetting the ecology of the lake with warm water.

It is estimated that we are able to conserve 18,000 gallons per hour on a hot day, or 372,000 gallons per day. This is three-quarters of our daily requirement. It may be several years before we can say that we have saved enough money to pay for the installation of our recycling program, but we are saving a precious resource that was being wasted. The average savings per year will be nearly 30,000,000 gallons of water!

Showing the beauty that can be worked into water conservation.

Underside of mushroom showing gills. Note size of mushroom in relation to the thumb and hand.

Everything You've Always Wanted to Know About Fairy Rings

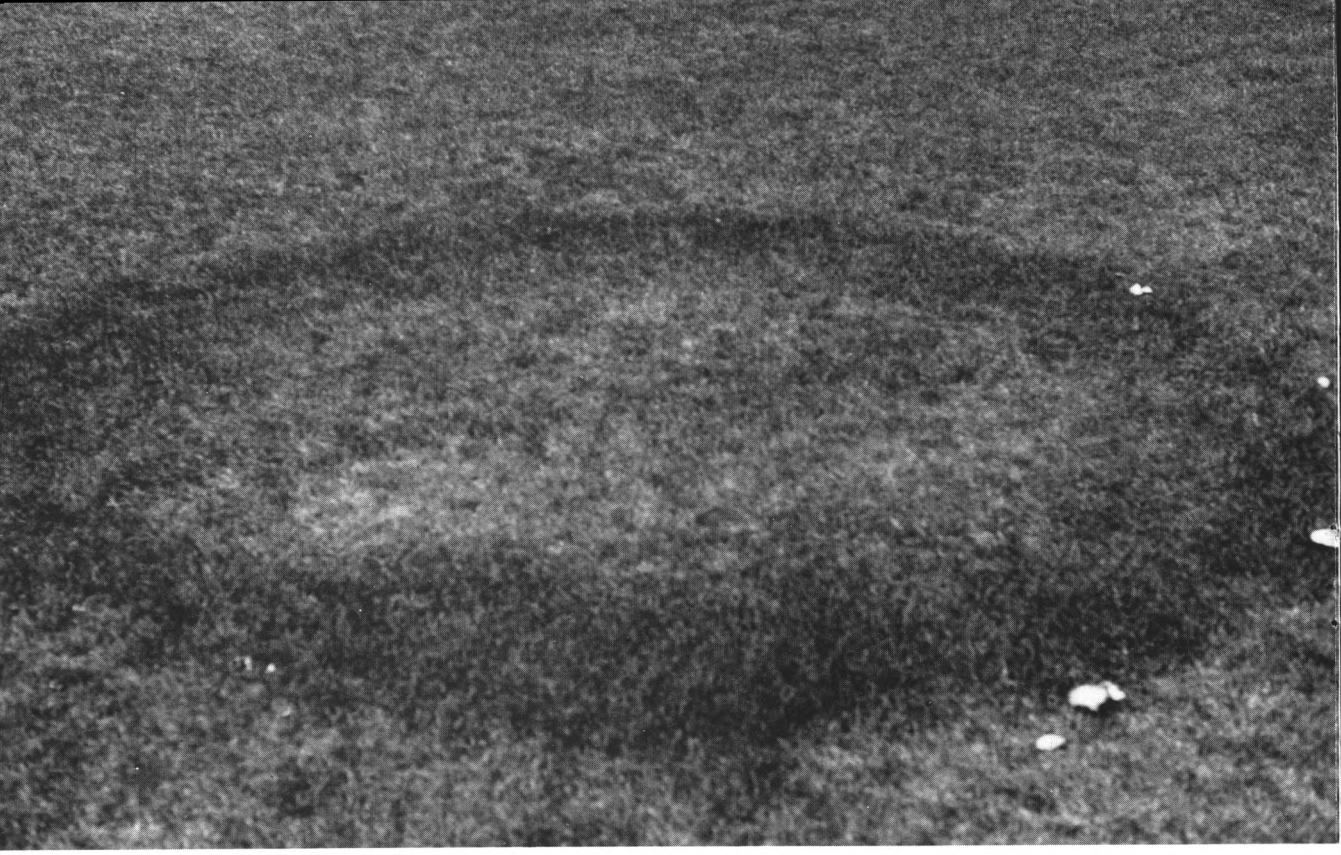
(But Were Afraid to Ask)

by CARL SCHWARTZKOPF, Mid-Continent Director, USGA Green Section

MUSHROOMS ARE popping up all over; on greeting cards, shirts, sweaters, salt and pepper shakers, kitchen utensils and even golf courses! Artists for centuries have been enchanted by their design. The forces of nature have joined to provide the climatic conditions that favor their growth and proliferation, not to mention their artistic touch to the landscape.

With the weather of 1977 exhibiting a wide range of characteristics; from the hottest to the coldest, wettest to the driest; it is only natural to expect a multitude and variety of turfgrass management phenomenas to occur. One, among many, was the increased incidence of mushrooms.

Mushrooms grow in a circular or crescent pattern and are commonly referred to as Fairy Ring. Early man believed the rings were made by witches, dancing fairies or even lightning. Many types of mushrooms grow in this circular pattern, Fairy Ring Champignon *Marasmius oreades*, an edible species, is only one of them. They discolor, weaken and sometimes destroy the turfgrass plant.



Fairy Ring and fruiting bodies.

A certain number of mushrooms are poisonous, some are even fatal. Their number is relatively small, about 30 species among the thousands that can be found in the wooded areas, fields and roughs of golf courses. Unfortunately, the most poisonous species are also fairly common, and a real danger lies in wait for the imprudent gourmet.

First of all, put aside any notion that there are simple tests to determine whether a mushroom unfamiliar to you is safe to eat. Do not give the least credence to the silver coin test. The silver coin is supposed to turn black when brought into contact with a toxic mushroom. Many people have died because they believed this. Because no more silver coins are being minted, the aforementioned procedure is difficult to complete.

You may have been told if you see a slug nibbling on a mushroom that it may be eaten without fear. What you were not told is that slugs can eat the deadly Amanitas without ill effects, whereas the same Amanitas will be fatal to you.

Also, if you are told that a mushroom will lose its toxicity if it is marinated for several days in water and vinegar — do not believe it!

Blanching, plunging briefly into boiling water, may eliminate bitter taste and irritants to the digestive tract from some mushrooms, but it does not eliminate the poisons of the truly dangerous species.

Whether you like it or not, there is only one way to avoid poisoning: to be completely familiar with the botanical characteristics of the dangerous species. You should even be able to identify mushrooms without question when they are damaged or develop imperfectly.

The best advice, really, is to leave all wild mushrooms alone, unless you are completely familiar with their taxonomy.

Since most Fairy Rings that appear on fairways and greens are mowed regularly, few mushrooms have the opportunity to mature and develop completely. Mycelium is the underground organism or plant part of which the mushroom itself is only the fruit. The mycelium results directly from the germination of spores. The germination of spores results from a network of extremely fine threads called hyphae. The accumulation of hyphae and mycelium growth contribute to the decline of turfgrass that one associates with Fairy Ring. They compete with it for soil moisture and nutrients.

Unfortunately, chemical control of Fairy Ring is not very effective. However, some golf course superintendents have reported varying degrees of control by coring the area, followed by applying a solution of mercuric and mercorous chloride suspended in a wetting agent or surfactant.

The mercuric and mercorous chloride may or may not have an effect on the mushrooms or their parts. Whereas, the surfactant or wetting agent will help to minimize the hydrophobic soil condition that contributes to the decline of the turfgrass plant.

Mushrooms are part of the fungi family and fungi span the world. They are just as numerous

and varied as flowering plants. They range from microscopic organisms to large fruiting bodies; from live savers like penicillin to killers such as ergot; from rust, powdery mildew, dollar-spot and brown patch that are damaging to turf, to yeasts which have been used for centuries in the baking of bread and fermentation of wine.

Although they are varied in size and appearance, all fungi have one thing in common — their lack of chlorophyll. Unlike green plants, they cannot utilize sunlight and carbon dioxide to convert inorganic materials into organic tissue. They must extract their nourishment, like man and animals, from organic materials, and in doing so, they destroy or "eat" whatever they are feeding upon. Consequently, when a golf course superintendent tells his chairman or club officials that the fairways were eaten alive with **Pythium**, the truth has been spoken.

In order to survive, fungi must have moisture and oxygen and usually warm, humid conditions. There are exceptions, however, such as snow mold organisms that require a lower temperature to grow actively. All fungi have specific temperature, moisture, light and nutrient requirements to survive and grow actively.

Usually when one speaks of fungi, most people imply the word to mean the larger members of this huge group, i.e. mushrooms, "toadstools," bracket fungi, puff balls and the various other and often strange, exotic-looking organisms which are big enough to be noticed fairly easily. Generally, it is not realized that these visible and often brightly colored fungi are not the whole story. They are merely the fruiting bodies, more or less equivalent to the flower clusters of green plants. A large and important part of the fungus remains hidden in the soil. It may not give any visible proof of its presence on the surface for long periods of time.

The bottom side of a mushroom showing the stem and gills.

Fungi reproduce themselves through minute spores, which are formed in different ways. In the common mushroom, and similar fungi, the spores are shed from flanges known as gills on the underside of the cap. Whereas, in other types of fungi, the gills may be replaced by a mass of narrow tubes whose pore-like openings are clearly visible. In puff balls and similar fungi, the ball itself is one large spore container.

In most fungi, the spore production is immense. It has been calculated that in an ordinary mushroom, a square millimeter of gill surface can produce approximately 130,000 spores, which can be discharged in a matter of five or six days.

Fortunately, only a small proportion of the spores end up in situations exactly suited for germination. When germination does occur, they send out little tubes which elongate into hyphae. These branch and extend as well as join with similar hyphae produced by other spores which have landed in the same proximity. Several hyphae develop to form a white mass of thin filaments, known as mycelium. Mycelium may be colored black, brown, gray or white.

The mycelium is one of the factors that contribute to the hydrophobic soil conditions that one associates with Fairy Ring. In woodland areas, it is the mycelium which actually chemically decomposes the dead branches, old stumps, rotting leaves or whatever substance it is growing on. The fruiting bodies are not formed until the fungus has received sufficient nutrients from its surroundings. When climatic conditions are favorable, small knobs appear on the mycelium where large numbers of the fine threads grow together into a knot. This knot or large bump gradually pushes towards the surface and finally appears as a mushroom, toadstool or other form of fungus. When the fungus has reached full maturity, spore production starts and can be extremely rapid. From beginning to end, the process can be completed in a matter of hours.

Consequently, it is easy to understand why mushrooms and Fairy Rings reappear quickly after the fairways have been mowed. As a result of an excessive amount of nitrogen that the mushrooms develop, it is only natural to find a dark green area developing along the outer edge of the circular pattern.

Since treating with fungicide solutions and wetting agents has produced unpredictable results, most individuals report fairly successful coping by applying light and frequent applications of fertilizer in an attempt to mask the dark green color, as well as frequent irrigation to keep the mycelium growth from monopolizing or utilizing all the water intended for the turfgrass plant.

Unfortunately, Fairy Rings are not only an inconvenience and annoyance to the golf course

Fairy Ring in a landing area. Find the golf ball.

superintendent, but also to the player. For example, imagine a nice long drive coming to rest in the vicinity of a group of Fairy Rings and the frustration of trying to find the golf ball!

Since an effective control for Fairy Ring does not currently exist, if possible, fertilize and irrigate frequently to mask the appearance of the saprophytic fungi. Mowing frequently, even daily, will help keep the fruiting bodies to a minimum and hopefully the frustrations the players experience in looking for the ball.

Remember the saying, "Stop and smell the roses as you walk down life's path . . . " You may also want to remember; "Don't eat or hit the mushrooms unless you are sure they are edible or playable."

News Notes for JANUARY

USGA Green Section Conference in San Francisco, January 27, 1978

In conjunction with the first USGA Annual Meeting ever to be held on the West Coast, the USGA Green Section Conference on Golf Course Management will be held on January 27, 1978, at the Mark Hopkins Hotel, San Francisco, California. The theme for the one-day meeting is "Turfgrasses for Golf and How They Affect You — The Golfer." Seventeen speakers will cover a host of topics. Registration is at 9 a.m. and all USGA Member Club officials and staff are invited to attend.

GCSAA 49th International Turfgrass Conference & Show, February 12-17, 1978

The GCSAA's 49th International Turfgrass Conference & Show will be held in San Antonio, Texas, from February 12th through 17th, 1978. The conference attracts over 5,000 turfgrass managers annually. The educational theme this year is "Economy Through Ideas." The exhibit hall is already sold out for displays of turfgrass management equipment, irrigation, etc. Further details are available from the GCSAA Headquarters, 1617 St. Andrews Drive, Lawrence, Kansas 66044.

"Three Years of Experience with A USGA Green"

by BOB PHIPPS, Superintendent,
Shorehaven Golf Club,
East Norwalk, Connecticut

Shorehaven golf professional Kelly Moser, putting on USGA green in late March. This green was ready for play — all older greens were too wet and soft.

In the May, 1976, issue of the Green Section Record, *the article "Mair Sand, Honeyman" by Stanley J. Zontek appeared. It reviewed the advantages of using high sand content for greens. One golf course superintendent's efforts in constructing such a green was discussed. In that article, it was promised that a follow-up report by the golf course superintendent, Robert Phipps, would appear at some future date. His report follows after three years of living with a USGA green.*

I CAME TO the Shorehaven Golf Club in Connecticut in the spring of 1972. At the time the club decided to initiate a long-range golf course renovation program, including the reconstruction of some putting greens.

We decided to build the first new green in accordance with the USGA Green Section Specifications for Putting Green Construction. The first step was to send samples of sand, soil and organic matter to the USGA Green Section Laboratory for analysis and determination of the proper top soil mixture. They recommended the use of eight parts of the sand we have available and two parts of our humus (8-0-2). (See Figure 1.)

To shorten the length of time the new green would be out of play (and lessening the membership inconvenience associated with new putting green construction), we decided to first develop a sod nursery. It would be 15,000 square feet in size and constructed with the same top soil mix as planned for the new green. Thus, we would avoid a soil layering problem when the nursery sod was brought into place. Penncross creeping bentgrass was dormant seeded in the nursery at 1½ pounds per 1,000 square feet.

In the fall of 1974 we reconstructed our sixth green precisely to the Green Section specs and sodded with the turf from the nursery. It was easily opened for play the following spring.

The following is what we found in maintaining a USGA green over the past three years.

FERTILIZER

Our older, heavier-soil greens normally are very lightly fertilized and receive between 2½ and 2¾ pounds of nitrogen per year. However, when fertilizing the new nursery and green, we have used from three to five pounds of nitrogen.

A word of explanation is due. When we constructed the nursery, we placed eight inches of the sand-humus mix over native soil. The root system developed exceptionally well and went through the eight inches of top mix and into the native soil below. We started fertilizing in the spring with ½ pound per 1,000 square feet of nitrogen per month in April and again in May. The turf responded well and filled in quickly. By the end of the season we had applied a total of three pounds of nitrogen. The reason so little nitrogen was used is because we did not have an extensive drainage system under the nursery. However, extensive drainage was built into the new green, thus a greater leaching loss and need for more nitrogen.

During the first year with the USGA green, we applied approximately four pounds of nitrogen per 1,000 square feet. We felt this was a lot when compared to what the other greens on the course receive. However, the new green did not wear or grow as well as expected. In 1976, we applied over 4¾ pounds of nitrogen. The green was better, but still not up to par. This past season, we applied slightly over five pounds of nitrogen and the growth, wearing quality and putting quality greatly improved. We feel that we now have a fertility program that will work and give us the desired results.

We supplemented the applications of nitrogen with superphosphate and sulfate of potash as per soil tests to achieve slightly over a 4-1-2 ratio of N-P-K. Iron and magnesium were also applied periodically throughout the season. We feel this balanced fertilizer program gives us the best results.

WATERING

Shorehaven is located on Long Island Sound in Norwalk, Connecticut. We usually have a regular breeze coming in off the water. This makes it necessary to water our older greens every morning and to syringe every afternoon during periods of stress.

The USGA green is watered "deep" every three or four days and is never syringed. We sometimes find we have to shorten this watering interval, not

Results of the soil analysis that was made for Shorehaven.

MISSISSIPPI STATE UNIVERSITY
AGRONOMY DEPARTMENT
GOLF PUTTING GREEN SOILS LABORATORY
DST OFFICE BOX 5248, STATE COLLEGE, MISSISSIPPI 39762
PHONE: AREA CODE 601 - 325-4181 OR 325-5660
DR. COLEMAN Y. WARD - DR. ROLLIN C. GLENN

SOIL ANALYSIS AND REPORT

SAMPLE NUMBER: MSU - GPGSL - 73 - 56

DATE: July 27, 1973

SENDER OR CLUB: Shore Haven C. C.

ADDRESS: East Norwalk, Conn.

PARTICLE SIZE ANALYSIS

SOIL MIX MATERIALS	GRAVEL >2 mm (> 9 mesh) %	TOTAL SAND .05-2 mm (9-300) mesh %	SILT .002-.05 mm (<300 mesh) %	CLAY <.002 mm %	SAND FRACTIONS					pH 1:1 H_2O
					VERY COARSE 1-2 mm (9-16 mesh) %	COARSE 0.5-1 mm (16-32 mesh) %	MEDIUM 0.25-.5 mm (32-60 mesh) %	FINE 0.1-.25 mm (60-140 mesh) %	VERY FINE 0.05-.1 mm (140-300 mesh) %	
Sand	5.05	92.4	2.04	.51	7.9	21.0	46.7	14.8	2.0	
Loam A	18.4	40.1	33.49	8.01	5.1	6.8	1.7	10.0	6.5	
Loam B	2.4	42.9	44.93	9.77	4.2	9.0	11.2	9.8	8.7	

% Ash = 14.6

MIXES EXAMINED (PARTS IN TEN)			BULK DENSITY g/cm^3	% PORE SPACE		INFILTRATION RATE-INCHES OF H_2O/HOUR	PERCENT MOISTURE RETENTION AT PRESSURE INDICATED							MIX. pH	LIME NEEDS lbs/1000 sq. ft.
SAND	Loam SOIL	Humus AMENDMENT		CAP.	NON-CAP.		40 cm of H_2O	1/3 atm	2/3 atm	1 atm	3 atms	6 atms	15 atms		
10	Loam A 0	0	1.44	21.0	24.5	8.5	14.5	.49	.69	1.2	.54	.52		6.9	
9	0	1	1.39	24.2	23.5	5.2	17.4	2.7	2.6	3.0	2.2	1.6		6.5	
8	0	2	1.24	29.3	23.7	3.4	23.7	4.7	3.8	4.3	2.9	2.4		6.5	
8	1	1	1.38	28.7	19.3	3.2	20.8	4.4	4.2	4.8	3.4	2.7		6.5	
7	1	2	1.32	34.7	15.3	1.2	26.4	5.3	4.2	4.5	3.1	2.5		6.3	
8	Loam B 1	1	1.42	29.5	16.5	2.9	20.8	8.0	8.6	4.3	3.2	2.4		6.2	
7	1	2	1.28	35.1	16.9	.68	27.6	6.7	6.5	6.3	5.0	4.2		6.3	

[illegible] carbonate (100% neutralizing value) uniformly incorporated to a six-inch soil depth

August, 1977,
a super putting green!

because the green actually requires water, but because the mounds surrounding it (on different soil) are drying out and showing the need.

DISEASE

With the excellent drainage and a longer time between watering, fungicides can be applied every two weeks. Our older greens are sprayed weekly.

WEEDS

We have had no trouble with weeds. A pre-emergence crabgrass control is the only herbicide we have applied. *Poa annua* invasion over the past three years has been minor.

INSECTS

We have had cutworms in the USGA green, but not any more than the older greens. Overall, we have experienced no special insect problem at all on this green.

OTHER OBSERVATIONS

Golf shots hit onto the USGA green hold well. For this reason, and because of excellent drainage and a deep root system, aerification can be greatly reduced, if not completely eliminated. It is in marked comparison with our older greens where these operations are normally scheduled.

Interestingly, the sand in our bunkers is the same as used in our top soil mixture. When it is blasted on the green, it disappears quickly. After three years we have not observed any "layering" condition caused by sand on the edge of the green. In fact, the sand exploded out almost acts as a top-dressing. We feel the normal sand accumulation will not cause problems.

In the past few years we have found more of our members playing golf later in the fall and when weather permits, in the winter. We allow play on frozen greens. The only time we close our greens is in late winter or early spring when they begin to thaw and become soft and prone to foot printing. However, because of its high sand content, the USGA green thaws and becomes firm faster in the spring and is not as soft and mushy as the older, heavier-soiled greens. If we had all 18 USGA greens, we could open much earlier in the spring, thus certainly pleasing many of our golfers.

CONCLUSION

The USGA green has been found to use more fertilizer than the other greens, but this is greatly offset by a saving in water, aerification and fungicides, plus the labor to do these jobs. Being able to play the green earlier in the spring pleases the membership and could be a source of additional income. This would be especially true on municipal golf courses.

At present we are reconstructing the tee on our par-3 15th hole. The topsoil will be the same 80 per cent sand/20 per cent humus and sod will come from our nursery. We are looking forward to a tee that will have firm footing for a good golf shot and good turf year-round.

USGA GREEN SECTION RECORD
JANUARY 1978

TURF TWISTERS

NOW YOU WISH YOU HADN'T

Question: Is activated charcoal still the best material to apply to try to neutralize the effects of chemicals perhaps overdosed onto a green? (Conn.)

Answer: At present, yes it is, but remember, activated charcoal does not neutralize every incorrectly applied chemical, but rather it is most effective on pre-emergence herbicides.

To avoid a mess if ever you have to apply it, spray it on using a sprayer with good agitating action. Cycloning or using a drop spreader to apply it, besides being messy, usually results in poor distribution of this lightweight and fine material.

CAGE THAT TREE

Question: I have trees near by lakes being debarked by beavers and/or nutria. Have you an idea how best to protect the trees and still keep the wildlife? (Texas)

Answer: The best protection we have seen and can suggest is heavy gauge wire formed into a cage around the base of the trees extending about 40 inches up the bole of the tree.

NOW YOU SEE IT — NOW YOU DON'T

Question: There are numerous guidelines telling what you cannot do with used pesticide containers, but there is an increasing problem in finding ways to dispose of them. Any ideas? (Hawaii)

Answer: The Du Pont Company may have come up with the answer. Any restricted pesticide in wettable powder form may be sealed in a water-soluble package. This package is simply dropped into the spray tank after removing it from its protective outer container. The soluble packages come in ½-, 2- and 10-pound sizes. Voila! There is no exposure to the chemical during filling or mixing and the outer container has never been in contact with the pesticide.