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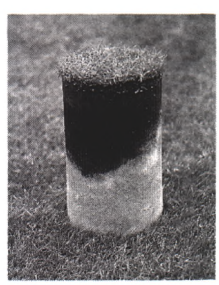

Cover Photo:
Black layer can occur when soil moisture is not managed properly.

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Managing Soil Water

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Algae growth occurs on wet, saturated soils, and indicates a problem that needs attention.

WHEN it comes to managing turf, anyone even remotely in tune with basic agronomics recognizes that putting greens with wet soils are going to cause problems. Equally, golfers know that soft greens, while they may hold a golf shot well, do not play very well. They tend to be soft underfoot, which equates to bumpy and uneven putting surfaces that are more prone to spike marks. Wet greens also seem to putt slower than firmer, drier greens.

The Green Section's agronomists certainly appreciate the problems associated with wet soils in greens. In fact, in a survey of the staff, they listed wet and overwatered greens as the highest-rated agronomic problem in managing putting green turf today.

The agronomic problems associated with wet soils in greens are not lost to golf course superintendents, either. They know all too well that wet, saturated soils are more prone to compaction and result in turf with shallow, weak root systems. *Poa annua* and other weeds tend to be more of a problem in wet, soggy soils, and outbreaks of many diseases can be far worse. Greens that hold water usually are a superintendent's *indicator* greens. That is, if a problem is expected, it will appear first on a wet, pocketed green. Rarely do greens die from a lack of water.

The question is, what can be done about it? How does one manage greens which, once they become wet, stay wet, and how does a golf course superintendent manage excess water in the soil?

By understanding the fate of water in the soil, the golf course superintendent can better manage soil water. The result is better grass with fewer chemicals, and fewer grass failures. Knowing how to manage soil water is an important aspect of establishing an Integrated Pest Management (IPM) program.

Sources of Water in the Soil

The perception exists today, and has for years, that wet greens are almost exclusively caused by overwatering. The thinking is that most golf course superintendents overirrigate on purpose since many golfers like soft greens and overwatering is easier than proper irrigation management. I submit that, like most generalizations, this one is unfair to the many superintendents who irrigate with good common sense. At one time, some years ago, this overwatering criticism may have been true. Today, with greater knowledge, better technology, and an awareness of the problems associated with wet greens, turf managers as a group are more careful than they ever have been in keeping greens as dry as possible. Good water control is recognized as a major management goal of today's golf course superintendent.

The question is, why do wet greens still occur? In particular, why do there continue to be wet soils on shaded, pocketed greens? To answer this question, the source of water in the soil needs to be examined.

Water in the soil generally comes from two sources, rainfall and irrigation. With golf course superintendents being better attuned to the problems of wet greens, and with the better irrigation systems we have today, the application of water *onto* greens should not be the main source of the problem. Obviously, problems still occur with overwatering, but the fact is, most golf course superintendents try not to overwater greens. They are doing more and more hand watering, especially on poorly drained, pocketed greens. But some years this program is less successful than others. Why? The answer lies with the second source of soil water — rainfall.

All things being equal, problems with greens occur much more often during wet years, especially when the rainfall occurs in conjunction with hot, humid summers. The reason is simple. During dry years, the superintendent has control of the water.

Poor syringing techniques result in poor water control. Runoff should never occur when turf is properly syringed.

When superintendents lose control of water in the greens, their troubles begin. Soils become wet and saturated; they become anaerobic and black layers can form; roots die back; the grass becomes weakened. Then, disease and other problems occur (including algae, brown patch, and damage from various *Pythium* species). In extreme cases, wet wilt can occur. In the meantime, golf continues to be played, the greens continue to be mown, and the soils become compacted near the surface. Problems accelerate as the turf thins, algae invades the voids, and the superintendent loses control of the situation.

Given this potential scenario, most superintendents I know prefer dry years. They simply have better control over the water on their golf course. Superintendents dread wet summers on soils that do not drain. They know that once the soil is wet, it is hard to dry it out. The question is, where does soil water go and how can soils that are wet be better managed?

The Fate of Water in the Soil

Once water has entered the soil, two things can happen to it. They are:

1. Drainage — Excess water moves down through the soil profile.

2. Evapotranspiration — Water is lost into the air from the turf surface through evaporation from the soil and transpiration from leaf surfaces.

It is very important to know and appreciate each of these fates. They are the means by which the golf course superintendent can manage excess water in the soil. Let's look at each one.

1. Drainage

It's an unfortunate fact that the majority of the putting greens in this country do not enjoy anything approaching rapid internal soil drainage. In fact, most golf greens in this country were not built with even a basic system of drain lines, much less on a gravel blanket. They would be characterized as having varying types and depths of soil; many are old-style, clay-based greens whose only salvation is having good surface drainage. And where soil modification may exist, it usually occurs only to the depth of the aeration holes or the topdressing layer.

Also, only a small minority of putting greens have a modified root zone through the entire soil profile down to a gravel blanket or to drainage lines. It is even a smaller percentage of putting greens that are carefully built to any recognized specifications for putting green construction, be they guidelines from the USGA Green Section or elsewhere. This is where most of the problem lies. Even though superintendents might be very careful when irrigating their poorly drained greens, water control is lost when rainfall occurs or in instances where overwatering does occur. Once wet, these greens remain wet, and when you combine wet soils with hot temperatures, the vicious cycle begins.

2. Evapotranspiration

The loss of soil water by evaporation from the soil and transpiration from plant leaves is termed evapotranspiration. Transpiration is the mechanism by which most of the evapotranspirational water is lost from dense turfgrass stands, including most greens. As much as 80 to 85 percent of soil moisture loss can be attributed to evapotranspiration (Beard, 1973).

The evapotranspiration rate (ET) is a well-known number used by many golf course superintendents when scheduling their irrigation programs. Unfortunately, the amount of water lost through evapotranspiration from a golf course varies from site to site and from green to green. For example, a green located in shade, without good air circulation, will lose much less water from the same soil than an adjacent green located on top of a hill with good air circulation and full sunlight.

It is in situations like this that the experience and expertise of golf course superintendents are tested the most. That is, the management of the amount of water

applied to individual greens. Different management strategies must be employed when irrigating grass on a green in one environment compared to greens in other locations.

On some courses, most greens require separate irrigation programs. Managing these differences remains one of the greatest challenges for today's golf course superintendents. If overwatering of greens occurs today, this is where it can happen. When greens growing in different environments are irrigated according to the same schedule, no doubt some of these greens are being underwatered or overwatered.

If there is an overriding purpose to this article, it is to point out how water reaches the soil and how it then moves out of the soil. Sometimes, I feel we look at each element — irrigation, drainage, and evapotranspiration — as a separate item. In reality, they are intimately associated.

Managing Soil Water

What are the tools available to the golf course superintendent to manage soil water?

1. Irrigation Management

Irrigation is the intentional application of water to the turf and soil. Determining how much water to apply to a given green on a given day is one of the most profound challenges facing a golf course superintendent. If a green has a sandy, modified soil over a gravel drainage blanket with a complete drainage system underneath, the best irrigation program will be different from that practiced on an old-style, clay-based *push-up* green. On these old greens, the only well-draining soil is what has accumulated, over time, through aeration and topdressing.

Managing soil water begins with proper irrigation. Simply appreciating the differences in the soil's ability to drain or hold water is critical to exercising water control, whether it is for a green on top of a hill or under a tree. This is why more and more superintendents are installing separate irrigation systems for their greens and green banks. This is a good way to separate the water needs of a green from those of the surrounding areas, which often require more water than the green surfaces themselves.

More and more greens are being watered by hand. This is a very effective tool for the golf course superintendent. Perhaps there is no better money spent on a golf green than for hand watering. It provides for improved water control, pure and simple. On poorly draining soils or on greens that are shady and have a lower ET rate, try to irrigate on the side of dryness. You can always add more water; it is tougher to remove the excess. These strategies work, at least until it rains!

2. Topdressing

Topdressing is the addition of a better draining root zone material on top of the existing green. A deeper zone of modified soil allows the superintendent to better manage compaction, turf root development, soil water, and drainage, at least to the depth of the modified zone. Many greens on old golf courses have been sufficiently modified by topdressing over the years to drain adequately, especially where surface drainage also is adequate.

Dense trees prevent good air movement and dramatically reduce evapotranspiration from the turf. Greens that hold too much water tend to be problem greens.

3. Aeration

Great strides have been made in soil aeration equipment during the past 10 to 15 years. Machines can now aerate deeper than ever before, produce more holes of different sizes and shapes, and do the job more quickly than ever. We can even aerate soil without complaints from golfers by using solid tines, traditional spikers, or high-pressure water injection.

All of these devices were developed, really, for three purposes:

1) to improve water infiltration,
2) to relieve soil compaction, and
3) to allow holes to be backfilled with a better quality material for improved soil aeration.

This is managing soil water at its best. Good aeration creates pores that provide an avenue for water to move through the soil. Also, aeration is a method of drying out a wet soil once it becomes saturated. Aerating in the heat and humidity of a summer stress period might seem extreme to some, but if it helps to keep a green alive, it is worth it. There is always some risk involved, but using a small coring tine, a solid tine, an old spiker, or a new water injection machine can minimize the risk.

4. Evapotranspiration

Have you ever wondered why the installation of oscillating fans on golf courses is such a rage today? It really is the result of several different, yet interrelated factors. Basically, fans significantly increase evapotranspiration, or the movement of water *out* of the soil. Fans are never installed around a green that is located in complete sunlight and receives good air movement. Fans are only used on pocketed greens that lack good air circulation. They are a mechanical means of increasing evapotranspiration and drying out the soil. Today, fans are one of the newest and best methods available to the golf course superintendent to maintain turf on enclosed, pocketed, and shaded greens.

We all know that one of the major problems facing golf course superintendents today is the difficulty of convincing course officials to cut down trees for more sunlight and better air circulation on pocketed greens. It has been recognized for years that the weakest greens and tees on most golf courses are those located in these areas. People are reluctant to cut the trees, prune limbs, and remove underbrush necessary for good air circulation, sunlight penetration, and a better grass-growing environment. However, they still expect good grass on these greens. When this occurs, the best option may be a fan, or fans, installed at the green site.

The most-asked questions about the use of fans include:

Will a fan compensate for the lack of sunlight?

No.

Will a fan help move water out of wet soil?

Yes.

In fact, a fan could be the golf course superintendent's last opportunity to manage excess water in the soil. It allows a wet green to dry out in situations where the green tends to stay too wet for too long.

If trees can't be removed, a fan is the superintendent's last hope to increase air movement.

Summary and Conclusion

Managing soil water includes providing good surface drainage, whenever possible, to move excess water away from the site.

Managing soil water includes managing the application of irrigation water *onto* the site.

Managing soil water includes providing good aeration and drainage to move water *through* the soil.

Managing soil water includes a good top-dressing program to modify an existing soil with a better-draining material.

And finally, managing soil water includes moving water *out of the soil* via evapotranspiration.

All too often today's golf course superintendent is being indicted, sometimes unfairly, for having wet greens. In reality, in many different situations and in many parts of the country, the superintendent really *does not* control soil water because of excessive rainfall, slow-draining soils, and/or insufficiently built or layered greens built of modified soil.

Whether a putting green becomes overly wet due to rainfall or irrigation, the golf course superintendent must manage the problem. It was the purpose of this article to help the turf manager understand the problem, consider all options, and develop short-, intermediate-, and long-term practices to help manage water in the soil. After all, if you can manage soil water, you can better manage grass growing in the soil. It is when you lose control of soil water that problems develop.

With a good appreciation that managing soil water involves more than just irrigation, programs and procedures can be put into place to solve these problems to produce better grass. If, however, all of these techniques fail to provide reliable turf, the final option for improving your ability to manage soil water is complete reconstruction.

Reference:

Beard, James B. 1973. *Turfgrass: Science and Culture*. Prentice-Hall, Englewood Cliffs, NJ. pp. 658.

BLACK CUTWORMS: Where Are They Coming From?

by R. CHRIS WILLIAMSON
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WHAT AM I DEALING WITH? This is a question any turf manager asks upon discovering a new turf problem. Proper diagnosis is the key to successful treatment when dealing with turfgrass problems.

Insect identification offers a unique twist. Not only can the superintendent try to diagnose the problem by observing the damaged areas, but he can try to locate the actual insect or larvae as well. In some cases the question must be asked, "Where did the insect come from?" Research at the University of Kentucky Department of Entomology is striving to answer just that question when dealing with the problem of black cutworms.

The black cutworm is a common pest on putting greens, tees, and even fairways. Feeding patterns of larval cutworms, or caterpillars, result in sunken areas, or *pockmarks*, as well as small, dead patches of turf. This damage interferes with ball roll and reduces the overall aesthetic of the turf. Damaged sites also are attractive to foraging birds that pull up tufts of turf. This can further reduce the overall surface quality.

Since damage thresholds for cutworms are low, many superintendents make regular surface insecticide applications to prevent injury. Such treatments are not always necessary or justified because cutworm outbreaks are sporadic and rarely occur uniformly on all greens. Managers relying on bird activity to predict cutworm activity also may be missing the target. Birds may be foraging for earthworms, sod webworms, beetles (especially black turfgrass ataenius adults), or other insects.

Little is known about the biology and habits of the black cutworm on turfgrasses. Other than information gleaned from a few reports made by researchers during pesticide testing, we know little about how black cutworms select sites to lay eggs on turf, when they arrive in the spring, where (or if) they overwinter, how many generations occur in a season, or how the larvae feed in the turfgrass environment. Because of this lack of basic knowledge, we decided to study the biology and behavior of the black cutworm on golf course turf.

General Biology

Black cutworm eggs are attached to the foliage of turfgrasses or weeds by night-flying moths. The eggs hatch in four to five days, and the larva, or caterpillar, goes through six or seven molts. Each larval form between molts is called an instar. The larva is the only destructive stage of this pest. Mature larvae burrow into the soil or thatch to form the pupa or transformation stage. The adults emerge in 10 to 14 days. Each generation (egg to adult) averages about 40 to 50 days, depending on the temperature. The adults prefer to feed on the nectar of flowers, and most female adults wait four to seven days before beginning to lay eggs.

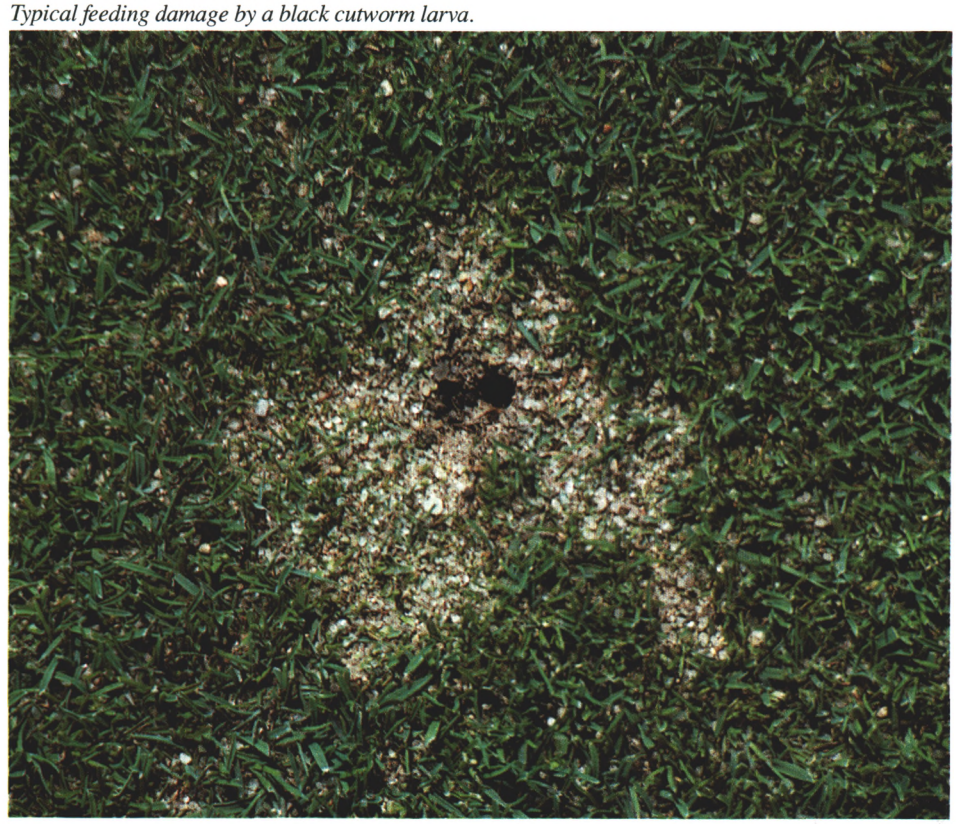
In North America, most areas in the transition zone have three to four generations per year, while cool-season turfgrass zones have one to three generations. Warm-season turf areas have three to five generations per season.

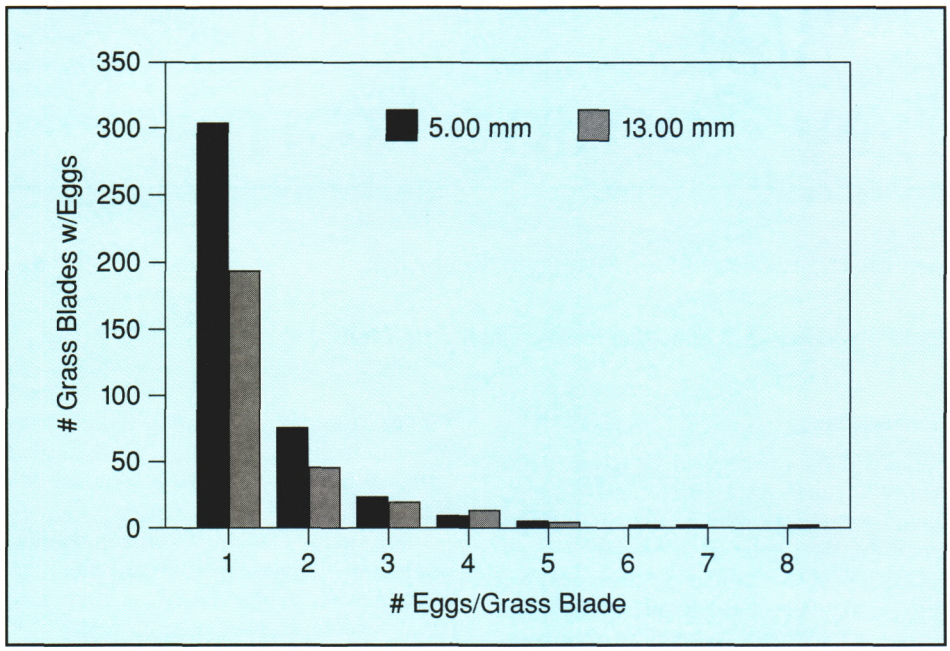
In our initial studies, we determined the location of egg placement in turf, sampling techniques for adults and larvae, and daily larval behavior in a turfgrass profile.

Egg Location and Early Larval Behavior

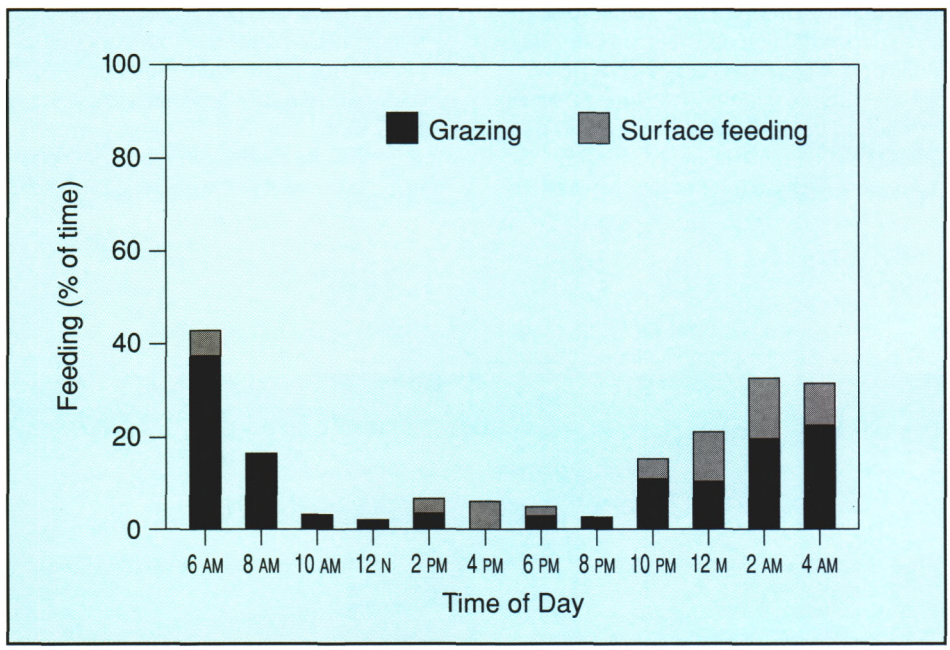
Agricultural information indicates that black cutworm females prefer to lay their eggs on weedy plants such as curled dock and yellow rocket mustard. Golf courses are typically devoid of these species, except perhaps in the out-of-play roughs. We discovered that the moths will readily lay eggs on turfgrass leaves in the absence of weeds.

Typical feeding damage by a black cutworm larva.





Ovipositional incidence of black cutworm eggs on 5.0 mm (3/16 inch) and 13.0 mm (1/2 inch) bentgrass.



Fifth instar black cutworm larval daytime and nighttime feeding behavior on 13.0 mm (1/2 inch) golf course turf.

Female moths, given the choice of laying eggs on 3/16- or 1/2-inch bentgrass turf, appeared to prefer the shorter cut turf, though analysis showed no significant differences. Regardless of the mowing height, most of the eggs were attached to the terminal 25% of the turfgrass leaf blade. This observation may provide some crucial information for developing cultural control strategies.

Golf course putting greens are typically mowed daily at 1/8- to 3/16-inch. Clippings are always collected in mowing baskets and discarded, often in the rough surrounding the green. If cutworm eggs are laid on turfgrass leaf blades where the clippings are collected, it is highly probable that nearly all of the eggs will be physically removed and discarded with the clippings. If this hypothesis is correct, the question remains, where do the black cutworm larvae found on the greens come from?

At present, the definitive answer remains unclear, although our observations provide some intriguing insights. From other research work, as well as our own larvae-rearing experience, we know that the first, second, and third instar black cutworm larvae can feed together in a rearing container or on the same grass blade. However, when they molt into the fourth instar, their behavior changes dramatically. The older larvae become aggressive and even cannibalistic.

To field sample for cutworm larvae on putting greens, a soapy water flush was used. We never observed the first, second, and third instar larvae. In contrast, the fourth, fifth, and sixth instar larvae were easily brought to the surface. It is possible that our inability to find small cutworms on putting greens is due to the soap drench killing the smaller larvae before they surface. However, we commonly find small sod webworm larvae and tiny fly larvae coming to the surface.

We hypothesize that the majority of older, damaging cutworm larvae found on greens are originating from areas surrounding the green. Most likely, they are coming from areas where the clippings are not removed during mowing or even from areas near the green where the clippings are spread. If this hypothesis is found to be correct in our ongoing research, then it may be possible to dramatically reduce cutworm damage by treating only the areas surrounding the greens.

Behavior of Larger Larvae

Bentgrass profiles were established in 18" long by 15" wide by 16" deep plexiglas containers. Mature fourth instar larvae were placed in the containers in aerification holes formed along the edge of the turf and the plexiglas surfaces. Each profile side was covered with cardboard to exclude light. The light:dark cycle was held at 11L:13D hours. The larvae were allowed to acclimate for five days, at which time most had molted into the fifth instar. The fifth instar larvae were then observed every two hours for a 72-hour period. During the dark hours, the larvae were observed with a small flashlight covered with a red lens.

Most of the time, the cutworm larvae rested in the aerification holes or were not visible. Most of the larval feeding was observed shortly after dark and an hour before morning light.

Feeding appeared to be of two distinct types which we have defined as confined feeding and grazing. Confined feeding was the chewing of the grass blades down to the soil line next to an occupied aerification hole. This type of feeding results in the typical pockmarks on greens. Grazing consists of the larvae crawling over the surface of the turf and chewing down random grass blades.

Adult black cutworm feeding on nectar of a flower.

Black cutworm eggs are laid on terminal 25% of turfgrass leaf blade.

These observations also are important in developing management strategies. First, the larvae feed most actively at night. Second, the larvae seem to prefer to remain in existing holes or aerification holes. Third, mature larvae seem to move from hole to hole, especially after the currently occupied hole has become fouled with fecal pellets.

Monitoring Black Cutworms

Black cutworm adults can be monitored using commercial pheromone traps that contain a synthetic female sex attractant (therefore, only males are caught) and black light traps (males and females). In our studies, the standard delta-wing, *sticky* pheromone trap did not capture as many males as the corn earworm *cone trap*. However, in 1993, neither trap seemed to help us predict when subsequent larval outbreak would occur. Several more seasons of sampling are needed to determine if a relationship exists between pheromone trap counts and resulting larval infestations.

Sampling for black cutworm larvae in turf is easily done by using a soap drench solution. We found that a solution of one ounce of Joy® liquid dishwashing detergent in two gallons of water is effective. Other detergents may work well, but they should be tested to ensure that they will not burn or discolor the turf. The two gallons of mix is applied to one square yard of turf, preferably with a sprinkling can, and allowed to infiltrate into the turf and soil. Larger cutworm larvae will emerge within four to five minutes. Sod webworm and black turfgrass ataenius adults may take five to ten minutes to surface. While this type of sampling was effective to confirm that cutworms were present, we were never able to find the first, second, or third instar larvae.

Since the application of biological control products or insect growth regulators does not cause the dying cutworms to move to the surface, soap flushes are recommended after using these products to determine the effectiveness of these pesticide alternatives.

Timing of Treatments

Black cutworm larvae are nocturnal pests, doing most of their feeding on the turfgrass foliage after dark. Therefore, the optimal time to treat with an insecticide or biological control, such as insect parasitic nematodes, is at dusk. This timing ensures that the cutworms will consume the turfgrass foliage immediately after it has been treated. Treatments in the morning or early afternoon are not as effective due to the fact that most insecticides are susceptible to both photodegradation and volatilization, thereby reducing product effectiveness.

Control Products

A myriad of products exist for golf course superintendents to choose from for the control of black cutworm larvae. Standard insecticides include: acephate (Orthene®), carbaryl (Sevin®), chlorpyrifos (Dursban®), cyfluthrin (Tempo®), ethoprop (Mocap®), fluvalinate (Mavrik®), fonofos (Dyfonate®, Mainstay®), inidacloprid (Merit®), isazofos (Triumph®), isofenphos (Ortanol®), lambda-cyhalothrin (Scimitar®), and trichlorfon (Dylox®, Proxol®). All of these products have performed well in recent tests, although liquid formulations appear to work better than granular products. If possible, select products that do not require immediate irrigation after the application. This will ensure that more pesticide is on the leaf surface to be consumed by the cutworm larvae.

Superintendents who wish to use a biological control should consider the insect parasitic (entomopathogenic) nematodes. Products containing *Steinernema carpocapsae* (Biosafe®, Exhibit®, Vector®) have been the most effective. Be sure to check the mixed product to determine that the nematodes are living, and apply the nematodes in the evening to avoid direct sunlight. Unlike standard insecticides, which should not be irrigated after the application, be sure to water-in the nematodes as soon as they are applied.

Another option for control of black cutworm is the use of an insect growth regulator (IGR). Azadirachtin (Turplex Bioinsecticide®) is a naturally occurring botanical IGR that has shown efficacy against black cutworm larvae. To achieve maximum efficacy, Turplex should be applied when you first think the cutworms are beginning to become active. Make the applications every two to three weeks during your *cutworm season* to achieve maximum efficacy.

Finally, remember that we now think that many of the larger cutworm larvae discovered on tees and greens are moving in from surrounding areas. Therefore, we recommend treating a 20- to 30-foot zone around these high-maintenance areas to reduce the chances of immediate reinfestation.

THE GREEN COMMITTEE CHAIRPERSON: Are You Up To The Challenge?

by JAMES FRANCES MOORE
Director, Mid-Continent Region, USGA Green Section

IT'S A LOUSY JOB, for the most part. You are a previously sane individual who joined a club for entertainment, a little exercise, and some social camaraderie, who somehow finds himself not only on what is arguably the club's most important committee, but also responsible for the club's most valuable physical asset — the golf course. Gone are the enjoyable rounds of golf, uninterrupted by a playing partner's constant advice of what he would do if he were in charge. Relaxing lunches at the club turn into mini-board meetings with uninvited attendees pursuing an agenda of gripes formulated during their morning round. And not only does the superintendent take every opportunity to subtly (and sometimes not so subtly) remind you that the management of a golf course is no job for an amateur, the women, men, seniors, juniors, hackers, and flat-bellies are all convinced that you listen and respond only to the complaints of groups other than the one they feel represents their interests. The final straw may be when your spouse threatens divorce if you *ever* volunteer for any committee again.

One of the most difficult challenges facing the Green Committee Chairperson is meeting the needs of all types of players.

Club politics aside, at first glance being the Green Chairperson might appear to be a *no-brainer.* Today's superintendents are better educated and more professional than ever before. There are computerized irrigation systems to precisely manage water, and maintenance equipment that can do more in less time and yield improved quality. Chemical companies have developed safer yet more effective pesticides and fertilizers. And turfgrass scientists are constantly developing new grasses and maintenance practices that allow us to enjoy the game even in the most demanding climate.

Unfortunately, in spite of all this progress there has never been a time in the history of golf that good leadership in the position of Green Chairperson has been more greatly needed. Both the game of golf and the golf course maintenance industry are under attack from many sides. Those who know nothing about the game or who can't afford the game at any cost consider it a sport only for the elite. Extremist environmental advocates paint golf courses as ravaged tracts of formerly pristine land that now glow in the dark as a result of chemical overload. Government regulatory agencies seem determined to pattern mandates after the tax code. Every day, more and more people want to use the course and expect it to be better conditioned than what was considered championship caliber just 10 years ago. And those better educated superintendents, computerized irrigation systems, and new mowers don't come cheap. Today's golf course budgets are growing rapidly and almost always represent the club's largest outlay of funds.

The position of Green Chairperson is anything but a *no-brainer.* In fact, this job should be filled only by an individual with exceptional leadership skills, an interest and willingness to learn a whole new vocabulary, the mental toughness necessary to make hard decisions, and the time to do the job right. Not many people in any club meet these criteria. As a result, most Green Committees are poorly led and in many cases do more harm than good in spite of the best of intentions. The unfortunate truth is that the lack of good leadership may well be the biggest problem many clubs face.

This article is written to help the new Green Committee Chairperson be more effective. It is hoped the following tips will prove helpful in making your term a successful one.

Tip #1 — Assemble a Committee with Club Management Experience

Many of the most serious mistakes made by committees are due simply to a lack of tenure. When terms are limited to less than three years, there is an understandable inclination to want to "leave your mark" on the course. New bunkers, tees, and mounds are added under the direction of amateur architects following a personal agenda. These new features seldom complement the rest of the course and are almost always expensive and/or difficult to maintain.

Perhaps the most dangerous additions are the trees that are planted in every open area of the course. This design philosophy invariably seems to be to get the trees as close to the greens and tees as possible. Sadly, the legacy you and your committee leave will be greens that remain under constant stress from a lack of light, poor air movement, and root competition.

The tip, of course, is to make certain the committee is composed of individuals with experience in club affairs and then allow them to remain on the committee for at least three years. One-year terms are invitations to poor management in any business. Golf course management is no exception. And don't forget the old saying concerning the size of your committee — "there should always be odd numbers, and three is too many." Realistically, a committee of five to seven should offer good representation of even the most diverse membership.

One excellent means of guaranteeing both continuity and experience is for the club's immediate Past President to become the newest member of the Green Committee. The committee is soon made up of all Past Presidents — individuals who are very familiar with the entire club operation. With a committee of five, tenure will likewise be five years. Given the experience of the committee, long-range planning will be realistic and considered by the majority of the membership as credible. Variations on this formula also have been used successfully.

Tip #2 — Develop a Mission Statement

It should be the committee's responsibility to determine a realistic level of maintenance for the course. While most people would want the course in "member guest" condition at all times, this seldom is a realistic goal due both to agronomic and budgetary restrictions. The course can be *peaked* for a special event, but the committee and golf course superintendent jointly should determine the level of maintenance appropriate for day-to-day golfing activity. This maintenance level should provide playing conditions agreeable to the majority of the membership while placing agronomically reasonable demands on the course itself. *Remember, for a mission statement to be useful, it must be realistic.*

Tip #3 — Prepare a Master Plan

Every club's master plan should include at least the following:

• A tree planting and removal program that considers the architectural and agronomic influence of trees on the game of golf. A tree care program is best developed through the combined efforts of the superintendent, golf professional, a professional arborist, members of the committee, and,

Major construction affecting the architecture of the course should not be attempted without professional guidance.

A good relationship between the superintendent and the Chairperson is vital to the success of the course as well as the individuals involved.

ideally, a professional golf course architect. This team should evaluate the existing inventory of trees as well as locate future plantings.

• A professionally prepared cart path routing plan so that even if the path system is built in stages, it eventually will all fit together.

• Location and design of new course features that can be built by the superintendent. Tees, bunkers, mounds, etc. should be professionally designed by the architect and approved by the membership prior to any construction efforts.

• An analysis of water quality and water availability for the future.

• Identification of large capital improvements so the club can ready itself financially over a period of years rather than in a few frantic months. Such improvements include new irrigation systems, pumping plants, maintenance facilities, the reconstruction of greens, and other major architectural changes to the course.

Tip #4 — Develop and Adhere to a Capital Equipment Replacement Plan

The committee should request from the superintendent a capital equipment replacement and acquisition schedule. This schedule should identify how much longer each piece of major equipment is expected to last and recommend a year for replacement. Occasionally the Green Section staff visits a club that has implemented this very sound business practice. Unfortunately, the vast majority of committees across the country choose to ignore these needs and simply pass them along to the next committee year after year. When the time finally comes that the purchases no longer can be ignored, the club finds itself totally unprepared. This is *crisis management* at its worst and always results in wasted funds and labor resources, membership dissatisfaction, and a prolonged reduction in the quality of the facility as a whole.

Tip #5 — Address Environmental Concerns

• The committee also must accept the fact that golf course maintenance as we now know it will almost certainly change radically due to environmental concerns. In the near future virtually all courses will need to conserve water, reduce chemical use, convert to superior grass varieties, and implement community-friendly programs such as the USGA-sponsored Audubon Cooperative Sanctuary Program for Golf Courses.

The members of the committee need to begin educating their fellow members that:

• Absolute perfection in terms of weed control is no longer a practical goal. Weeds that threaten the course from an agronomic standpoint and those that adversely affect playing quality should be controlled. But there are many, many times golf courses are sprayed for weeds that really could be tolerated. These "weeds" often can become the basis for sanctuary areas and *native* areas. Make no mistake, there is a selling job involved here to convince people that there is a difference between a weed patch and a nesting habitat. Influential members of the committee will be much more persuasive than even the most eloquent superintendent.

• The same types of compromises in terms of appearance will be necessary for water features. Instead of immaculately manicured borders surrounding a totally weed-free lake, we need to learn to accept buffer strips and a few aquatic weeds. Repeated chemical treatment of water features to compensate for insufficient depth, nutrient runoff, and stagnation is neither cost effective nor sensible.

• What is perhaps most important, the committee members must help educate the golfers of the club that the course cannot reasonably be kept in "member/guest" condition at all times. Attempting to do so will result in a turf that is kept in a constant state of vulnerability to damage from disease, insects, weeds, and traffic. While chemicals are extraordinarily valuable tools for golf course maintenance, the goal at every course should be to create favorable growing conditions and establish a level of maintenance that reduces the need for such crutches as much as possible. A course that is not constantly pushed to the maximum has far fewer problems year in and year out *and* requires less input in terms of chemical controls.

Tip #6 — Get to Know Your Superintendent

Establish a personal relationship with the golf course superintendent. Many times the Green Committee Chairperson takes the position that if the superintendent is taking good care of the course it is best not to interfere. While this attitude might seem appropriate at first, consider the problems that arise when something goes wrong on the course and the lines of communication are not well established.

Most superintendents are like employees in any profession. They are anxious for the opportunity to communicate their needs to their employers. However, golf course superintendents have the added problem of working in a profession so specialized that the average Committee Chairperson initially will have little idea of what the superinten-

dent is talking about. It is equally important that the superintendent have a good understanding of what the membership needs. These needs should be articulated by the Green Chairperson.

There are a number of steps the new Chairperson can take to make certain good communication exists between himself and the superintendent.

• Play golf together often. Be certain to play with all types of members rather than the same group each week. This will help you see the course from their perspective and better understand their demands. Play other courses, too. Put together a foursome of the Pro, Superintendent, Green Chairperson, and one other. Meet your counterparts at the other club if possible.

• Attend local superintendent meetings and Green Section conferences together as often as possible. Try to attend the annual Golf Course Superintendents Association of America meeting. This is always an "eye-opener" for the Green Chairperson, and the time spent in the seminars and looking at the newest innovations the industry has to offer will prove very productive.

• Hold committee meetings in the maintenance facility occasionally. Let the entire committee learn a little more about what it takes to care for the course. If the condition of your maintenance facility is too poor to hold a simple meeting, consider the working environment in which your course maintenance staff must work on a daily basis.

Tip #7 — Utilize the Green Section's Turfgrass Advisory Service

The staff of the Green Section visits more than 1,500 courses each year, with maintenance budgets ranging from much less than $100,000 to well over $1,000,000. The agronomist can help you reach a balance between the agronomic needs of the course and the desires of the players. They can help you identify the potential of your facility as well as pinpoint areas in which both short-term and long-term improvement efforts need to be made. They will give the superintendent and the committee an honest assessment of the programs in place and help formulate new programs if necessary. The Green Section's Turfgrass Advisory Service is one of the best bargains in golf and a resource every Green Chairperson should tap.

Do You Have "The Right Stuff"?

How critical is this need for stronger leadership at the top? Look at it this way. Never before has our industry been better prepared to deal with the challenges of the future. We have the best-educated superintendents, a scientific and research community that produces invaluable information on a regular basis, computerized irrigation control that gives us the best-ever management of water, and unbelievably efficient equipment. We have immediate access to critical information sources and a worldwide network of turfgrass professionals of all types who freely exchange ideas. Unfortunately, the sad truth is that all of these assets can be negated at the management level by one chairperson or a committee whose only goal is to have faster greens and 100% pristine conditions. Simply put, poor leadership is worse than no leadership at all. The game of golf and the golf course maintenance industry cannot meet the challenges of the future without the support and leadership of those who are the ultimate consumers — the golfers.

Hopefully, all these challenges do not scare you away from accepting the responsibility of Green Committee Chairperson. Make the commitment, accept the challenge, and follow the guidelines outlined above. The pay may not be great, but the knowledge that you have had a positive impact on your course, those who use it, and the lives of those who maintain it, should go a long way toward justifying the effort.

The Long-Range Plan should include an evaluation of water quality and future availability.

Ozaukee Country Club's Audubon Stepping Stone to a Better Environment

by PHIL BAILEY
Environmental Coordinator, Ozaukee Country Club, Mequon, Wisconsin

THE OZAUKEE COUNTRY CLUB golf course, designed by Langford and Moreau in 1921, is an 18-hole layout spread across 151 rolling acres, including 1,300 feet of Milwaukee River shoreline. For many years, the surrounding area consisted of farmland, but recent growth has changed the landscape to include a low-density residential area and 1,400-student high school. An intermittent stream crosses the property, emptying into the Milwaukee River. It now carries much more runoff water than ever before due to rooftops, streets, and other impermeable surfaces associated with the development of the adjacent property.

Negative articles in all types of the media prompted our staff, led by Ozaukee Country Club superintendent Wayne D. Otto, CGCS, to evaluate the impact of our maintenance operations on the environment and our neighborhood. He elected to utilize the Audubon Cooperative Sanctuary Program for Golf Courses as a source of information and guidelines to formulate environmentally friendly maintenance procedures. His goal was to assure the residents of Mequon that our club would continue to be a positive influence on the environment and not pose a risk to our neighbors or the area wildlife.

We followed the procedures outlined by the Audubon Society of New York State, beginning with the formation of a Resource Committee. Our Resource Committee consisted of club members and golf course staff, which helped ensure strong lines of communication within the organization. This committee contributes a wide range of ideas on health, safety, and environmental stewardship. A function of the committee was to develop a strong Statement of Purpose for the Board of Directors, outlining the club's responsibilities as a member of the community, and providing the Board oversight on committee activities.

Public Involvement

After being fully accepted as an Ozaukee Country Club advisory committee, the Resource Committee's first objective was to create stronger public involvement both

Naturalist Jean Hack introduces the children at Ozaukee CC to a screech owl during a session on native birdlife.

Alex Wagner, a Homestead High School student, samples Milwaukee River water as a part of the "Test the Waters" program.

within the club and the community. Special programs were presented to members and their families by locally known environmental authorities. Community organizations were invited to the Resource Committee meetings to present their ideas for sound environmental practices. Some of the programs offered included:

1. A five-member panel discussion by the Milwaukee Audubon Society. The panel members included: Mark Fieder, a Milwaukee high school environmental science teacher; Lorrie Otto, an authority on native flowers; Fred Sweet, President of the Milwaukee Audubon; Dan Boelke, an experienced woodland native plant nursery operator; and Carol Bangs, a local landscape designer with an interest in waterway enhancement.

2. A children's presentation on native owls. Jean Hack, a naturalist at the Ledge View Nature Center in Chilton, introduced the children of Ozaukee Country Club to Cinnamon, a live screech owl, during a talk on area native owls.

3. Environmental planning plans of the City of Mequon. Jon Censky, of the Mequon Planning Department, presented the environmental plans for the City of Mequon to the Resource Committee.

4. Wildlife food and cover enhancement projects. Dan Panetti, a local store operator representing Wild Birds Unlimited, introduced us to correct feeding and housing practices for wild birds.

5. Water quality testing program. Dave Savage, a Homestead High School teacher, designed a program for students to test the waterways at Ozaukee Country Club.

Wildlife Food Enhancement

To help increase the number of wildlife sightings at Ozaukee Country Club, the Resource Committee introduced several bird feeding stations. With the guidance of Wayne Otto, several flower gardens were developed using native plant materials. The objective of the native plant gardens is to attract more hummingbirds and butterflies to the course, as well as introduce native plants to golfing members.

We encouraged the involvement of golfing members at Ozaukee by inviting them to fill out wildlife surveys. These surveys included reports of any wildlife sightings during their round of golf. The inventories are returned to any of three locations within the club facility.

Wildlife Cover Enhancement

In a continuing effort to be good stewards of our environment, the staff at Ozaukee Country Club sought to assure adequate shelter for the wildlife attracted to our area. We developed natural areas, installed birdhouses, and created brush piles, all in an effort to increase wildlife cover. Large areas of out-of-play roughs were left unmowed and have reverted to naturally occurring vegetation. Our members maintain and monitor more than 25 nest boxes, including bluebird, flicker, bat, wood duck, and purple martin houses.

Native Prairie Landscape Plant List

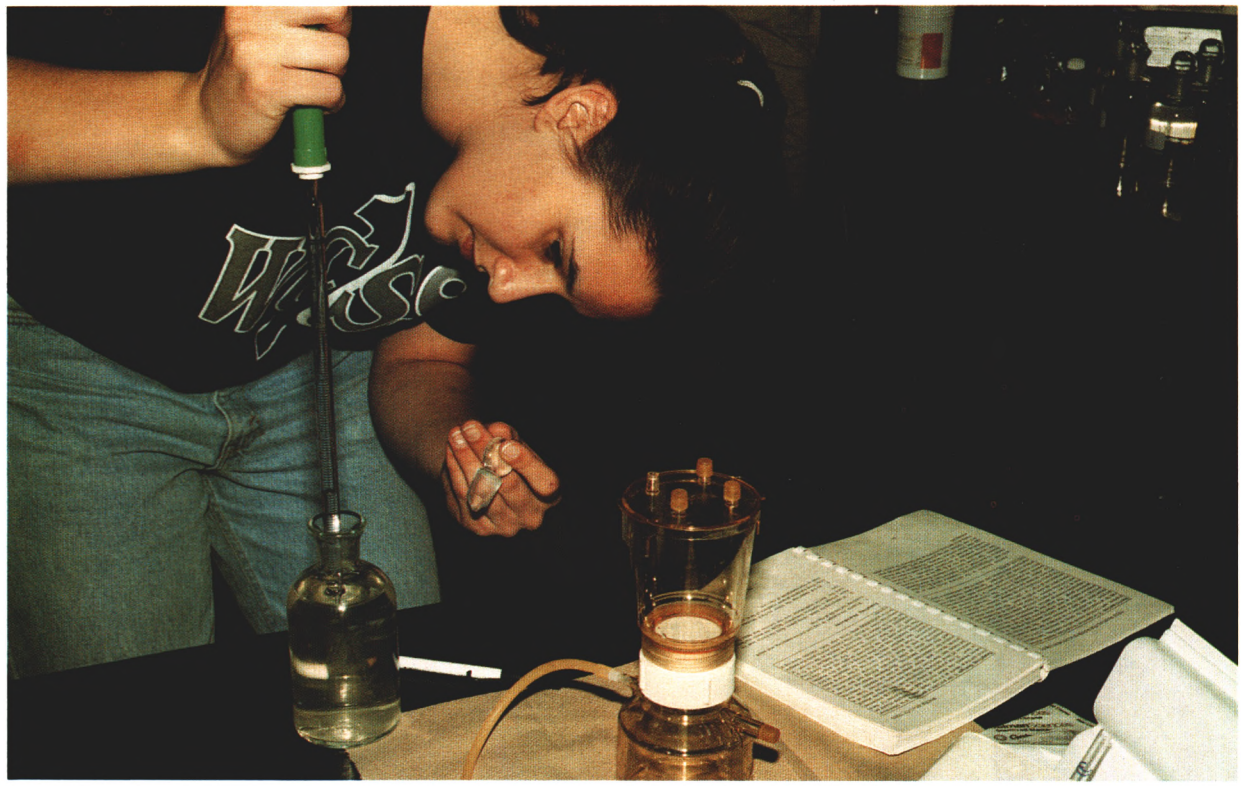
100	Columbine
51	Butterflyweed (for clay soil)
51	Sky Blue Aster
51	Smooth Aster
100	Purple Coneflower
40	Queen of the Prairie
150	Prairie Blazingstar
30	Cardinal Flower
26	Yellow Coneflower
40	Sweet Black-Eyed Susan
30	Stiff Golden Rod
51	Culvers Root
100	Golden Alexanders
150	Little Bluestem
150	Prairie Dropseed

Plant Source: Prairie Nursery, Westfield, Wisconsin

Planting Date: May 15, 1993

Water Conservation

Along with habitat enhancement projects, Ozaukee Country Club also strives to con-



Julie Hahm is testing for fecal and total coliform bacteria in the Homestead High School biology laboratory, under the direction of Dave Savage, biology teacher.

serve our local natural resources. To conserve water and to replace an outdated irrigation system, the club contacted T. J. Emmerich Associates, irrigation consultants, to help us meet our goals. The new system, installed in the fall of 1992, combines the use of low-pressure irrigation heads, a pump station with variable frequency drive motor controls, a Toro 8000 central/satellite control system, and a central weather station.

The installation of the low-pressure (65 psi) sprinkler heads and the use of the variable frequency drive motor controls not only saves on water consumption, but also allows the irrigation system to operate more economically, using only the electricity needed to keep the system fully charged to the required pressure. In conjunction with the sophisticated pump station, the new computer-driven irrigation system is connected to a central weather station. The superintendent develops the water programs, based on the weather station data, to provide only the amount of moisture needed by the turf.

Water Enhancement

We have been fortunate in gaining the help of Homestead, our local high school. *Testing The Waters*, a state-funded program, allows students to practice water quality testing while providing our club beneficial information on the water quality entering and exiting the property. The students perform tests for dissolved oxygen, biochemical oxygen demand, fecal and total coliform, pH, temperature, phosphate and nitrate levels, turbidity, and they check for aquatic organisms that depend on good water quality. After the tests are completed, the students report their results and recommendations to the Resource Committee. To date, they have found Ozaukee Country Club to be an asset to our community. The golf course acts as a buffering zone, filtering water from the surrounding community before the water enters the Milwaukee River.

Integrated Pest Management

To meet the integrated pest management (IPM) certification requirements, a detailed IPM program, already in place at Ozaukee Country Club, was presented to the Resource Committee. Our IPM program is titled **A Rational Approach to Integrated Pest Management**. This IPM approach uses the acronym **RATIONAL** as a key word. It includes our **R**ole in the program, the **A**pproach to be used, **T**hreshold limits to be determined, **I**nspections to determine the proper threshold, **O**ther appropriate methods, only **N**ecessary pesticide applications, **A**nalyses of the results, and **L**ogging all pertinent information. In our Rational Approach to IPM, we file daily scouting reports to determine how the turf stands with regard to the threshold limits.

To further protect the groundwater and the environment, the Board of Directors approved the installation of a self-contained chemical facility. The facility includes a chemical storage room, a pesticide loading pad, and a washwater recycling tank. We also are testing biological control methods on the golf course, such as diatomaceous earth for insect control, along with the use of Bt (*Bacillus thuringiensis*) for caterpillar control.

Recycling

As a further commitment to the Audubon Cooperative Sanctuary Program, the Resource Committee goals include a well-developed recycling program for both the grounds and clubhouse facilities. At this time, we are in the process of putting together a detailed recycling program. A major goal is to have a recycling program in place before 1995 to meet the Wisconsin State Waste Reduction and Recycling Law. Paper and cardboard, along with aluminum recycling, have already been established at the clubhouse and grounds department. This program will soon be followed by a commingling recycling program.

Wayne Otto stated it best: "With today's environmental concerns, it is very important for golf courses to get involved with programs such as the Audubon Cooperative Sanctuary System. There is no better way to show our golfers and the whole community that by caring for the environment and providing needed greenspace, we are truly *stewards of the land*." The Resource Committee agrees with this philosophy and is proud of the accomplishments that Ozaukee Country Club has made to enhance the environment in our community.

But Can You Prove It?

by **RONALD G. DODSON**
President, Audubon Society of New York State

WHICH DO YOU PREFER: "Golf Courses Are Denounced as Health Hazards — To Environmentalists, Golf Courses Aren't All Fun and Games" or "Golf Courses Seek to Attract *Other* Birdies"? Both are recent headlines representing two attitudes toward golf and the environment. We know from what we read and hear that there are those who believe that new golf courses destroy acres of already dwindling habitat, and once built, use too much water and chemicals in maintaining the "manicured" appearance associated with golf courses.

We also know that there are others, both within and outside of the golf industry, who believe golf courses can provide excellent habitat for a variety of wildlife species. It has even been suggested that sometimes more wildlife is seen after a golf course is built than before it was there, and that water and chemical use is kept to a minimum not only because of a concern for the environment, but for economic reasons as well.

The first question we need to ask ourselves is, what exactly is the significance of wildlife on a golf course? The fact is that wildlife is a great indicator of environmental quality. The different types and numbers of wildlife seen on a property are a visible indicator that the golf course is a healthy and thriving habitat. The quantity and variety of wildlife also reflect our human commitment to take care of the land. But for those who believe in the value of golf course habitat, the critical question is, "Can you prove it?" How can you prove the *biological productivity* of an area? How can you assess the *environmental health* of wildlife found on the course? How do you prove the value of golf courses as productive wildlife areas? One way is to track wildlife environmentally and record what you see.

Your records should include a baseline inventory of the types of wildlife found on the course throughout the year. Those records will prove to be even more valuable if information is available about the property before the golf course was built. Once you have established an inventory, record keeping on specific species can begin. Wildlife that use nesting boxes (bluebirds, swallows, or wrens, for example) may be of particular interest to your members or the public. Volunteers can regularly monitor the boxes during the nesting season to record the number of eggs in each box and the number of young birds that successfully leave the nest. If this simple process is completed on a yearly basis, over an extended period of time, population trends can be established. These trends then can be compared to other information, such as habitat changes on the course, or possible interactions between golfers and wildlife. Most important, from a golf perspective, information collected about these species can be compared to information that has already been gathered on other types of land, such as parks and wildlife refuges. This comparison not only helps determine the relative value of different types of land management and uses, but leads to a more complete understanding of appropriate wildlife management techniques in the human-managed landscape.

These birds of feather (sandhill cranes) certainly stick together. That makes it all the easier when conducting your wildlife inventory of the golf course. ROBERT WALKER/USGA

When you're asked about the *environmental sensitivity* of your courses, can you prove it? Identification of species and the systematic process of keeping records will help document the value of golf courses as wildlife havens. Need help getting started? Participation in the Audubon Cooperative Sanctuary Program for Golf Courses (ACSP) is one way for golf courses to gather and submit wildlife information. The ACSP serves as a national clearinghouse for information concerning golf, wildlife, and the environment. By participating in the record-keeping process and assessing the results, we will not only *believe* that golf courses are valuable as wildlife habitat, we will also be able to answer "Yes" to the question, "Can you prove it?"

FALL NEWS NOTES

Additional Research Funding Approved

At its meeting held in conjunction with the U.S. Open Championship at Oakmont Country Club, the USGA Executive Committee approved a $1.5-million, three-year continuation of a responsible and scientifically based investigation of the environmental impact of golf courses.

As part of these studies, the USGA will support research to 1) understand the effects of turfgrass pest management and fertilization on water quality and the environment and to 2) determine the human, biological and environmental factors that golf courses influence.

Turfgrass scientists at universities throughout the country were contacted in early June to submit project proposals pertaining to best management practices that demonstrate that pesticides and fertilizers can be applied to golf course turfs while protecting environmental quality. During the USGA's Environmental Research Committee meeting in August, new and existing pesticide and nutrient fate projects, as well as studies related to best management practices, were evaluated for possible funding for the next three-year period.

The Executive Committee also approved a USGA-sponsored meeting of wildlife specialists to plan future research concerning the effects of golf courses on wildlife. The proposed research should further document the role golf courses play in providing wildlife habitat, and will improve cooperation between wildlife enthusiasts and golfers, all of whom will gain as we learn more about how to build and maintain golf courses for the benefit of wildlife *and* the game.

You Think You Have Problems?

We recently received an interesting letter from Dr. D. S. McClymont at Elephant Hill Golf Course in Zimbabwe, Africa, seeking our help with their animal nuisance problems. The golf course is located in Victoria Falls National Game Park, and a feature of the course is the large number of wild animals that are in residence.

The list of animals could make for very interesting reading as part of a Resource Inventory in the Audubon Cooperative Sanctuary Program, but the problem is that the golf course serves as a sort of *animal heaven*. The course provides the only patch of green grass and trees for several hundred square miles. Although most of the animals do little damage to the turf for the majority of the year, they can provide some interesting challenges. Chacma baboons *(Papio ursinus)* break the flags on occasion, and together with the vervet monkeys *(Cercopithecus aethiops)* they challenge the golfers by occasionally picking up golf balls during play.

The devastating problems come from the warthogs *(Phacochoerus aethiopicus)*. These menacing animals leave ugly scars on any turf they decide to attack. Their extremely tough snouts dig up the turf to get at the stolons and rhizomes of the bermudagrass on the fairways, greens, and tees. The size of the holes depends on the root growth; the better the root growth, the larger the hole. Oftentimes, the holes are up to two feet deep. Their voracious eating habits leave any remaining material nonviable for replanting. A family of 10 to 12 can devastate a green in a matter of one or two hours. Laying sod to repair the damage has been tried, but the warthogs consider this à la carte treatment and flip over the turf to gobble the roots in short order.

Warthogs consider Elephant Hills Golf Course a gourmet treat, and they can devastate the turf in short order.

It seems like all the potential solutions have been tried. Since shooting the animals is not allowed in the nature park, relocation was considered. But this is very expensive, and the commercial operators who handle this task are more interested in larger, more lucrative animals like elephants. Warthogs can travel more than 25 miles in three short days, so relocating them would involve moving them at least 65 miles away so they would not quickly return to their garden of eden.

A ground hog repellent from Germany was tried, but this seemed to act as an appetite stimulant! Even seven-strand electric fencing was used, but this proved worthless as well. The warthogs breach the fencing with ease, squealing loudly before gaining speed to hit the fence and charge through. Sparks fly, but wouldn't you do that to get to your piece of heaven?

Turf Benefits Paper Published

Drs. James B. Beard and Robert L. Green have published *The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans* in the May-June 1994 issue of the *Journal of Environmental Quality*. This USGA-sponsored paper provides a detailed assessment of the research literature and serves as a valid scientific source of information documenting the benefits of turfgrasses.

More than 400 scientific references were identified, obtained, and assessed, and a total of 116 of the references were identified as the most important for developing a scientifically based paper on the benefits of turfgrasses.

The paper highlights a wide range of technical areas, including a) turfgrass evolution; b) history of turf use; c) functional benefits, such as soil erosion control, dust stabilization, groundwater recharge, surface water quality, and heat dissipation; d) recreational benefits; e) aesthetic benefits; and f) contemporary issues such as water conservation and water quality preservation as related to pesticide and fertilizer use.

A free reprint of the paper is available from the USGA Green Section, P.O. Box 708, Far Hills, NJ 07931.

The Green Section is currently working on a layman's version of the paper for distribution to the Allied Associations of Golf, the media, and the general public. The scheduled completion date is September 1994.

Turf Advisory Service Fee Changes for 1995

To keep up with increasing costs of providing quality turf advisory services to its member clubs and to the game of golf, it is necessary for the USGA to increase the fees charged for the Green Section's advisory visits. Because our agronomists can schedule much more efficiently with early notice of your request for a visit, you will find a significant break on the fee if you pay before May 15. Following is the fee schedule for 1995:

	If paid by May 15	After May 15
Half-day visit	$ 900	$1,200
Full-day visit	1,400	1,700

Despite the increase, the USGA will be subsidizing the Turf Advisory Service with more than $1 million in 1995, reflecting a

commitment to provide golf courses with the best services from a top-quality staff of 16 full-time agronomists. A Green Section visit is still a bargain for the many benefits that can be realized, perhaps more so now than ever. Schedule early and join us for great golfing turf in 1995!

In Memoriam

Dr. Kenyon T. Payne, best known for his dedication and commitment to his students at Michigan State University, died in East Lansing, Michigan, on June 15, 1994.

Under Dr. Payne's direction, the MSU two-year Golf Turf Program grew in numbers and stature to the point where it is now recognized as one of the most successful in the country. One of the unique strengths of the program under Dr. Payne's leadership was the emphasis he placed on encouraging his students to remember the importance of personal values, relationships with people, and contributions to the community.

After receiving his Ph.D. degree, Dr. Payne joined the Purdue University staff as Assistant Professor with responsibilities in teaching and turfgrass breeding. He joined the MSU staff in 1952, and was named Department Head of Farm Crops in 1959. After a short tenure as Dean of Agriculture at the University of Nigeria in Ksukka, West Africa, he rejoined the MSU staff in 1966 and stayed until his retirement in 1988.

Dr. Payne received numerous awards during his career. Most recently, he was awarded the 1994 USGA Green Section Award. Dr. Payne's legacy will continue through the activities of his many students in the turfgrass industry today.

A memorial fund has been established in Dr. Payne's name for the benefit of the golf turf program at Michigan State University. Anyone wishing to make a contribution can send a check payable to Michigan State University, with a note that the contribution is for the K. T. Payne Memorial Fund.

K. T. Payne Memorial Fund
Crop and Soil Sciences Department
Plant and Soil Science Building
East Lansing, MI 48824-1325

ALL THINGS CONSIDERED

For Heaven's Sake, Get Some Insurance!

by DAVID A. OATIS
Director, Northeast Region, USGA Green Section

HAVE YOU ever noticed how common insurance is? Everywhere you look you see one form of insurance or another. In most states, liability insurance is required before we can even license our automobiles. We have disability insurance and health insurance and life insurance. We have homeowner's and renter's insurance. Doctors, lawyers, and many others buy malpractice insurance. Baseball pitchers may insure their arms, and professional golfers may have special policies for their golf clubs. The point is, most of us have insurance in one form or another because it helps us sleep at night and because it makes good sense.

With insurance so prevalent in our lives, I am constantly astounded that more golf courses don't have insurance policies against the loss of putting green turf. Putting green turf can be lost in the blink of an eye and totally without warning. We can lose it to disease, vandalism, sabotage, and even honest mistakes. The winter storms that bring snow and ice can cause damage, but turf can die just as quickly during hot, humid weather. We can lose putting green turf because of an oil spill or an irrigation system failure, and we can lose it from carelessness. Contaminated or improperly formulated fertilizers and pesticides can destroy perfectly healthy putting green turf in an instant. Considering the number of different ways we can lose putting green turf and considering its relative importance to the game of golf, one would think that every golf course would have insurance policies specifically for their greens. Sadly, many courses do not.

Now, before you start scrambling to call your insurance agent, talk to your golf course superintendent. He or she is responsible for this policy, and it simply amounts to having a good quality putting green nursery. "We already have one!" you say, but do you really? Read through the next few questions and then ask yourself again if you really have a putting green nursery.

• *Do the turf and soil in the nursery match the turf and soil in the existing greens?* If they don't, plugged or sodded portions will stand out like a sore thumb and may not perform well because of soil layering problems.

• *Is the turf nursery being maintained at the same cutting height as the other greens on the golf course?* If the nursery is cut 1/32" higher, it may take quite a while for it to adjust to a lower height.

• *Are the topdressing, fertilization, aerification, and pesticide programs similar?* If they are not, it may take even longer for the turf to adjust when it is used.

• *Is the nursery treated just as the other greens are,* or is it in an out-of-the-way location and forgotten more often than not?

• *Is it usable at a moment's notice*, or is it puffy, thatchy, comprised of a different turf, or mowed too high?

If you have a good nursery, you will find a hundred uses for it. Nurseries can be used to test mowers and new products, and they provide a great training ground for new personnel. They can be used to patch damaged areas or to expand shrunken greens. They are really helpful when disaster strikes. If you don't have a good nursery, *probably there will come a day when you wish you did!*

The message is, *Don't get caught with your pants down!* Have as large a putting green nursery as possible. It should be *at least as large as the largest green* on the course and preferably double that size. The soil and grass types should match the existing greens. If several different types of greens exist (different grasses, soils, etc.), you may need more than one nursery. Nurseries can be built inexpensively by using a few inches of the existing topdressing material and a mixture of shredded aerification plugs and various cultivars from seed.

Yes, there is some cost involved, but the advantages of having a good quality putting green nursery make the cost insignificant. This is an insurance policy you cannot afford to be without, so *for heaven's sake, get some insurance!*

TURF TWISTERS

AS YOU SOW

Question: I've heard bentgrass seed can be sown more accurately by mixing it with fertilizer. How much seed and fertilizer should be mixed together? (Oklahoma)

Answer: A mixture of seed and a non-burning fertilizer can make it much easier to apply seed accurately, particularly very small seeds such as bentgrass. Let's assume you are using a 6% nitrogen fertilizer source. Mix 40 pounds of fertilizer and 5 pounds of bentgrass seed. Apply the mixture at the rate of 10 pounds per thousand square feet. This would result in approximately 0.5 pounds of nitrogen and 1.1 pounds of seed being applied per thousand square feet.

SO SHALL YOU MOW

Question: We have Tifway (419) bermudagrass fairways and roughs throughout our golf course. An ongoing debate has centered around the best mowing heights to provide both good playability and course definition for daily play. What are the standard recommendations? (Florida)

Answer: When active growth is occurring, a fairway mowing height of 0.5" provides an excellent playing surface for golfers of all skill levels. To provide good fairway/rough definition, it is recommended to have at least a 1" difference in heights of cut. With hybrid Bermuda roughs, a mowing height of 1.25" to 1.5" is best for general play. As turf growth slows down in the fall, slightly raising the mowing heights to between 0.6" to 0.75" for fairways and 1.75" to 2.0" for roughs is a good practice to improve wear tolerance and maintain course definition.

AND SOW AGAIN

Question: To fill in the bare spots, I overseed thin areas in our greens each fall after they are aerified and topdressed. Tiny seedlings usually can be seen in the holes a few weeks later, but after a month or so there is little bentgrass to be found in these areas. Do you have any tips to produce better results? (Iowa)

Answer: Bentgrass seedlings have a difficult time surviving on a green that is in play. The wear and compaction caused by concentrated traffic, daily mowing of seedings at putting green heights, and other factors take their toll on the new turf. Try using .25"-diameter hollow quadratines set to penetrate about .5" deep as a pre-treatment for overseeding thin areas with a topdressing/seed mix. The close 1" × 1" spacing produces numerous shallow holes that can be ideal places for bentgrass germination and development.