USGA® GREEN SECTION

Record

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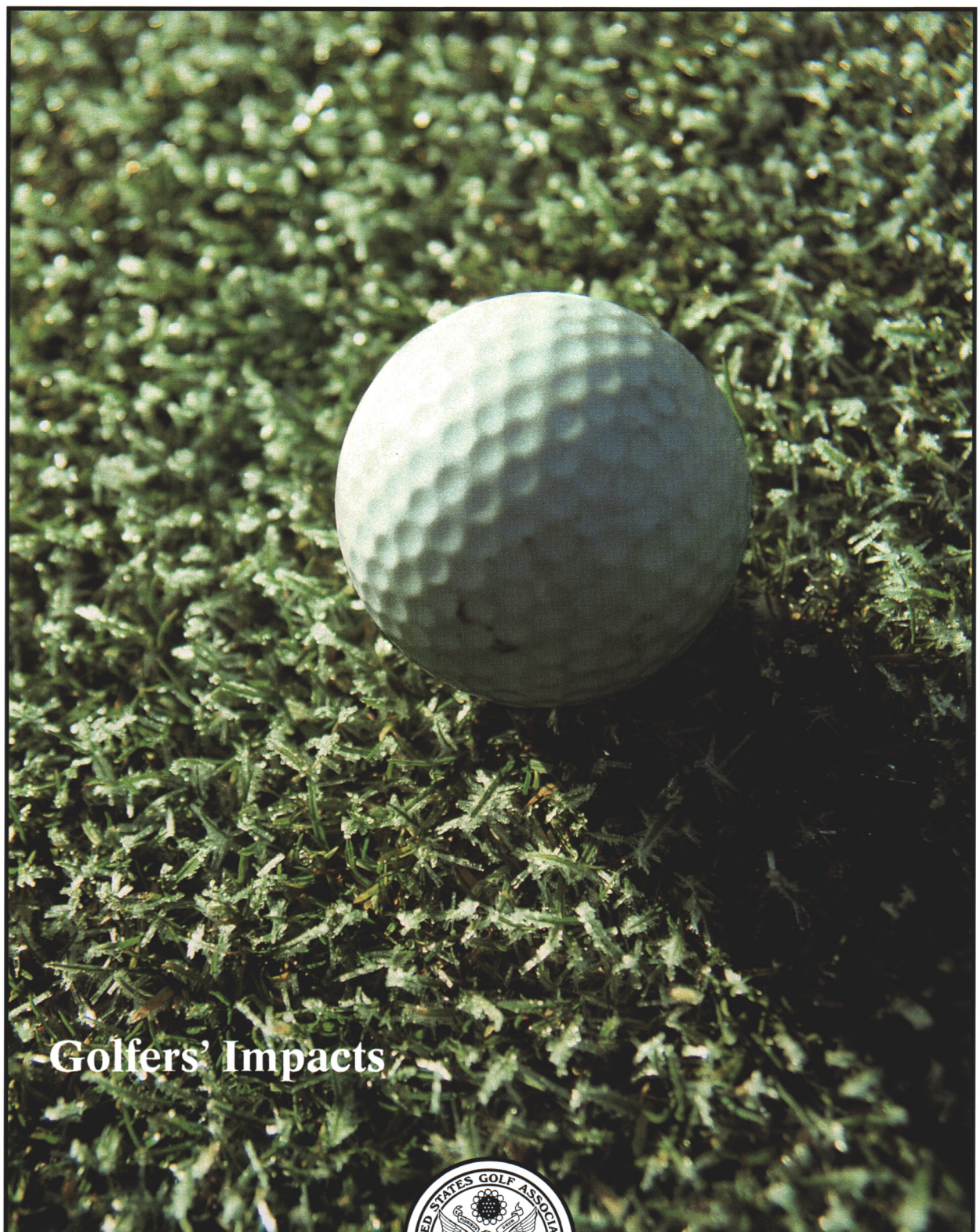

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Cover Photo:
Plant tissues in a frozen or frosted turf are brittle and more easily damaged by traffic. Winter play on tees and greens at many northern golf courses is discouraged to protect the turf and underlying soils, and maintain the integrity of the playing surface.

A well-planned putting green nursery can be a superintendent's best friend in times of trouble. See page 9.

Developing an environmental plan is more than just writing goal statements about managing the golf course property. See page 16.

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Golfers' Role in Maintenance

Golfers' actions impact the golf course and maintenance operations more than they realize.

by JIM SKORULSKI

IT IS A CRISP, clear Saturday morning in October. The sun is just beginning to rise as you step into a hot shower and prepare for the 8:00 A.M. shotgun start of the Fall Classic breakfast tournament. A quick bite, a cup of coffee, a peak at the sports page, and you're off, full of anticipation for a great morning on a pristine golf course with friends. Ah, but there is trouble in the air when you arrive at the golf course. A sign reading "FROST DELAY" is posted on the message board. Tension fills the air as more and more golfers gather only to realize that the tournament is delayed indefinitely until the frost lifts. You hear the complaints: "There he goes again . . . . Is this place ever open? . . . How much damage can a few golfers create? . . . Last weekend it was too wet for golf carts, today a frost delay . . . . What's next? Close the greens for winter?"

Is this scene familiar? Maybe the scenario is different, but time and time again golfers question the judgement of the golf course superintendent, especially when a decision or activity directly affects their ability to play the golf course. Is the superintendent dutifully protecting the golf course, or is he overreacting to a condition that's really not so important? As a golfer, do you realize the implications of your attitudes, demands, and actions on golf course conditioning and operations, and that you, too, are responsible for the appearance and playability of the golf course? Let's take a closer look.

Expectations

There are few weekends when a beautifully maintained golf course cannot be seen on television. It is only natural to want to emulate those conditions at your home course. The largest misconception many golfers have is that the near-perfect conditions observed on television can be provided on an everyday basis. The fact is, maintenance programs are planned far in advance to peak a golf course for a special event. Major championships can require years of preparation work, a very large staff, and countless volunteers to produce the near-perfect conditions. Trying to produce those conditions every day is simply too cost prohibitive for most golf courses and usually leads to turf loss.

Green Speed

Many golfers have unrealistic expectations or make unfair comparisons regarding green speed. An arbitrary green speed is demanded without first considering important factors such as the design of the greens, their agronomic condition, the level and quality

of play, and the size of the operating budget. Elevating green speed temporarily for a special event is also very different from elevating green speed for everyday play. Sadly, turf loss, golfer dissatisfaction, and the demise of superintendents' careers have occurred because too much pressure was applied to increase green speed to unrealistic levels without first considering all the potential implications of that request. Use reason, not passion, when determining what green speed is best for the golf course, and understand that green speed alone does not make a good green.

Uniformity/Consistency

Demands for uniformly green, blemish-free playing surfaces throughout the golf course also are becoming more common. Superintendents are forced to use additional water, fertilizer, and pesticides to meet these demands. Even in cooler, temperate regions, golf courses often add irrigation to out-of-play areas solely for aesthetic reasons. Fertility and irrigation programs at some golf courses also are dictated less by the plant's needs and more by demands for color or a green's ability to hold a golf shot. Those programs usually result in excessive fertilizer and water applications that create a weak, shallow-rooted turfgrass that is even more dependent on water and pesticide inputs for survival. Actual playing conditions also will suffer from the softer surface and more lush growth. Many golf courses have the financial capabilities to provide wall-to-wall green, blemish-free turf, and a small fortune is required to do so. The issue of cost may not be a concern at those golf courses. However, the increase in water, fertilizer, and pesticide use should be.

There is a genuine desire with most golf course superintendents to reduce fertilizer, water, and pesticide inputs in golf course management programs. Achieving this goal will not be possible until golfers can accept and adapt to even small irregularities or imperfections in the playing surface. Golf is different from other sports in that its playing field is a dynamic living system that has a major impact on how the game is played. Golfers who learn to identify, accept, and adjust to the natural changes, as opposed to insisting they be eliminated entirely, will develop more realistic expectations, become more proficient players, and may even find the golf experience more enjoyable.

Maintenance

Maintenance staffs are busier than ever, trying to satisfy the growing expectations and meet the demands from increased play. Larger staffs and creative scheduling are used to accomplish maintenance objectives with as little interference to play as possible. Golfers should anticipate some degree of interference when elevated levels of conditioning are expected. Pressures to open golf courses earlier in the morning and to keep golf courses open every day make it difficult to complete daily tasks, especially the more disruptive practices such as topdressing, cultivation, and spray applications. Closing the golf course for one day or at least one morning per week, implementing later starting times, and allowing for some flexibility in operations are small sacrifices that allow the staff to complete their daily tasks and more disruptive practices more efficiently and when they are most required. Be patient and pleasant with the staff in the field. Your cooperation allows them to safely complete their work and provide the conditions you demand.

Foot traffic from unknowing golfers can be very damaging to steep bunker banks. Avoid steep bank faces when entering or exiting bunkers.

Traffic

Golf courses are busier today than ever before. The increase in traffic has had the most pronounced effect on older golf courses that were not designed with today's play or level of conditioning in mind. Traffic effects are most evident as worn, thin, discolored turf, or heavily divoted, bare areas. The most common traffic injury involves abrading or bruising the leaf and stem tissues. A healthy turfgrass plant can recover remarkably well from simple leaf damage if weather conditions permit active growth. Heavy traffic or traffic during inclement weather can lead to more significant wear injury that extends into the lower stem or crown region of the plant. Recovery from the more severe damage is slow or may not be possible. Traffic can also damage the structure of underlying soils, affecting their drainage and aeration characteristics.

Foot Traffic

The move from traditional metal to nonmetal spikes has helped reduce the injurious effects of foot traffic. The improvement in surface quality on greens is obvious to most golfers. What may be less obvious, but equally important, is the improved turf vigor resulting from a reduction in wear injury. The added vigor improves the turfgrass plants' ability to tolerate all types of stress and resist disease infection.

Beware that not all nonmetal spikes are created equal. Some nonmetal spikes and shoe patterns are more damaging than others. It is conceivable that as the spikeless shoe patterns become more pronounced, they could

become just as damaging as traditional metal spikes. Universities around the country are field-testing the new shoe patterns to determine which provide adequate traction and create the least amount of turfgrass injury. Spikeless shoes will not prevent the surface disruption and wear injury that occurs when golfers drag or twist their feet while walking or addressing the ball. Be aware of your actions, especially on the putting surface, and make a conscious effort not to drag or twist your feet. It is true that more caution is needed when wearing spikeless shoes on hillsides and other potentially slippery surfaces, but a move to nonmetal spikes may be the single most beneficial act golfers can do to improve the golf course.

Foot traffic also can be very damaging to recently seeded areas or unstable sod. Young seedling plants are most vulnerable to traffic. There are few things more disheartening to a golf course superintendent than to see footprints tracking across a recently graded and seeded area, especially when the area is clearly marked with signs and ropes. When possible, avoid any areas where seed or sod has been used to establish new turf.

Human nature is such that we seek the shortest, or most economical, path between two points. The consequence of utilizing the same route repeatedly is a worn path. Often these paths are evident adjacent to sand bunkers in a green complex. Superintendents use ropes and signs to deter traffic in such areas. A design modification may ultimately be required to address the traffic problem. However, common sense should suggest that the ropes and signs are there for good reason, so be responsible and accept the small inconvenience to take an alternate route that will be less damaging to the turf.

Turfgrass on sand bunker banks also is vulnerable to foot traffic. The steep banks are often fragile and quickly break down from traffic pressure. Damaged bunker banks are unsightly and lead to washouts that contaminate the sand. Repairing the damage is costly and would not be necessary if golfers would avoid the steepest banks and faces when entering or exiting sand bunkers.

Golfers twisting and turning their feet and making multiple practice swings create significant wear injury and divot damage on the first tee. Complete your stretching and warm-up swings off the tee box and try to avoid creating a divot when taking practice swings.

Winter Play/Frost

Winter play is often a contentious issue between superintendents and golfers in northern areas where there is intermittent snow cover and the turf is dormant. The superintendent's desire to protect the course during periods when the turf is not actively growing conflicts with the pressures to keep the golf course open for play. Winter play causes wear injury, compacts and displaces the soil, and damages the playing surface. Wear injury is more severe because of the dormant turf's frozen condition and inability to recover. The traffic effects are not always immediately noticeable, making it harder to convince golfers of the potential for damage. Even a small number of winter golfers can create significant and long-lasting damage, depending on the soil and weather conditions.

Traffic on frosted turf results in immediate injury. Cells in the frozen leaf blade and stems are brittle and are easily ruptured by the pressures exerted from the traffic. Damaged turf initially has a water-soaked appearance and then turns a straw color. Wear injury on frozen, dormant turf may be less acute. Turfgrass can recover relatively quickly from foliar damage alone, once warmer weather returns. However, longer-lasting or permanent damage can be expected when the traffic injures the crown or basal stem region where the plant's regenerative tissues are located. The greatest potential for damage to the crown area occurs during periods of thaw, when soft or saturated surface soils overlay frozen soils. Expect winter traffic to thin the turf canopy in areas where traffic is concentrated or play is very heavy. The damage can remain noticeable well into spring and early summer. The damaged plants will be weaker and more susceptible to disease infection, and the thinned areas more vulnerable to weed encroachment.

Soils also can be impacted severely by winter traffic. Frozen soils are rigid and are damaged the least. Wet or saturated surface soils are most prone to damage from compaction and dis-

Golf carts have the potential to create significant surface damage, especially in wet areas on the golf course. Obey all cart operation rules and respect the signs and ropes that are put in place to protect the golf course and your safety.

placement effects. Compaction involves pressing the soil particles together to create a more dense material with less total pore space. Water movement through the soil is impacted and the surface becomes hard. Compacted soils remain cooler in the spring (delaying growth) and retain more heat in summer. The changes in soil properties have a negative influence on root growth that can affect turf's performance through the entire summer season. Surface smoothness also is sacrificed as a result of the displacement effects.

Utilizing temporary greens and tees for winter golf in northern regions remains the best strategy for preventing traffic damage and the costly and disruptive work required to repair the damage. Respect golf course superintendents' opinions and decisions regarding frost, winter play, and the use of temporary greens. Their knowledge and experience are invaluable for making decisions based on what is best for the golf course and the long-term interests of golfers.

Golf Carts

Golf carts, along with television, may be responsible for the game's huge growth in recent years. The popularity of carts among today's golfers cannot be denied. Golf carts are a significant revenue source, yet at the same time can be responsible for a large share of maintenance expenses. Cart traffic effects are minimal at new golf courses that are designed with extensive path systems, but path design obviously was not a consideration at older golf courses. Expenses associated with cart use on those courses are usually higher because carts are forced to travel more extensively over the playing surfaces. Areas where carts converge, such as the entry and exit points adjacent to cart paths, suffer the most obvious damage, but less conspicuous effects will occur wherever carts are operated over turf areas. Golf carts and pull carts exert several forces on the turf and soil. A vertical force created by the dynamic load of the wheel, sheer stress created by wheel slippage, and forces from vibration all impact the turf and surface soils.

Operating carts with care and common sense will reduce traffic injury. Avoid rapid starts and stops or sharp turns that increase wheel slippage and subsequent damage to the turf and soil. Respect the cart operation rules and obey the signs and ropes set to guide the flow of traffic. The rules have been developed to minimize traffic effects and protect the operator from potentially serious injury. Golf carts or pull carts should never be operated in critical play turf areas immediately adjacent to the greens. All carts should be kept on designated paths. Avoid the tendency to park the cart partially off the path. This leads to significant wear injury and sod damage adjacent to the paths. Golf carts should not be operated in naturalized, tall-grass areas where the traffic can be especially damaging to the native vegetation and ruin the appearance of these areas.

Avoid operating golf carts and pull carts through known wet areas or standing water. Saturated soils are more easily compacted and displaced. Do not operate carts where frost is evident. Avoid turfgrass areas that are suffering from water stress. Anticipate water stress on hot, dry afternoons between the hours of 12:00 P.M. and 4:00 P.M. Turf suffering water stress will take on a wilted or flaccid, grayish-blue appearance. The limp cells are highly susceptible to wear damage, much like a tire when it is flat. The heavy weight of a cart is likely to cause more permanent injury under such conditions.

Divot and Ball Mark Injury

There are many who feel that the rules and etiquette of golf have been overlooked as the game has experienced tremendous growth. Issues of etiquette, such as the care of the course, are probably not the biggest concern to a golfer tackling the game's challenges for the first time. Many junior golf programs stress etiquette issues to young players. Regional golf associations and some golf courses also provide workshops or seminars to teach similar issues to new or interested golfers. The USGA has recently produced an instructional video on etiquette issues titled *The Spirit of the Game* that is free to USGA members and is also being distributed to regional

During the growing season, severe and long-lasting wear injury occurs when carts are operated over a turf suffering moisture stress.

golf associations, the PGA, and the GCSAA for use in the field. Sadly, etiquette and course responsibility seem to be lacking in many more experienced golfers, who should know better. All golfers are expected to repair their divots, ball marks, and any other surface damage created while playing the game. Divots, ball marks, and other damage that are not repaired leave unsightly depressions and scars that negatively influence future play and provide opportunities for weeds to become established.

Golfers are encouraged to repair their divots on tees and fairways with sand or sand/seed mixes provided to them. The sand or seed mix should be placed in the divot, tamped down, and leveled even with the surrounding grade. Applying excessive divot mix creates an uneven surface and disrupts mowing operations. It also is important to replace grass divots if a sand mix is not provided. Replacing and tamping the divot in place may not ensure the turf's survival, but it will level the surface at least until a more permanent repair can be completed. Divots should not be made when taking practice swings!

Ball marks also need to be repaired promptly and properly to avoid long-lasting scars. Repairing a ball mark incorrectly or carelessly may be as damaging as not repairing the ball mark at all. There are excellent pictorial guides that illustrate the proper repair methods. The golf course superintendent or golf professional also is willing and able to demonstrate the proper procedures. Make a conscientious effort to repair your ball mark and encourage other golfers to do the same.

Golfers do have a major impact on golf course maintenance operations. The impact does not have to be negative as long as expectations are realistic and based on reason, and golfers understand and fulfill the responsibilities expected of them. Informed and conscientious golfers are an asset to any maintenance program. Become more familiar with the effects of your actions and do your share to preserve the golf course and all that is special about this game. Your cooperation ultimately will result in improved playing conditions and reduced maintenance costs for all.

References

Beard, James B. (1973). *Turfgrass: Science and Culture.* pp. 24, 368-378.

Brightwell, Neville (1993). *Playing During Frosts. New Zealand Turf Management Journal.* Vol. 7, No. 4, p. 25.

Carrow, Robert N. & Petrovic, A. Martin (1992). *Effects of Traffic on Turfgrasses. Turfgrass.* pp. 285-324.

Ferguson, Marvin H. (1963). *Effects of Traffic on Turf. USGA Green Section Record.* Vol. 1, No. 1, pp. 3-5.

Isaac, S. P. (1992). *Winter Play on the Golf Course. Sports Turf Bulletin.* Vol. 176, pp. 6-9.

Lutz, Jeralyn (1994). *Dealing with Divots. Grounds Maintenance.* Vol. 29, No. 1, pp. 20-28.

Schaffer, Laura (1995). *A Short But Sweet Stroke. Golf Course Management.* Vol. 63, No. 3, pp. 122-126.

Vermeulen, Paul (1995). *S.P.E.E.D. — Consider What's Right For Your Course. USGA Green Section Record.* Vol. 33, No. 6, pp. 1-5.

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The tendency to pull golf carts off to the side of cart paths creates wear injury and soil compaction that damages the turfgrass. Golf carts should be parked on the path. If others approach, they can pull off the path to go around.

Use of Prodiamine as a Preemergence Herbicide to Control Annual Bluegrass in Roughs

Knowing the period of prolific Poa annua *germination is crucial to properly timing preemergence applications.*

by PETER H. DERNOEDEN, Ph.D.

ANNUAL bluegrass is a puzzling weed with diverse annual (*P. annua* ssp. *annua*) and perennial (*P. annua* ssp. *reptans*) biotypes. Several chemical strategies involving pre- and postemergence herbicides and plant growth regulators can reduce annual bluegrass (Beard et al., 1978; Callahan and McDonald, 1992; Dernoeden and Turner, 1988; Goss et al., 1980; Kageyama et al., 1989; and Hall and Carey, 1991). Long-term or complete control of the weed, however, is seldom achieved (Branham, 1991; Christians, 1996). Cultural methods, such as increasing mowing height, collecting clippings when seedheads appear, improving drainage and fertility, alleviating soil compaction, applications of iron and magnesium, and flaming reduce the competitiveness of annual bluegrass (Beard et al., 1978; Bell et al., 1997; Desjardins et al., 1997; Watschke et al., 1995). Among preemergence herbicides, multiple applications of bensulide (i.e., Betasan, LescoSan, etc.) and tricalcium arsenate have been reported to consistently reduce annual bluegrass in cool-season turf (Callahan and McDonald, 1992; Goss et al., 1980). Late-summer applications of preemergence herbicides to areas in play on golf courses, however, are discouraged in the Mid-Atlantic region. The use of these herbicides in late summer conflicts with overseeding operations and can be potentially phytotoxic because of generally high air temperatures. Also, persisting herbicide residues in soil could interfere with successful overseeding should large turf areas be killed during winter due to ice cover, crown hydration, desiccation, disease, or other factors.

Annual bluegrass produces large amounts of seed, and heavily colonized areas in golf course roughs and out-of-bounds areas provide a large potential reservoir of seed. The use of a preemergence herbicide in rough areas not adjacent to fairways, greens, and tees would be less risky, assuming turf density was good in late summer. A cursory Maryland study suggested that prodiamine (Barricade 65DG®) was an effective preemergence annual bluegrass herbicide (Dernoeden and Krouse, 1994). The time that annual bluegrass seed germinates in the Mid-Atlantic and most other regions, however, has not been well documented.

Annual bluegrass seedling emergence was monitored adjacent to a putting green at Woodmont Country Club in Rockville, Md., between September 1, 1994, and May 2, 1995, by Robert Larsen, a student then attending the University of Maryland. Mr. Larsen first observed annual bluegrass seedlings on September 21, 1994, in 1.5-inch diameter spots created by a nonselective herbicide. No germination occurred after December 14, but he did observe some seedlings emerging between April 12 and 26, 1995. Although the main germination period of annual bluegrass in the Mid-Atlantic region is likely to begin in late summer, the best timing for an application of a preemergence herbicide for this weed in the region has not been established. Hence, the objectives of this study were to determine the proper timing and rates of prodiamine for preemergence annual bluegrass control in Kentucky bluegrass maintained under golf course rough conditions.

Methods

Treatments were applied to a mature stand of "Kenblue" Kentucky bluegrass at the University of Maryland Turfgrass Research and Education Facility in Silver Spring, Md. For several years the test site was uniformly infested each spring with *P. annua*, but virtually all of the annual bluegrass died during each summer. Because of its apple-green color, prolific seedhead production in May, and inability to survive summer, the biotype at the site was considered to be *P. annua* ssp. *annua*. There also was a heavy smooth crabgrass (*Digitaria ischaemum*) infestation at the site when treatments were applied each fall. The soil was a Chillum silt loam with a pH of 6.2 and 2.3 percent organic matter. Turf was mowed to a height of 2.0 to 2.5 inches and was fertilized with 2.0 lb. N/1000 sq. ft. per year. The 1995 and 1996 studies were conducted on separate, but adjacent sites.

Three rates of prodiamine were applied on three dates in 1995 and 1996 (Tables 1 and 2). The site was irrigated within 24 hours of each application with at least 0.20 inch of water. Prodiamine was applied in 50 gallons of water per acre with a CO_2-pressurized backpack sprayer equipped with an 8004E flat-fan nozzle. Plots were 5.0 by 5.0 feet and were arranged in a randomized complete block with four replications. Percentage of plot area covered by annual bluegrass or smooth crabgrass was assessed visually on a 0-to-100% linear scale where 0 = no weeds and 100 = entire plot area covered by weeds. Rating for annual bluegrass cover was facilitated by the presence of seedheads between mid-May and early June. Subjectively, annual bluegrass cover ≤ 5.0% was considered to be commercially acceptable control for a golf course rough. Data were subjected to statistical analysis and the results of this study were reported previously (Dernoeden, 1998).

1996 Results

Large numbers of annual bluegrass seedlings were first noted emerging at the site on October 3, 1995. The annual bluegrass coverage trends evident on November 27, 1995, remained relatively unchanged on subsequent rating dates, including the final rating on May 24, 1996 (Table 1). All rates applied on either August 11 or September 14 significantly reduced annual bluegrass and produced statistically similar levels of control. Complete control was provided only by 1.0 lb. ai/A applied September 14. None of the

treatments applied October 13, however, reduced annual bluegrass significantly when compared with untreated control plots. Using a subjective annual bluegrass cover threshold of 5.0%, the following prodiamine treatments provided for commercially acceptable control for golf course roughs: 0.32 lb. ai/A applied September 14 and 0.65 or 1.0 lb. ai/A applied on August 11 and September 14.

Smooth crabgrass was highly invasive and weed cover was rated on August 20, 1996 (Table 1). Ratings showed that 0.65 lb. ai/A prodiamine applied on October 13 and 1.0 lb. ai/A applied on September 14 or October 13, 1995, provided an excellent level (1 to 6% crabgrass cover) of season-long smooth crabgrass control in 1996. These findings were similar to those reported previously for November applications of prodiamine 65DG in Maryland (Dernoeden, 1993).

1997 Results

Treatments were initiated later in 1996, and prodiamine was applied at two-week intervals to better pinpoint the application window for the herbicide and germination time of annual bluegrass. Annual bluegrass seedlings were first observed in the test site on September 30, 1996. Except for the 0.32 lb. ai/A rate applied on September 30, 1996, all treatments provided a similar level (0 to 8% cover) of annual bluegrass control. The only treatments not within the 5% cover threshold were the 0.32 and 0.65 lb. ai/A rates applied on September 30. On all 1997 rating dates, annual bluegrass control was better with the higher prodiamine rate applied September 30. These data suggested that the high rate may have had some early postemergence activity on annual bluegrass. During the summer there was very little rainfall and only a small amount of irrigation water was applied, and the turf eventually became drought dormant. As a result, smooth crabgrass levels were very low and all treatments significantly reduced crabgrass cover.

Discussion

Annual bluegrass seed germinates during cool, moist periods in late summer and fall, but in some regions seed may germinate in the spring (Beard et al., 1978). According to Dr. Bruce Branham (1991), annual bluegrass germinates so profusely in the spring and fall in Michigan that three annual applications of preemergence herbicides are needed to effectively control the weed. In Tennessee, the annual subspecies germinates from mid-November to early January (Callahan and McDonald, 1992).

Poa annua's *prolific seed production provides a large reservoir of seed in rough and outlying areas that can easily be tracked to fairways, tees, and greens.*

Observations and data from this study indicated that the major germination period of annual bluegrass in central Maryland was from late September to early December. The view that germination occurs after mid-September is supported, in part, by the relatively poor level of control provided by 0.32 lb. ai/A prodiamine applied September 30, 1996, relative to that obtained with the August 29 and September 16 applications in 1996.

There was little change in annual bluegrass cover ratings between November 27, 1995, and April 3, 1996, indicating that most of the annual bluegrass emerged by late November in 1995 (Table 1). Annual bluegrass seed may have germinated at the site in April, but seedling emergence was not noted. Field observation indicated that the rapid increases in annual bluegrass cover ratings during April and May in both years was largely due to aggressive tillering of overwintering annual bluegrass in the spring.

Hence, as reported in Tennessee (Callahan and McDonald, 1992), the annual biotype appears to have one major germination period between late summer and early winter in central Maryland. As previously noted, however, there may be a brief spring germination period in April. Results from this study also showed that annual bluegrass could be controlled effectively with as little as 0.32 lb. ai/A prodiamine 65DG applied during the first two weeks of September. This time and rate may only be appropriate for the central Mid-Atlantic region in a non-disturbed (i.e., no core cultivation, verticutting, etc.) turf maintained at a mowing height above 2.0 inches.

It also is important to note that only the sprayable, 65DG formulation of prodiamine was evaluated. Granular forms of prodiamine may not perform as well as the 65DG. For example, numerous granular forms of prodiamine have been tested for several years at the University of Maryland for preemergence smooth crabgrass control. These studies clearly have shown that there is a great variation in crabgrass control performance among the many granular forms of prodiamine available in the marketplace.

Literature Cited

Beard, J. B., P. E. Rieke, A. J. Turgeon, and J. M. Vargas. 1978. Annual bluegrass (*Poa annua* L.) description, adaptation, culture, and control. Michigan Agr. Expt. Sta. Res. Rept. 352, 32 pp.

Bell, G. E., E. Odorizzi, and T. K. Danneberger. 1997. Controlling annual bluegrass and rough bluegrass in creeping bentgrass fairways: A nutritional approach. Agron. Abstr. 122.

Branham, B. 1991. Dealing with *Poa annua*. Golf Course Mgt. 59 (9): 46, 48, 52, 54, 58, 60.

Callahan, L. M., and E. R. McDonald. 1992. Effectiveness of bensulide in controlling two annual bluegrass (*Poa annua*) subspecies. Weed Technol. Vol. 6:97-103.

Christians, N. 1996. A historical perspective of annual bluegrass control. Golf Course Mgt. 64(11):49-57.

Dernoeden, P. H. 1993. November applied preemergence herbicides for smooth crabgrass control the following summer. Intl. Turfgrass Soc. Res. J. 7:291-297.

Dernoeden, P. H. 1998. Use of prodiamine as a preemergence herbicide to control annual bluegrass in Kentucky bluegrass. HortScience. 33:845-846.

Dernoeden, P. H., and J. M. Krouse. 1994. Preemergence smooth crabgrass, annual bluegrass, woodsorrel, and prostrate spurge control. Proc. Northeastern Weed Sci. Soc. 40:120 (Abstr.)

Dernoeden, P. H., and T. R. Turner. 1988. Annual bluegrass control and tolerance of Kentucky bluegrass and perennial ryegrass to ethofumesate. HortScience. 23:565-567.

Desjardins, Y., M. Tardif, J. Gill, and C. Lague. 1997. *Poa annua* war calls for scorched-earth policy. Golf Course Mgt. 65(10):49-54.

Goss, R. L., T. W. Cook, S. E. Brauen, and S. P. Orton. 1980. Effects of repeated applications of bensulide and tricalcium arsenate on the control of annual bluegrass and on quality of Highland colonial bentgrass putting green turf. Proc. Third Intl. Turfgrass Res. Conf. 3:247-255.

Hall, C. S., and C. K. Carey. 1991. Control of annual bluegrass (*Poa annua*) in Kentucky bluegrass (*Poa pratensis*) turf with linuron. Weed Technol. Vol. 6:852-857.

Kageyama, M. E., L. R. Widell, D. G. Cotton, and G. R. McVey. 1989. Annual bluegrass to bentgrass conversion with a turf growth retardant (TGR). Proc. 6th Intern. Turf. Res. Conf. 6:387-390.

Watschke, T. L., P. H. Dernoeden, and D. J. Shetlar. 1995. Managing turfgrass pests. CRC Press, Boca Raton, Fl.

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Table 1
Influence of rate and time of application of prodiamine (Barricade 65DG®) on preemergence control of annual bluegrass and smooth crabgrass in "Kenblue" Kentucky bluegrass, 1995-1996

Prodiamine		% Plot Area Covered				
		1995	1996			
Rate	Date Applied	Annual Bluegrass				Smooth Crabgrass
(lb. ai/A)	(1995)	27 Nov.	3 April	1 May	24 May	20 Aug.
0.32	11 Aug.	2 b[2]	3 bcd	4 bc	7 bc	90 a
	14 Sept.	2 b	2 bcd	3 bc	4 bc	46 bc
	13 Oct.	23 a	31 a	33 a	40 a	39 c
0.65	11 Aug.	2 b	3 bcd	3 bc	4 bc	61 b
	14 Sept.	<1 b	1 cd	2 bc	2 c	24 cd
	13 Oct.	19 a	15 abcd	16 abc	18 abc	4 d
1.0	11 Aug.	<1 b	1 cd	1 c	1 c	33 c
	14 Sept.	0 b	0 d	0 c	0 c	6 d
	13 Oct.	22 a	18 abc	21 ab	25 ab	1 d
Untreated	——	16 a	19 ab	34 a	38 a	96 a

[2]Mean separation within columns by Duncan's multiple range test, $P = 0.05$

Table 2
Influence of rate and time of application of prodiamine (Barricade 65DG®) on preemergence control of annual bluegrass and smooth crabgrass in "Kenblue" Kentucky bluegrass, 1996-1997

Prodiamine		% Plot Area Covered				
		1996	1997			
Rate	Date Applied	Annual Bluegrass				Smooth Crabgrass
(lb. ai/A)	(1996)	17 Dec.	28 April	16 May	2 June	5 Sept.
0.32	29 Aug.	2 b[2]	1 c	3 c	3 c	2 b
	16 Sept.	0 b	4 c	4 c	5 c	<1 b
	30 Sept.	4 b	11 b	20 b	17 b	1 b
0.65	29 Aug.	0 b	1 c	2 c	3 c	<1 b
	16 Sept.	0 b	1 c	<1 c	1 c	0 b
	30 Sept.	3 b	6 bc	8 c	8 bc	<1 b
1.0	29 Aug.	0 b	0 c	<1 c	<1 c	0 b
	16 Sept.	0 b	0 c	0 c	0 c	0 b
	30 Sept.	2 b	3 c	4 c	3 c	0 b
Untreated	——	8 a	21 a	33 a	35 a	5 a

[2]Mean separation within columns by Duncan's multiple range test, $P = 0.05$

Poa/Bent Nurseries — A Perfect Match

Aerification cores can be used to build a sod nursery to match mature Poa annua *greens.*

by PATRICK J. GROSS

A nursery established from aerification cores is a useful method to provide a perfect match with the existing turf. After the nursery site has been prepared, cores are collected during the spring or fall aerification for spreading on the nursery site.

Aerification cores should be collected and spread on the nursery as soon as possible to prevent desiccation of the cores.

PUTTING GREEN nurseries are an afterthought at most courses. The old topdressing pile is spread out near the shop, sprinklers are added, and leftover seed or sod is planted. It may be mowed once in a while and might be fertilized with whatever is left in the spreader. The nursery survives in relative obscurity until a hydraulic oil leak or vandalism damages one of the mature *Poa annua* greens and an emergency repair is needed. Only then is it discovered that the nursery turf is unsuitable and the only option is to purchase creeping bentgrass sod.

Creeping bentgrass has many positive attributes, but the texture and playing quality do not match a mature *Poa annua* green. A bentgrass sod patch is not only visually conspicuous, but often causes long-term problems with soil layering, inconsistent playing quality and the gradual patchy invasion of *Poa annua*. Since so many mature golf courses have *Poa annua* greens, it makes sense to have a nursery with the same grass to maintain consistent and uniform playing conditions whenever repairs are necessary.

Until recently, it was not possible to purchase *Poa annua* seed, and the only way to establish a nursery was to seed creeping bentgrass and encourage the rapid encroachment of *Poa annua*. This was a long, slow process as annual biotypes gradually gave way to perennial biotypes that were more representative of mature *Poa annua* greens. A successful way to speed the process and provide a perfect match with the existing turf is to build a nursery using aerification cores from the greens.

Planning

Timing and preparation of the site are more critical when using aerification cores to establish a nursery because the cores need to be spread as soon as possible to avoid desiccation. It is best to schedule your aerification date in the spring or fall and then plan backward the appropriate number of weeks to give yourself enough time for preparation of the nursery site and root zone.

Select a site for the nursery that provides good sunlight exposure and air movement throughout the year. A location next to the maintenance facility is ideal for convenience of maintenance and management. There must be access to a water supply and an irrigation field satellite. In general, the nursery should be the size of the two largest greens on the course, or

10,000 to 15,000 sq. ft. The nursery site should be slightly elevated to allow for good surface drainage.

To insure soil compatibility, the root zone should match whatever material is found in the top four inches of the greens. For most courses, it is recommended to use the current putting green topdressing material. The same advice applies to native soil greens — use the same soil or amended soil mix to avoid layering. It is always a good idea to have the sand or soil tested along with any other construction materials. Submit a core sample from a representative green along with a sample of the sand or soil to a physical soil testing laboratory for a sieve analysis. Incorporating peat moss or other amendments into the root zone mix should not be necessary since the aerification cores will provide adequate organic matter.

Next, consider from which greens to harvest cores. Choose the best planting material available and avoid transferring any pest problems. Generally, select greens with a high population of perennial biotypes of *Poa annua* that seem to perform well throughout the year. Avoid greens with a history of heavy weed invasion, chronic disease problems, bermudagrass encroachment, or nematode infestation.

A mechanical topdresser is used to spread aerification cores evenly on the surface of the nursery.

Construction

Although there are many ways to save money when building a green or a nursery, it is best to follow sound construction procedures and avoid shortcuts. Keep in mind that cutting corners leads to inferior turf quality, and it does no good to replace dead grass on your greens with dead grass from the nursery. For long-term performance, construction of the nursery should proceed just like a green on the golf course. Plan the subgrade so that the finish grade of the nursery will be about 10 in. to 12 in. higher than the surrounding area. The subgrade should have a gradual slope of 2% to 3% and be thoroughly compacted to avoid soil settling. Trench and install a network of 4-in. diameter subsurface drain pipes at 10-ft. to 15-ft. intervals and backfill with gravel or crushed stone to create a 4-in. gravel blanket. Next, place the intermediate sand layer, if necessary, according to laboratory recommendations, and then a 12-in. layer of root zone material. Install inrrigation and connect the control wires to a nearby field satellite. Lastly, irrigate and compact the root zone to provide a firm surface.

While the above construction method is ideal, there are other options for building the nursery if budget constraints are a limiting factor. One option is to simply build a smaller nursery. Another viable method is to grade the nursery site with a 2% to 3% fall and place 8 in. to 12 in. of a compatible root zone material on the site. Maintain a uniform depth of mix throughout the nursery, then compact and finish grade the top for good surface drainage.

Fumigation of the nursery should be considered if heavy weed encroachment was evident prior to site development or if there is a chance of bermudagrass or kikuyugrass contamination of the mix during construction.

A mechanical bunker rake or water-filled roller can be used to press the cores and seed into the surface of the nursery for good soil contact.

Planting and Establishment

A preplant fertilizer should be incorporated into the top 4 to 6 inches of the root zone and the surface smoothed and firmed for planting. As a general guideline, incorporate a natural organic nitrogen source into the root zone prior to planting to provide approximately 2 lbs. nitrogen per 1,000 sq. ft. A starter fertilizer (such as 6-20-20) should be applied at seeding to supply approximately 0.5 lb. nitrogen and 2 lbs. phosphorus and potassium per 1,000 sq. ft.

Next, harvest and spread the cores. Any size aerification cores will work, but ⅜ in. to ½ in. diameter cores seem to be the most successful. The cores should be collected and brought to the nursery area and spread with a top-dresser to provide an even distribution of cores on the surface. Spreading the cores in two directions (two cores deep) is recommended. In general, cores collected from 110,000 sq. ft. of total putting surface will provide enough material for a 9,000 to 10,000 sq. ft. nursery. If it is not possible to collect enough cores to plant the entire nursery, you may want to establish half the nursery in the spring and the remaining portion in the fall. Another option is to shred the cores prior to planting to stretch out the amount of available planting material.

To improve sod strength, creeping bentgrass seed should be spread over the cores at the rate of 1-2 lbs./1,000 sq. ft. The cores and seed should be rolled into the surface with a water-filled roller or the tires of a mechanical bunker rake for good contact with the root zone mix.

Frequent irrigation during the establishment period is critical. Four or more light water applications should be made throughout the day to keep the cores and seed moist. Germination and growth are normally evident within one week, at which time irrigation can be gradually reduced. The surface should be rolled with a water-filled roller, water injection aerifier, or putting green roller approximately one to two weeks after planting to smooth the surface in preparation for mowing. Mowing can begin at ¼ in. within three to four weeks, along with light and frequent applications of sand top-dressing to further smooth the surface. Once mowing begins, continue to fertilize the nursery weekly to sustain healthy growth until the turf is fully established. With favorable growing conditions, you can expect to have good nursery turf within 10 to 12 weeks.

Other Benefits of a *Poa*/Bent Nursery

While it is reassuring to have a compatible source of putting green sod should something go wrong, there are other benefits of having a nursery. The nursery is the perfect site to test new products and evaluate new equipment to use on the greens. New employees can receive valuable training and practice using various equipment on the nursery so that mistakes are kept to a minimum on the course.

Damage to a putting green is inevitable, but it is not necessary to live with the damage or suffer the inconsistency of using a different sod for repairing a green. As long as golfers place a high priority on putting green consistency and uniformity, there will be a need for a suitable nursery to make prompt repairs. For mature *Poa annua* putting greens, a nursery established with aerification cores solves this problem and provides a perfect match with the existing turf.

PATRICK GROSS *is the director of the Southwest Region of the Green Section, serving the states of California, Arizona, Nevada, Utah, and Colorado.*

Like any new green, frequent irrigation during the day is critical for healthy establishment.

Education Does Not End in the Classroom

Developing a quality student internship program.

by TODD VOSS

TODAY, more and more students are entering the field of agronomy and are selecting a career in turfgrass management. In turn, the job market is becoming much more competitive, and graduates are being evaluated for job positions based on both their education and practical job experience. Internships and summer employment on a golf course are essential to building a strong resume, and students who wish to build their resumes are taking a careful look at where they are working. Whether you are trying to attract one student or many, we hope that the programs we have developed at Double Eagle will help give you some ideas to develop your own program or add to your current program. As superintendents, we are faced with many challenges, and turf students have made it easier for us to produce a quality product.

Turf students can be some of your best employees on the golf course. They not only have the opportunity to learn from the golf course superintendent and their interaction with one another, but also they learn from Turf Advisory Service visits.

Turf students in general tend to be some of your best employees. They display a great interest in learning as much as possible, are willing to tackle many jobs, and take on responsibility. As a result, careful consideration needs to be taken not to offend your core staff. Jealousy can develop, which can make for a poor work environment. Still, students need an opportunity to gain experience in all aspects of golf course maintenance. Our policy is that there is no seniority when it comes to job assignments. The day-to-day routine changes greatly, and employees are encouraged to take pride in whatever task they are assigned. We do not want staff to get into a rut by doing the same job every day.

Not only do the turf students learn from participating in the program, they also learn from each other. We have found that it is beneficial to attract students from the many different turf management programs throughout the world. Each student brings a different perspective to the table and is able to share common practices from their region. Your current students directly impact the future of your program just through positive or negative word-of-mouth feedback to fellow students and professors.

To get quality student help, networking with professors is a great advantage. Professors want their students to go to golf courses where valuable work experience is gained and they are not just treated like seasonal help. Most interns are now receiving college credit, and, in turn, superintendents should take the time to teach these students. Because many professors are taking such an interest in where their students are placed, it is beneficial for you to invite them to come and see your facility. This enables you to build an ongoing relationship with them. They will be knowledgeable about your golf course facility and, hopefully, will refer students to you in the future.

With qualified help, especially turf students, getting more difficult to find, Double Eagle is very fortunate to be in close proximity to the Ohio State University. We have utilized many turf students through the university, and this has helped develop our student program. In addition, the college offers an international agricultural intern program. Mike O'Keefe is the coordinator of this program and has been very helpful in placing many qualified students throughout the United States from Myerscough College in England.

Students placed at Double Eagle live dormitory style in a Turf House on the property. It is almost a necessity to house these students, especially if you wish to attract international students. It is very difficult for a student to find affordable housing for a six-month internship or for the golf season. It also is very important for you to keep in mind the cultural differences that students face coming from different parts of the world. Someone on the staff needs to spend time acclimating them to the area. They will have questions concerning banking, driver's per-

mits, groceries, and, of course, the local hot spots.

In addition to providing housing, Double Eagle designed an optional Turf Club program. This program complements the turf student's opportunity to work on the course. The Turf Club is dedicated to reinforcing their classroom studies, as well as giving them practical experience that they will find useful when they are out on their own. The Turf Club is voluntary, and students are not paid for their attendance. They meet weekly with the superintendent and are offered a forum to discuss many topics. Past topics have included budgeting, event preparation, irrigation, disease identification, IPM, equipment calibration, and resumes. On occasion, guests are invited to speak to the Turf Club about various related topics. Past speakers have included Eric Psolla of Brookside Labs, Dick Warner of the Scotts Company, Tom Campbell of the Toro Company, Dr. Trey Rodgers of Michigan State, and Mike O'Keefe of Ohio State.

During the annual Turf Advisory Service visit from the USGA Green Section, the students follow Bob Brame throughout the inspection of the golf course. The students take notes and ask questions during the visit. This small group format has been extremely beneficial because everyone participates and shares ideas.

In our eight-year history at Double Eagle, after the first two assistants were hired, all subsequent assistants have been promoted from within. Each of our management assistants was at one time a part of the intern program. Having them know our management routine has paid great dividends in our success. The assistant knows the dedication and hours it takes to produce a quality golf course, and also knows the importance of properly training new interns.

With assistants constantly moving on to superintendent jobs, it is especially important for the second assistant to have a grasp on intern candidates who could be promoted in the future. In addition, many superintendents begin by encouraging golf course employees to go to school to advance their careers in the turf industry. They then return to your course to do their internship and promote your golf course to other students while away at school.

After spending the time to educate our interns, we like them to stay on or return for a second season. This method has proved advantageous for both the club and the intern. Our golf course management team does not have to retrain them, and they are able to step right into the program. More than 60% of our interns have returned for additional seasons.

A major topic of conversation in the business world, including golf courses, has been attracting quality, new employees. There are "help wanted" signs outside just about every business. Fast-food chains even are paying signing bonuses. Good, quality employees are in demand. As a golf course superintendent, it is extremely important that you portray an accurate picture of your golf course when recruiting turf students. In addition to the items that we have discussed, you need to offer a competitive wage, determine golf playing privileges, and be able to explain, in detail, the level of training and education that the student is going to receive during the internship. Money is certainly an issue with the students, but their level of involvement and being made a part of the team can ultimately influence which golf course they select to fulfill their internship requirements.

In conclusion, these shared ideas may be of use to you as you evaluate your current program or build a program from scratch. Once you have attracted a student to your course, superintendents have an obligation to work with students to expose them to all aspects of golf course management. We are continually receiving support and education from organizations and universities. In turn, we should share our hands-on experience with the next generation of the turf industry.

TODD VOSS *has been the golf course superintendent at the Double Eagle Club in Galena, Ohio, since 1996, and also is a member of the USGA Green Section Committee. He was first assistant at the golf course from 1991 to 1994 during the construction and grow-in. He shares his experience with multiple student interns each season.*

The policy at Double Eagle is to expose employees, especially the turf students, to all aspects of golf course maintenance. The day-to-day assignments are changed regularly, and the students are encouraged to take on the responsibility of completing each task thoroughly, with attention to the details.

YOUR BUDGET IS A SALES TOOL!

Thoughtful budget preparation can help you inform, lead, and sell your ideas.

by CHRIS CARSON

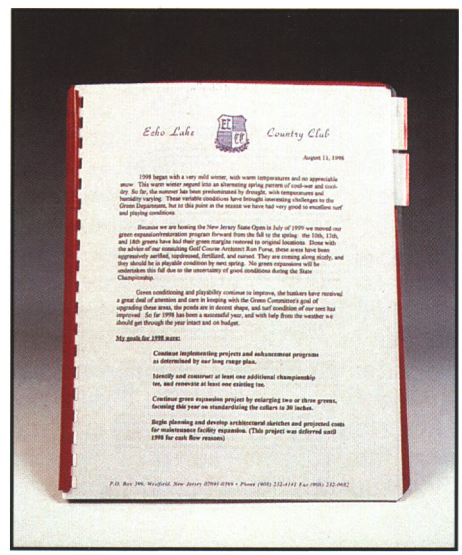
WHEN budget preparation time rolls around, many superintendents see it as a real chore, painful and time consuming, something that takes away from the *real* work to be done on the course. As a result, many budget requests are haphazard and sloppy, or are nothing more than a hastily prepared sheet containing slight adjustments to last year's numbers: three percent here, two percent there, and the job is done. These superintendents are losing a great opportunity to explain and promote their operations.

What is a Budget?

Golf courses usually rely on their superintendents to forecast the needs of the course. Unfortunately, this is where many superintendents fail. As a road map of the year to come, the budget must predict golf course needs as precisely as possible. That means looking back at what has been spent and what has been accomplished, then analyzing current needs and forecasting expenses for the coming year.

Budget preparation gives the golf course superintendent a superb opportunity to present information and goals to the governing bodies of our courses. Those who don't take full advantage of this opportunity are shortchanging their courses and perhaps their own careers.

I view the budget process as a year-round process, not just a once-a-year endeavor. The first green committee meeting of the year at my club includes a tour of the maintenance facility so that committee members, especially new ones, are made aware of the type and amount of equipment we use. Awareness of this equipment makes it easy to branch out into discussions of labor and maintenance procedures. At this meeting our mechanic is present to talk about the care we take in maintaining and preserving our equipment. The committee will be much more receptive to requests for replacement or additional equipment if they are convinced that existing equipment is being well maintained.


Echo Lake Country Club

August 11, 1998

1998 began with a very mild winter, with warm temperatures and no appreciable snow. This warm winter segued into an alternating spring pattern of cool-wet and cool-dry. So far, the summer has been predominated by drought, with temperatures and humidity varying. These variable conditions have brought interesting challenges to the Green Department, but to this point at the season we have had very good to excellent turf and playing conditions.

Because we are hosting the New Jersey State Open in July of 1999 we moved our green expansion/restoration program forward from the fall to the spring. the 10th, 13th, and 18th greens have had their green margins restored to original locations. Done with the advice of our consulting Golf Course Architect Ron Forse, these areas have been aggressively aerified, topdressed, fertilized, and raised. They are coming along nicely, and they should be in playable condition by next spring. No green expansions will be undertaken this fall due to the uncertainty of green conditions during the State Championship.

Green conditioning and playability continue to improve, the bunkers have received a great deal of attention and care in keeping with the Green Committee's goal of upgrading these areas, the ponds are in decent shape, and turf condition of our tees has improved. So far 1998 has been a successful year, and with help from the weather we should get through the year intact and on budget.

My goals for 1998 were:

Continue implementing projects and enhancement programs as determined by our long range plan.

Identify and construct at least one additional championship tee, and renovate at least one existing tee.

Continue green expansion project by enlarging two or three greens, focusing this year on standardizing the collars to 30 inches.

Begin planning and develop architectural sketches and projected costs for maintenance facility expansion. (This project was deferred until 1998 for cash flow reasons)

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A well-presented budget plan provides a golf course superintendent with an excellent opportunity to present information and future planning to the Green Committee.

As the year progresses, I make it a point to inform both the committee and the board of problems we are encountering as they arise. By identifying a problem and laying out the proposed actions and extra costs involved in correcting it, we avoid year-end budget surprises. This communication is vital to the budget process as it sets the stage for appropriate increases for the next season. Pre-selling the needs of the golf course makes the actual presentation of the budget document much easier. In my case, I have developed a budget presentation that has proved to be very effective in helping the green department and the course make steady progress.

My budget begins with a letter recapping the kind of year we have had, with special emphasis on the weather. I mention the overall quality of the course and talk about special events and highlights of the season.

My budget letter then recalls the goals we had for the previous year and our success or failure in meeting those goals. I try to emphasize the positive, but I don't shy away from writing about failures or uncompleted tasks. This is a good opportunity to remind my governing body about the successes we had, to congratulate, by name, the hard work of the people who accomplished those successes, and to mention continuing problems that require future resources.

The final part of the letter contains four to six clearly defined goals for the year to come. These goals are very specific and help set the tenor for the budget document that follows.

Examples of goals:

- Continue implementing projects and improvement programs as determined by our long-range plan, focusing on course enhancements pertinent to our hosting the New Jersey State Open Championship in 1999.
- Identify and construct one additional championship tee, one forward tee, and renovate one existing tee.
- Continue work to improve the health, playability, and consistency of our putting greens, particularly our practice putting green.
- Complete planning for irrigation system improvement and finish the installation by the spring of 1999.
- Complete the planning and supervise construction of new pavers and curbs around the front of the pro shop and along the path toward the pool.

Operating Expenses

The first page of the budget document itself is a summary of my requests, showing last year's numbers, next year's request, and percentage increase (or, in some instances, decrease) for each line. Under this spread sheet are comments as needed about key items in the summary.

After the summary, each line item in the budget is addressed on a separate page. These pages are the best opportunity I have to talk about green department needs, so I try to be as detailed as possible. In the case of payroll, for example, my budget for 1999 has three pages of information covering the following:

1. Individual crew members and the work they have done.

2. General payroll issues such as our pay scale as it relates to neighboring clubs.

3. Any extraordinary situations that may be anticipated in the coming year.

Each employee is then listed by years of service, rate of pay, and number of weeks and hours worked. Finally, the payroll is summarized on one page to allow easy analysis.

Payroll details are important. Including names and information about each individual crew member helps the committee members understand exactly what they do and why they are needed to ensure maintenance of a first-rate golf course. It is much harder for those who are passing judgment on the budget to cut an individual and the work he does than it is to slash, say, 10% from a budget request that is presented simply as a lump sum, with no supporting details and no mention of the staff members involved — "Larry Smith, an excellent employee for three years, qualified for his pesticide operator's license in July. His duties now include chemical applications and irrigation repair, and his pay increase rewards these extra responsibilities."

Although payroll is the largest and most detailed operating item in any golf course budget, each operating line deserves similar treatment. Under chemicals, for example, I talk about the stresses encountered by the turf in the previous season, money spent in relation to budgeted funds, and projected needs for the coming year. This is another opportunity to emphasize both the problems encountered during the past season and the solutions that were achieved.

The operating section of the budget is prepared with the idea of giving management a clear picture of where we have been and where we would like to go. The budget request must demonstrate careful analysis of each item and not be simply a hasty and unsupported adjustment of previous numbers; it must be a thoughtful, well-designed plan.

Three-Year Plan

A few years ago I had to fight vigorously for every piece of equipment I requested. This changed when we developed a three-year plan for equipment purchases. In collaboration with the committee, I started out by forecasting equipment needs based on projections and past purchases. Once the three-year plan was agreed upon, it became an almost undebated part of the club's financial plan; the club knows that yearly funds for equipment are needed and plans accordingly. Each year, at budget time, we move the plan forward to cover the next three years.

The budget plan at Echo Lake C.C. (Westfield, N.J.) is used to help inform Green Committee members of upcoming projects. Each specific goal statement for the upcoming year outlines the necessary resources needed to successfully complete the project.

Taking this idea several steps further, we have expanded the three-year equipment plan to include all golf course capital items. Tee construction, irrigation work, building expansion, landscaping, cart path improvements, and many other items have been successfully funded and completed using this technique. By forecasting the need out three years, the governing members of the club become familiar and comfortable with the request and have sufficient time to plan financing. I have learned that the most unwelcome news to any committee member is a crisis situation and an unexpected request for a large sum of money to cope with it.

Specific requests for equipment for the coming year are part of the three-year plan, but again we do not just ask for a lump sum of money. Following a first-page summary, each requested item is explained and justified. I make it a point to detail the savings and equipment longevity we achieve because of our excellent mechanics, and when replacement or addition is needed, I fully explain why. Each of these requests is followed with a copy of the sales brochure for that piece, which gives a quick description of the equipment and its application to the course — "Toro Sand Pro 3020: The Sand Pro is a vital machine for bunker maintenance. Equipped with a plow, scarifier, and rake, it can perform all sand-related tasks efficiently. Our current machines are 12 and 20 years old; we have gotten many more years than the industry standard out of these machines, and it is time to replace the oldest."

Other items in the plan are treated similarly with descriptions of the proposed work, supporting documents, such as USGA Turf Advisory suggestions, photographs or diagrams of the project, and cost options.

Professionally presented in a bound folder, the budget I prepare is more than just a sheet with numbers; it is a well-thought-out and well-defended plan. It can stand alone because of its detail, it is a valuable sales tool for the green department, and it lets my club know that their golf course superintendent has specific goals and a plan to achieve them. A similar document might go a long way toward improving *your* golf course, not to mention your standing with the committee!

CHRIS CARSON *has been a golf course superintendent for 16 years. The last 13 years he has been at Echo Lake C.C. in Westfield, N.J.*

The First Step in an Environmental Plan

Before you start improving environmental conditions on your course, it's a good idea to begin with a map of the property.

by MARY COLLEEN LIBURDI

YOU ARE JUST starting to take a good look at the management plans you have in place for the golf course. The idea of making a commitment to manage this property in the most environmentally sensitive way possible not only seems like the right thing to do, but also makes sense from economic and community-relations standpoints. So where is the best place to start? Well, developing a *plan of action* is certainly the first step. One of the best ways to accomplish this step is to make an assessment of the land you are managing. To make that assessment as thorough and comprehensive as possible, you will want to make a map of your property.

Mapping the golf course helps you comprehend the relationship of one land feature to another, seasonal land use, traffic patterns, plant species, and what natural resources are used and how they are used. Mapping your property provides you with a record of how the property is managed now, and provides a guideline of how it should be managed for the future.

The first step in making a map is preparing yourself mentally. Consider what you are trying to accomplish with the long-range management of the course. Take a walk on the golf course, but this time walk it with a different set of eyes and a more specific set of goals. The most important rule in making a map is to recognize that you are recording specific elements with particular goals in mind. When you walk the golf course, observe features of the land that you may not have noticed before. The reason for this is simple: you now have a defined set of goals in mind. Maybe you want to reduce the amount of water used on your course. It could be that you want to increase the numbers of wildlife that make their home on the golf course. Perhaps you have pest problems or isolated dry areas that require changed traffic patterns. All of these concerns become part of your visual assessment of the property.

Just as land is used on a seasonal basis, a map also should reflect the seasonal nature of the way it is used. In preparing your map, consider using overlays that reflect seasonal land use changes. The ability to look at your land at various times of the year can make a difference in management goals. For example, land use in the winter is very strong in southern and western states, but slows considerably at other times of the year. For the North and Midwest, just the opposite is true. Overlays of seasonal land use can assist you in making solid decisions about how you manage the land year round, as well as help record successes and failures from season to season. Most of all, this information will help you learn from practical experience.

To start making your map, take a notebook with you as you make your visual assessment of the golf course. Write down specific features of the property, such as different plants, land features, evidence of wildlife, places where natural lands meet fairways or other parts of the golf course, and all water features. Note areas that seem to get the most traffic and also note areas that are left in solitude. All of these notations will be important in making your goals a success in the future.

If you have an aerial map or another map already available, use it as a starting foundation. Trace over the existing map and make an outline of the main features. After the outline is complete, begin adding the features that you recorded during the visual assessment. You do not have to be a great artist. The map is to serve as a guide for developing the land management plan, and being able to juxtapose one feature or detail next to another is the goal.

You may decide that adding color helps define areas of water from vegetation or naturalized areas. You may even want to designate areas that have the highest amount of play in one color.

Once you have the basic features added, you will be able to get a real feeling for how certain traffic patterns and land uses can impact wildlife, natural resource consumption, and even the amount of labor needed to manage the property. At this point, you can compare your list of goals to the environmental plan and make some concrete decisions for the year.

Overlays for different seasons can be made on acetate or tracing paper and laid over the map for comparison. Overlays are particularly handy when deciding on adding new features such as no-mow areas or buffer zones. Using the overlay, you can see where it falls on the property and how it might impact play or the other environmental stewardship projects.

Archiving your maps with dates and seasons provides an excellent record of stewardship activities and a permanent record of accomplishments. The maps also can assist in budgeting from one year to the next and assist in developing plans based on real trends and patterns found in these important documents.

Remember, mapping the property is an important tool to help plan your environmental and land management decisions for today and the future of the golf course. Once the initial map is made, this valuable process takes a minimal amount of time but reaps boundless benefits to ensure success in sound land management. Whether you stick with pencil and a notebook or add seasonal overlays, the mapping process is integral in setting a solid foundation for all your stewardship decisions.

MARY COLLEEN LIBURDI was *the Communications Director for Audubon International, a not-for-profit environmental organization dedicated to issues of sustainable resource management. Audubon International manages the Audubon Cooperative Sanctuary Program for Golf Courses and the Audubon International Signature Program.*

SURVIVAL TOOLS FOR THE PUTTING GREEN

Using a few tools can enhance stress management on putting greens.

by CHRISTOPHER E. HARTWIGER

THE SCENARIO is the same every summer. The days grow longer, putting greens are placed under stress, and superintendents lie awake at night hoping for cool weather. Each summer offers a unique variety of challenges. Spring is an excellent time for superintendents to reflect upon last season and develop their putting green management program for the summer. The superintendent must take on the uneasy task of balancing the agronomic needs of the turf with the expectations of the golfers. Following are descriptions of several tools that the superintendent can have on hand to assess the status of the greens during the summer.

Soil Profiler

A soil profiler is a must for every golf course. A good profiler extracts a plug approximately eight inches deep, four inches wide, and one-half inch thick. A soil profile can speak volumes about the history of the root zone as well as its current status. By looking at the upper portion of the profile, the superintendent can monitor thatch accumulation and assess the effectiveness of topdressing in managing thatch accumulation. A soil profiler also can assist in determining the level of available moisture in the upper portion of the profile.

Other questions can be answered, too. Is the thatch layer excessively wet and limiting the flow of water down through the profile? Are there any layers present in the profile that may be affecting infiltration? The superintendent can assess several aspects of the root system. The first is the depth of the roots. Are the roots growing deeper or are they declining? How have management practices such as fertilization or aerification affected the root system? The density of the root system can be checked as well. In certain parts of the country, nematodes can be a tremendous problem in sandy root zones. How do the roots appear? Are they well branched or are they short and stubby? These questions and others can be answered by regular use of a soil profiler.

Hollow Soil Probe

The chances are good that at some point during the summer, hand watering the greens will be necessary. Training employees to properly hand water is important. Even more important is training employees how to spot areas that need to be hand watered. A hollow tube probe is an excellent tool to assess the moisture status of the root zone. A crew member can efficiently check different portions of the green to look for areas in need of water and then irrigate as needed.

Infrared Thermometer

Temperature is an excellent way to monitor changes occurring in nature. Warm-season and cool-season grasses have optimum soil and atmospheric temperatures for maximum growth. Weed seeds germinate in a certain temperature range. Temperature is also a function of many turfgrass diseases. Using an infrared thermometer is an excellent method to check the canopy and soil temperatures in a green.

An infrared thermometer can be used to monitor hot spots on a putting green. During wilt, canopy temperatures rise dramatically and the turf shows classic wilt symptoms such as leaf curling, footprinting, and an off-color appearance. In the early stages of wilt, the canopy temperature increases before any wilt symptoms are visible. An infrared thermometer can be used to check for areas that may be heating up but have not shown any visible symptoms. With this early warning tool, crew members can correct a moisture deficit earlier and reduce stress to the green.

These are essential diagnostic tools for the summer stress period.

Magnifying Lens

A 20x or 30x magnifying lens is a tool a superintendent should have on hand. The naked eye can detect many things on a green, but a closer look can reveal a couple of interesting things. First, a hand lens may be helpful in field diagnosis of disease. A great example is the ability to see the fruiting bodies (acervuli) associated with anthracnose. Close examination of the leaf tips is another use for a magnifying lens. This will allow the superintendent to determine the quality of cut being achieved. A ragged leaf blade cut can create additional ports of entry for disease. The importance of a sharp mower blade should not be underestimated since it plays a direct role in putting surface quality.

Conclusion

Managing putting greens throughout the summer stress period remains a great challenge for golf course superintendents. Using these tools in conjunction with a good agronomic program allows superintendents to get a little more sleep during the summer while maintaining healthy putting greens.

CHRIS HARTWIGER *is surviving quite well as an agronomist in the USGA Green Section Southeast and Florida Regions.*

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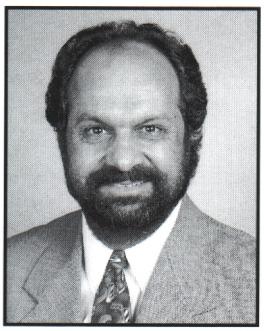

Dr. Ali Harivandi

Welcome to the Group

The USGA is pleased to welcome Dr. Ali Harivandi to the USGA Turfgrass and Environmental Research Committee. As a visiting scientist, Dr. Harivandi will serve a two-year appointment to the committee, through 2000.

Dr. Harivandi is an area Environmental Horticulturist with the University of California Cooperative Extension Service, specializing in turf, soil, and water issues. He has been based in the San Francisco Bay area since 1980. He holds a Ph.D. in Horticulture (turfgrass science and soils) from Colorado State University.

Dr. Harivandi will attend research committee meetings, review research proposals, and participate in monitoring visits to USGA-sponsored research sites throughout the year. His specialties in water conservation issues, soil and water salinity management, efficient irrigation practices, and reclamation of disturbed lands will be particularly helpful in the committee's review of proposals in the 1999 call.

Give Your Budget a Break

There's an important deadine date to highlight on your 1999 golf course management calendar.

The USGA offers a discounted fee for Turf Advisory Service (TAS) visits that are paid before May 15. Golf courses subscribing to the Green Section's TAS will receive a $300 discount for full-day and half-day visits if the payment is received at Golf House on or before May 15, 1999. The same offer is available for municipal golf courses that order the TAS by a purchase order — the purchase order must be received by the deadline date to receive the discounted rate. In either case, the actual TAS visit can take place anytime during the season.

For those golf courses taking advantage of multiple TAS visits during the season, if the initial payment for the first visit is received before the May 15 deadline, all subsequent TAS visits will be billed at the discounted fee.

Contact your regional agronomist soon to schedule your 1999 TAS visit.

1999 Turf Advisory Service Fees

	Early Payment	*Regular 1999 Fee*
	Received on or before May 15	*Received after May 15*
Half-day visit	$1,000	$1,300
Full-day visit	$1,500	$1,800

Regional News Feature to Continue in 1999

During the 1998 golf season, the Green Section added a new item to the USGA Web site. The Regional News feature on the Web site has been expanded and will continue through 1999.

The goal is to take advantage of the Green Section agronomists' travels to golf courses across the United States, and to share this information with golf course superintendents, Green Committee members, course officials, and golfers. The agronomists have the opportunity to see what's happening in golf course maintenance on a day-to-day basis in a way that cannot be matched by anyone else in the industry. They witness firsthand that a problem affecting one golf course is usually something that another course will have to deal with at one time or another.

Approximately every two weeks, each Green Section region will provide a short update as to what is happening in their region. The topics vary as widely as the regions themselves. They cover everything from golf course maintenance issues, the impact of recent weather, tips for planning ahead, recent events to be aware of and watch out for, to educational opportunities happening in a region.

The Green Section agronomists can help you keep on top of current problems that golf courses are facing in your area, and maybe even provide an idea or two to help solve a problem. Access the website on a regular basis to see what is happening in your part of the country. You can find the Green Section Regional News under News & Updates at: *http://www.usga.org/green*.

Physical Soil Testing Laboratories*

The following laboratories are accredited by the American Association for Laboratory Accreditation (A2LA), having demonstrated ongoing competency in testing materials specified in the USGA's Recommendations for Putting Green Construction. The USGA recommends that only A2LA-accredited laboratories be used for testing and analyzing materials for building greens according to our guidelines.

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*Revised March 1999. Please contact the USGA Green Section (908-234-2300) for an updated list of accredited laboratories.

Where is Your LOYALTY?

Superintendents and course officials alike have lost their sense of loyalty to each other.

by MIKE HUCK

LOYALTY: faithful adherence to a person, government, cause, duty, etc. — *Webster's New World Dictionary, Third Edition.*

GONE ARE THE DAYS when employee/employer relationships are built on long-term trust and loyalty. There are occasional exceptions, like the following story I read several years ago. A textile factory in Massachusetts was gutted by fire a month prior to Christmas. Several hundred employees were suddenly put out of work, or so they thought. The employees feared that the owner (a single owner, not a corporation) would choose not to rebuild the company, but just close the doors and collect the insurance settlement.

Twenty-four hours following the fire, owner Aaron Feuerstein surprised employees by announcing that he planned to rebuild the plant immediately, with portions to be completed and operational in 90 days or less. Not only did Mr. Feuerstein begin immediate reconstruction of the plant, but he continued paying all 1,400 employees their full wages for the next 30 days and provided 90 days of insurance coverage. He said it was his responsibility to both his employees and the community because *they had been responsible for his success*. This gentleman showed a tremendous amount of loyalty to his employees, above and beyond what many current day entrepreneurs and corporations consider reasonable.

Except in rare cases like this, loyalty between employees and employers is at an all-time low. Employees no longer are rewarded with job security for many years of faithful service. Salary increases and benefits that coincide with long-term employment are often looked upon negatively by upper management. Such rewards are considered too damaging to the bottom line. This attitude seems to be found throughout the entire business world. Everyone is looking out for *number one* with a survival-of-the-fittest mentality.

Tenure and experience seem to mean little these days because there are many up-and-coming turf professionals willing to work countless hours for less pay. They get a nice increase in salary compared to their prior assistant's position, but very often nowhere near the pay level of the experienced superintendent. The course "saved money" by this move, or at least that was the justification used by management — a corporate downsizing philosophy, I suppose.

I have seen a number of older, very good golf course superintendents released over the years, replaced by a younger person with a college education and maybe two or three years of experience as an assistant. Does this cost-cutting move make up for many years of experience and local knowledge of a property? I don't think so.

In reality, the overall financial position may not have improved other than in the *Superintendent's Salary* line item category. A careful look at the entire budget in subsequent years might reveal that overall spending increased while course conditioning remained the same. How could this happen? Could the previous superintendent's many years of experience have paid off in more cost-effective management and fewer mistakes? Equal golf course conditioning at less expense? It is possible. I am not implying that all young turf managers are incompetent or wasteful, but remember the old adage "you get what you pay for," and this goes for work experience also.

It is not just employers who have forgotten the meaning of loyalty. Superintendents, both young and old, are also guilty of changing jobs at the drop of a hat. Superintendents will jump ship for a small increase in salary, or make a lateral move for the chance to manage a more prestigious course. This quite commonly is justified as required to *move up the ladder.*

We all need to stop and think about the good and the bad times we've had over the years. Course officials must ask themselves who it was who stuck by them when the going was rough. Who was there during the lean years when there wasn't money in the budget to perform needed course improvements or purchase new equipment? Who spent their nights babysitting an unreliable pump station to get the course watered? Or, as a superintendent, perhaps the course officials stood by you in a time of serious need such as a personal family problem or serious illness?

If you are fortunate enough to have a trusting and loyal working relationship with your employee or employer, do you really want to throw it away and risk what you have for a few more dollars in your paycheck or budget? Loyal working relationships don't just happen; they must be developed. Once developed, they need to be appreciated by both employees and employers.

MIKE HUCK *loyally works as an agronomist in the Southwest Region of the USGA Green Section.*

Subscriptions $15 a year, Canada/Mexico $18 a year, and international $30 a year (air mail).

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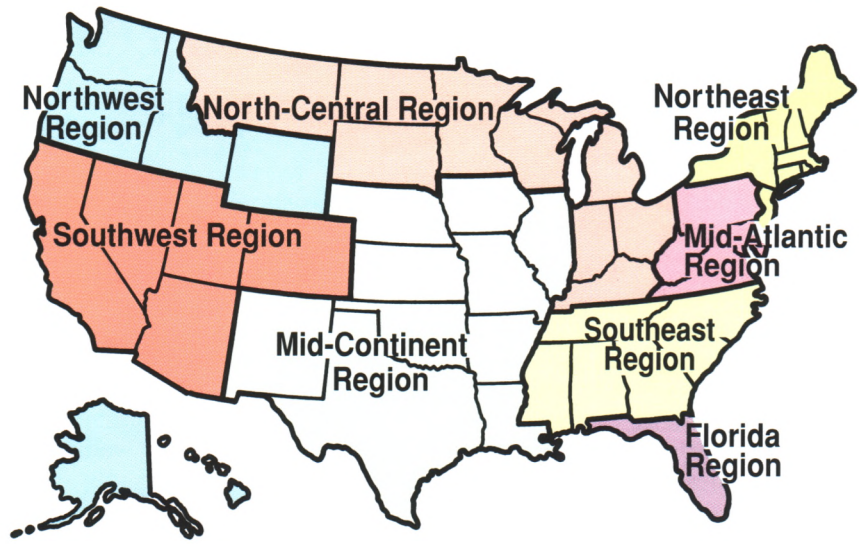

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TURF TWISTERS

LOOK AHEAD

Question: How many black cutworm traps should I place around a green to protect the turf from damage? (Minnesota)

Answer: The traps that attract black cutworm adults are basically monitoring devices, and their use does not provide any level of cutworm control. However, the use of a few traps on the course could help prevent unnecessary pesticide applications to turf at courses located in the northern tier of states where black cutworms cannot overwinter. The first generation of cutworm larvae develop from the eggs laid by adults that migrate north from states having milder winters. Consequently, there is no need to treat the turf with insecticides or even sample for caterpillars until the initial wave of adults arrives and their eggs hatch on the turf. Adult arrival can be monitored with a few well-placed pheromone traps. Monitor greens and other high-priority turf before adults arrive if the previous winter was unusually mild.

TO EVALUATE AND IDENTIFY

Question: We are considering rebuilding our greens in a few years and are having a difficult time evaluating which bentgrass variety will be best for our golf course. What is your opinion? (Alabama)

Answer: There are a number of new bentgrass varieties available today. Many of these grasses appear to be regionally adapted. The USGA is sponsoring 15 putting green variety trials throughout the country. Make sure to review the results of the trials and pay particular attention to the varieties that perform best during the summer stress period. Seeing 15 to 20 of the leading varieties side-by-side, under the same growing conditions and management, is valuable in selecting the variety that is best for your course.

THE BEST ROOTZONE MIX

Question: Why doesn't the USGA include regional guidelines in their recommendations for the construction of golf greens? (received via the Internet)

Answer: Our recommendations include ranges of values that make it possible to adapt the guidelines to varying circumstances. For example, the SHC (saturated hydraulic conductivity) rate has a range from 6 to 24 inches per hour. Six to 12 inches is considered *normal*, while 12 to 24 inches is considered *accelerated*. In areas where very poor quality water must be used, extremely high annual rainfall is experienced, or bentgrass is being grown in a climate of high heat and humidity, the *accelerated* range should be employed. Otherwise, the *normal* range is the better choice.

Other values within the USGA's guidelines also include ranges. Since growing conditions can change radically over the span of just a few miles (e.g. water quality), it may never be possible to offer broad regional recommendations. Therefore, it is very important to know how to use the existing ranges in the guidelines to identify a rootzone mixture that is best suited to your area. Contact your Green Section agronomist for help.