Irrigate for Playability and Turf Health, Not Color

Automatic irrigation systems should be utilized to keep turf alive and achieve firm playing conditions, not to produce the color green.

BY ADAM MOELLER

Firm conditions and not turf color are the foundation for quality playability.

Golf was born in the British Isles, where courses evolved centuries ago from windswept, sandy sites adjacent to the sea. The game has changed since its beginning, but traditions and challenges remain the same — turf, terrain, and weather. Firm conditions and fine-textured turf have long been the foundation for ideal playability. Over time, many golfers have forgotten the value of firmness and replaced it with the desire to have a visually appealing golf course. The ability to irrigate has enabled golf course superintendents to produce amazingly resilient, uniform turf despite low mowing heights, extreme heat, drought, undulating terrain, variable soils, traffic, etc. However, golfer expectations and irrigation advancements have also contributed to the idea that aesthetics, particularly lush green grass, are greatly important to the enjoyment of the game and even define good conditions. The genesis of cosmetic irrigation, which involves irrigating the golf course to keep all turf areas an attractive green color, began as irrigation systems were installed at golf courses throughout the country. Cosmetic irrigation is not a problem at every golf course, but far too many facilities still place the highest priority on lush green conditions at the expense of playing quality. This fact was alarmingly evident in recent years when record droughts hit, and many golfers simply could not understand why all of the turf was not consistently dark green.

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There are many factors that influence green color on golf courses, including fertilizer, pigments, and overseeding, but for the purposes of this article irrigation will be the sole focus. Cosmetic irrigation has many consequences, and it often comes at the expense of firm conditions. Increased irrigation for cosmetic purposes has also resulted in irresponsible water usage, higher golf course expenses (from more mowing and the need for additional disease control), and the proliferation of failure-prone grasses like annual bluegrass, i.e., *Poa annua*. These issues are discussed in depth below. Golf purists might argue that automatic irrigation has been one of the most detrimental advancements introduced to the game of golf. The answer is not to eliminate golf course irrigation, however, because it is essential to keeping grass alive in most situations. Instead, the focus of irrigation should be shifted entirely to playability and turf health, discounting color as the primary criterion for course quality.

There are several benefits to using less water and promoting drier, firmer playing conditions. This article will discuss these benefits along with specific steps for moving away from cosmetic irrigation while improving the playing quality of golf facilities.

BENEFITS OF FIRM, DRY GOLF COURSES: ENVIRONMENTAL AND ECONOMIC FACTORS

Water is the most valuable natural resource used by golf facilities worldwide. The USGA Green Section has invested millions of dollars toward water conservation research and the development of drought-tolerant turfgrasses to address these challenges so that golf facilities may use less water. However, many positive outcomes from years of research have yet to be adopted at golf facilities, particularly because the cost and availability of water can vary widely from one course to the next and are regionally specific throughout the U.S. For instance, the same amount of water may be more than enough for one golf facility, depending on site conditions, acreage, turfgrass selection and water storage capacity, whereas it would be barely enough for a neighboring facility to make it through the growing season. A golf course in the Southwest could pay as much as a

Gardiners Bay Country Club in New York has yet to install an automatic irrigation system in fairways. Playability is excellent, but it only works because the membership is accepting of brown turf.

A few brown spots should be acceptable, but efforts to minimize cart traffic need to be a priority because it can be very damaging to drought-stressed turf.

million dollars a year for water, while a facility in the Northeast might only pay for irrigation system operating and maintenance costs. Water restrictions can also vary greatly, with some facilities experiencing more stringent restrictions than others. These variations have huge environmental and economic implications. Golf course water use can often be separated into the haves and have-nots. However, the pressure to reduce cosmetic irrigation will eventually be felt by all facilities and superintendents. In response, golfers must adjust their expectations.

Golfers who play at facilities with a large source of water and/or ample resources to buy whatever quantity they desire may be even less understanding of occasional off-color brown spots on the golf course. Golfers who play at facilities that have little water available and are unable to buy more are likely to be more understanding of off-color turf. One could argue that green fees and the acceptance of off-color turf might parallel one another. Paying more for your golf experience does not justify using water for cosmetic purposes. Having the resources to purchase more water during a drought also does not justify cosmetic irrigation.

Regardless of the costs, availability of water, or restrictions at your course, irrigating based solely on playability and turf health will save money and reduce the environmental footprint of your golf course. Irrigation pumping expenses and costs for purchasing water from outside sources like municipalities add up quickly. Less water also translates into less turfgrass growth, which equates to less mowing. In turn, cost savings can be realized with less labor, fuel, and equipment maintenance. These costs may need to be reallocated to other areas, such as hand watering or improving the soil system to support reduced water use, but these programs are more beneficial for long-term playing characteristics and management inputs compared to paying for water.

PLAYABILITY

There are four main criteria that influence playability:

- A uniform turf cover.
- Good turf density for adequate ball support.
- Smoothness of the surface.
- Surface firmness that allows shots to bounce and roll without plugging into the turf.

From a playability perspective, turf color and cosmetics have nothing to do with the quality of the surface. Of the four factors, firmness plays a critical role. Firm conditions place a priority on shot-making and course management skills. The flight of the ball is only one part of navigating a golf course; what happens when it lands is just as important. One of the great features of many links courses in the British Isles is firmness. Hitting tee shots that travel an additional 50 to 75 yards after the ball hits the turf is not uncommon, especially downwind. While this type of bounce and roll may not be possible at your course, 20 to 40 yards of bounce and roll is not an unreasonable expectation. This will allow for longer tee shots and shorter irons for second shots into par-4s. A par-5 may be reachable in two well-played shots when the course is firm, but this is not possible if conditions are soft. However, firmer conditions, longer tee shots, and increased roll will also bring more bunkers and hazards into play if shots are not well executed. A tee shot traveling 250 yards that has bounce and roll can suddenly trickle into a bunker that is beyond reach under soft conditions. The same is true for poorly played approach and pitch shots. The axiom “play hard” can be offered.

LESS DISEASE AND FUNGICIDE COST

Plant pathogens need water to grow, spread, and infect turf. Dry turf is still vulnerable to disease, but fungal activity is reduced when compared to persistently wet turf. For disease infection to occur, the right environmental conditions must exist. Pythium and brown patch are two diseases in particular that are much more prevalent on overwatered turf. Drier conditions limit the environmental pressure needed for these diseases, so outbreaks and severity will be reduced. Fungicide reductions will then be possible, which has significant long-term cost saving advantages.

CART TRAFFIC

Cart traffic significantly complicates maintaining a truly dry golf course in the heat of the summer. Some of the best and firmest courses in the U.S. and British Isles do not have to manage cart traffic. For many facilities, cart revenue is believed to be important. This may not actually be the case, given the hidden detriments and subsequent costs associated with cart use and traffic damage, but that is a discussion for a separate article. Turf that is under stress from dry soils and hot temperatures can be killed by cart traffic. A few brown spots should be tolerable, but dead grass in tire tracks should not.

Because of large acreage and lower mowing height, fairways usually receive the greatest amount of water annually, so it is here that conservation efforts will have the most impact. Fairways also receive the most concentrated cart traffic, so they are likely to experience the most damage from carts if the turf is too dry. This will be one of the biggest challenges for superintendents irrigating solely for playability and turf health, especially for those managing facilities with heavy cart usage and fairways planted to cool-season turfgrasses. Cart damage when dry soils and hot air temperatures collide can be minimized with a very short automatic irrigation syringe cycle, often in early afternoon, which cools the grass slightly. This is challenging when the golf course is busy, but not impossible. Good communication with the golf shop will help educate golfers about why they may see irrigation running briefly during their round. The need for syringing will be highest in the summer months when turf is under environmental stress.

STRONGER GRASSES DEVELOP

Most agree that advancements in automatic irrigation systems have dramatically benefited the game of golf. However, an argument can be made that such advancements have allowed superintendents to keep weaker grasses alive, limiting the development of hardier grasses. This seems to be true with many older courses that have been invaded by failure-prone annual bluegrass over time. This species is highly adapted to golf courses because it tolerates a wide range of mowing heights, but it does not tolerate persistent dry conditions. As irrigation capabilities expanded over the last 75 years, annual bluegrass populations paralleled these advancements. Low mowing heights, heavy traffic, and shade also contribute to greater amounts of annual bluegrass on golf courses. But once annual bluegrass becomes prevalent, it becomes difficult to eliminate without disruptive measures, and thus greater amounts of water are needed to keep it alive compared to hardier, perennial grasses.

GOLFER EDUCATION

Golfers throughout the country have expressed little patience when grasses turn off-color, regardless of whether they are producing desirable firm conditions or not. After all, the course has an expensive automatic irrigation system. The relationship between irrigation, firmness, and color is nothing new. However, golfers have long been under the misconception that green grass is healthy and desirable, whereas off-color, brown grass must be dead or dying. Not true! A few brown, dry spots does not mean the golf course is dying or being maintained poorly. Thus, a dilemma exists. Golfers want firm conditions but they don't want to see off-color turf. As a result of these pressures, many superintendents have been inclined to grow grass for aesthetics and not for golf. This is especially true when the neighboring course truly is "greener on the other side." For facilities with fixed budgets, which is the overwhelming majority, firm surfaces and a golf course absent of any off-color turf is not possible. The first step in understanding this fact is to review some basics about golf course irrigation.

Advancements in automatic irrigation allow superintendents to water more accurately than ever before, but the simple act of pushing a button or clicking a mouse has far reaching impacts on the playability and appearance of the golf course. Even with modern automatic irrigation systems, applying water uniformly can lead to severe differences in soil moisture and off-color turf. Terrain and soil types vary. Rock, ledge, sand, and clay can be found in a single fairway. Level areas are often found in equal proportion to slopes, mounds, depressions, and hills. You cannot expect an automatic irrigation system to completely overcome these challenges, even if it has an installation price tag of over a million dollars. This is particularly true when drought conditions persist for weeks at a time. Automatic irrigation is a supplement to natural rainfall, never a complete replacement.

MAINTENANCE GUIDELINES AND SUPPORT

Without the support from course officials and decision makers, superintendents are not likely to fully adopt the concept of reduced water use for fear of the consequences. After all, it is rare to get fired for having a course too green. Establishing maintenance guidelines is crucial for justifying the practice of irrigating the golf course solely for playability and turf health. Maintenance guidelines dictate the desired playability, and an appropriate maintenance plan is developed based on these conditions. Maintenance guidelines are also extremely useful in maintaining consistent playability despite turnover in course officials, the green committee, golf professional, or superintendent. For example, if it is determined that firm and fast playing conditions for the fairways are desired, it should be noted what level of tolerance, in terms of potential turf loss and/or off-color turf, is acceptable while providing desired conditions. These guidelines provide much-needed direction for the superintendent and also serve as a document that explains the maintenance philosophy, which will be helpful when concerned golfers ask why off-color turf exists on the golf course.

STEPS TO USING LESS WATER AND PROMOTING DRIER, FIRMER CONDITIONS: SOIL SYSTEM

A deep and infrequent irrigation regime is best for turf health and playability.

Weak grasses and poorly draining soils will not support such a regime in the summer when cool-season turfgrasses are under extreme environmental stress. It may be necessary to amend soils to promote drainage and deep and infrequent watering. Relatively good firmness is still attainable during wet conditions on sites with sandy soils and adequate drainage.

Heavy clay soils or those with excessive thatch will not drain well and remain wet for several days after rainfall or heavy irrigation. Such soil conditions are not conducive to producing firm conditions or reliable turf.

Thatch management is also crucial for firm conditions. Thatch will hold moisture tightly and contribute to soft surfaces when it has not been controlled adequately. Excess thatch will also be quick to develop into isolated dry brown spots when water is withheld to promote better playing conditions. The more thatch your course has, the more brown spots can be expected during dry conditions. If thatch is adequately controlled, the turf can be firm and dry with minimal brown spots. Wetting agents and soil surfactants are beneficial because they improve uniform wetting of the soil and thatch and can reduce isolated brown spots.

AUTOMATIC IRRIGATION SYSTEM PERFORMANCE

The condition of the automatic irrigation system is also a major factor in how dry the golf course can be maintained. If the irrigation system is old, inefficient, and unreliable, the decision to irrigate solely for playability and turf health is much more challenging because water cannot be applied where it is needed, when it is needed, and in the proper amount.

To further explain this concept, consider how irrigation decisions differ for a golf facility if the entire course can be irrigated in a single night with a modern automatic irrigation system compared to an antiquated system that would require two nights. Now let's assume it is a typical hot mid-July day and the overnight forecast is calling for a 50 percent chance of thunderstorms. With a modern irrigation system and excellent pumping capacity, the superintendent can withhold irrigating that night in hope that it will rain. If it does, no irrigation is necessary. If not, sufficient water can quickly be applied to all turf areas in need of water in the early morning or following night without risking the golf course going into drought stress.

Now consider the same dilemma with an antiquated system. If it does not rain, two full nights are required to irrigate the entire golf course, and severe drought stress is very likely to develop if irrigation is withheld. To avoid the possibility of drought stress, the golf course is irrigated. If it does not rain, then the irrigation cycles are warranted and turf health preserved. However, if it does rain, the course will play very soft and take longer to dry out, and the irrigation water applied was wasted.

This scenario is very common, and it is the reason why the decision to irrigate or not is the single most difficult decision many superintendents make on a daily basis. Learning the intricacies of how the golf course dries and how well the automatic irrigation system functions takes time. There is no teacher like experience when it comes to fine-tuning one's skills in irrigation management (Snow, 1983). A modern automatic irrigation system will allow for the least risk to the turf when reducing water use to promote firmer conditions.

ESTABLISH GRASSES THAT USE LESS WATER

Irrigating the golf course to produce firmer conditions is not as simple as shutting off the water. Water requirements vary among turfgrass species, and the grasses on your golf course will dictate the automatic irrigation regime. In the Northeast, creeping bentgrass, annual bluegrass, and perennial ryegrass are some of the most common grasses in fairways. Kentucky bluegrass and colonial bentgrass are two other grasses that are sometimes found in fairways. If a high amount of annual bluegrass is present in fairways, applying limited irrigation is a major risk because it is very intolerant of drought and will likely die if dry conditions persist. Creeping

bentgrass, however, tolerates drought much better than annual bluegrass and can recover if it goes dormant, in most instances. It will take time, perhaps two to three years, before the turf and the superintendent become comfortable with drier conditions and less water. The use of soil moisture meters can be invaluable as irrigation programs are altered.

CONSIDER WEATHER AND TIME OF YEAR

Allowing the golf course to dry down substantially is safer in the spring and fall when air temperatures are typically much cooler because the grass is actively growing and under less environmental stress. As such, firmer conditions in the spring and fall are not uncommon. Keeping the turf as dry as possible in the spring and fall will also improve rooting and precondition it for summer and winter stress. However, soil drying can be much slower in the spring and fall compared to the summer because of cooler temperatures and shorter day lengths, so firmness at these times can take longer to develop following rain.

HAND WATERING

Hand watering is the best way to conserve water and promote good playability and turf health because it can be applied only where it is absolutely necessary. The quandary, however, is that hand watering is expensive. On putting greens, hot spots and dry mounds should always be watered by hand if the majority of the green has adequate moisture. Many superintendents wait until the swales begin to show signs of moisture stress before applying automatic irrigation. For those with limited budgets, hand water as much as resources permit. Fairways and approaches are more difficult. Facilities with adequate resources have a distinct advantage in water conservation and irrigating solely for playability and turf health because hand watering approaches and fairway hot spots can be performed regularly. In so doing, the amount of drought-stressed turf can be minimized. However, hand watering simply to promote greening of off-color turf that is healthy is still cosmetic irrigation and an inefficient use of labor. Portable soil moisture meters are extremely helpful in this scenario. A quick probe of an off-color area could reveal that plenty of moisture is in the soil. These tools are also great to find moisture thresholds, which greatly improves irrigation decision making.

The course management team needs to determine the value of water conservation and irrigating based solely on playability and turf health when budgeting hand watering capabilities for the golf course. An increase in the labor budget may be needed, especially for those growing failure-prone annual bluegrass, but the water conservation efforts should offset some of these costs.

CONCLUSION

Changing irrigation practices to promote turf health and playability is much more than simply cutting back on water. It requires a carefully coordinated approach that involves managing the soil system, detailed programming of the irrigation system, promoting grasses that naturally use less water, and a talented maintenance staff that understands the nuances of weather and the basic inputs required to keep turf healthy. The most critical aspects of the process are golfer education and supporting maintenance guidelines that place the focus on playability rather than cosmetics. This is easier said than done. Moving away from cosmetic irrigation requires a cultural attitude adjustment that appreciates playability more than cosmetics. While golfer education will present some challenges, there are many benefits in promoting firmer conditions and moving away from cosmetic irrigation. Benefits include water conservation and economic savings, improved playability and firmness, less disease and subsequent fungicide use, and the development of stronger turfgrasses over time. The many benefits make a strong case that using less water and irrigating for turf health and playability is better for the turf, better for the environment, and ultimately better for the game.

LITERATURE CITED

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Establishing drought-tolerant grasses will allow for sustainable water conservation, economic savings, and firmer conditions. University research trials that evaluate drought tolerance provide invaluable information when selecting the best turfgrasses for your site.