Five Ways to Improve Putting Green Quality

Understanding and perfecting the fundamentals of plant nutrition, water management, pest management, mower setup, and topdressing will elevate any putting green management program.

BY CHRIS HARTWIGER AND ZACH NICOLUDIS

ake a trip to the practice range during any professional golf event and you will see even the most experienced golf professionals working on fundamentals like alignment, grip, and posture. Failure to get these right can lead to a myriad of undesirable compensations in the rest of the golf swing. In a similar way, there are several basic putting green management fundamentals that need to be adhered to if quality playing conditions are to be achieved.

The fundamentals of turfgrass management are understated; they are simple to grasp but difficult to perfect; they are not the latest and the greatest but have a proven track record. This article is all about the fundamentals. Whether you manage the maintenance operation at a basic-services golf course or have the largest budget in town, this article will help you improve putting green management by focusing on the fundamentals of plant nutrition, water management, pest management, mower setup, and topdressing. To facilitate cohesiveness among the topics, each fundamental has been structured the following way:

- Purpose
- Intended Outcome
- Steps to Take
- Is It Working?
- Adapting to Local Conditions
- Additional Resources

PLANT NUTRITION

Purpose — Turfgrass must be fertilized to ensure growth and a positive response to management practices such as irrigation and mowing. Actively growing turfgrass plants also have the ability to tolerate and recover from

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Rotary spreaders are an effective way to apply granular products. Calibrate spreaders before each use to ensure that products are applied at the correct rate.



When turf requires readily available nutrients, a properly calibrated sprayer can apply liquid fertilizers at low rates.



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traffic-related injury, withstand climatic extremes, and tolerate pests such as insects and diseases.

Intended Outcome — The goal of fertilization is to provide the turfgrass species at your course with sufficient levels of plant nutrients so that consistent growth can be achieved when temperatures and sunlight are in the optimum range. Consistent growth is predictable, which allows turfgrass managers to schedule other inputs accordingly. Ultimately, a consistently growing putting green that is well managed will provide a smooth and true ball roll. Wide fluctuations in growth should be avoided because they have a detrimental effect on playing conditions.

Steps to Take — Soil testing is the best way to determine if nutrients are within desired ranges for plant health and consistent growth. However, nitrogen levels cannot easily be evaluated by soil testing because of its rapid fluctuation within plants and soil. Measuring plant growth rate is the best way to determine if nitrogen is needed.

Is It Working? — Annual or semiannual soil test reports will verify nutrient status and will tell you whether nutrients are within their desired ranges. Furthermore, comparing soil test reports over time will allow you to observe trends and make adjustments to your fertility program as needed. Remember to evaluate the need for nitrogen by monitoring turf growth rate. A simple way to determine growth rate is to measure the amount of clippings collected by putting green mowers. There are a variety of ways to analyze clipping yield, such as visually estimating clipping volume or physically weighing clippings.

Managing nitrogen is especially important because it causes the most rapid response in plant growth. Too much plant-available nitrogen will produce lush growth and increase the potential for disease and stress. Too little nitrogen will cause inconsistent canopy growth and reduce the ability of playing surfaces to recover from wear and ball marks. Also, certain diseases such as dollar spot and anthracnose are more likely to occur at low nitrogen levels.



Although hand watering is a labor-intensive practice, it is worthwhile because it allows turfgrass managers to precisely address putting green water requirements.

Adapting to Local Conditions — The methods and means to apply fertilizer to putting greens vary greatly among golf facilities. It is possible to deliver nutrients in the right amount and at the proper time using granular fertilizers applied with walk-behind fertilizer spreaders. However, many superintendents with access to a sprayer choose to spoon feed putting greens with smaller amounts of fertilizer more frequently. Either way, evaluating soil tests and turf growth rates will provide feedback as to whether your fertility program is on track.

Additional Resources — The USGA Collection, Turfgrass Fertilization for Golf Courses, includes a variety of materials that cover a range of fertilization topics such as the role of nutrients, how to apply fertilizer, soil testing techniques, and desired soil nutrient levels.

WATER MANAGEMENT

Purpose — Water management has a significant influence on playing conditions, especially when it comes to putting greens. Diligent water management must be a priority for all golf facilities. Water should only be applied to putting greens to maintain adequate plant health and produce quality play-



ing conditions; any additional water can have negative effects.

Intended Outcome — Smooth, consistent putting conditions and resilient turf should be the goal of putting green water management. To achieve this goal, it is important to only apply water to the areas that need it. Unfortunately, this is easier said than done because there are many factors that influence putting green water requirements.

Steps to Take — Understanding the amount of moisture in the soil profile is the first step in determining how much water to apply. Using moisture meters to accurately measure soil moisture helps turf managers make informed irrigation decisions. If a moisture meter is not part of your daily maintenance program, invest in one.

An accurate weather forecast is another critical resource for making good irrigation decisions. Evapotranspiration (ET) is one of the key components of a forecast that must be considered before irrigation is scheduled. The National Weather Service has developed a measure of ET called Forecast of Reference Crop Evapotranspiration (FRET). For more information on FRET, please refer to the National Weather Service.

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Poor sprinkler uniformity and improper watering practices can create waterlogged soil conditions that lead to the development of black layer — a distinct dark layer and the smell of sulphur are telltale signs.

Moisture meter readings, weather forecasts, and a thorough understanding of each putting green's microclimate form the foundation of sound irrigation decisions. Using the "set-it-and-forgetit approach" and scheduling the same irrigation runtime for all of the putting greens fails to address the individual water requirements of each putting green and will inevitably reduce turf health and playing conditions. For suggestions on how to improve irrigation practices, please review the article, "Five Techniques to Improve Irrigation Efficiency."

Is It Working? — Putting greens must be assessed daily to determine if irrigation practices are producing the desired results. Watering to maintain lush, green turf often results in too much water being applied. Overwatered turf is more susceptible to footprint indentations, deep ball marks, algae, black layer, disease, and turf thinning. Conversely, too little water can cause wilt, localized dry spots, turf thinning, and an inconsistent canopy. Ultimately, it is far easier to correct issues with underwatering compared to overwatering. Water can always be added, but once it has been absorbed by the soil there is little that can be done to remove it. For more information on water management, please review the article, "Irrigate for Playability and Turf Health, Not Color."

Adapting to Local Conditions -Superintendents must regularly evaluate sprinkler performance to ensure that water is being evenly applied. Uneven water distribution will result in poor turf quality and undesirable playing conditions. Moisture meters can be used to identify irrigation system coverage issues by pinpointing variations in moisture content. When a significant discrepancy in soil moisture is noticed, sprinkler performance should be evaluated to determine if adjustments or repairs are required. Monitoring irrigation performance and making necessary adjustments is

important for all golf courses, but it is especially important for golf facilities that have limited labor and cannot compensate for irrigation deficiencies with hand watering.

Additional Resources — Visit the USGA Water Resource Center for a wide range of resources that provide information about water conservation, irrigation efficiency, alternative water supplies, and many other water-related topics.

PEST MANAGEMENT

Purpose — Pests are unwelcome guests that can compromise the conditions of any playing surface, but pest damage is most serious when it affects putting greens. Severe pest outbreaks on putting greens can have a significant impact on the bottom line of any golf facility. The old saying rings true: "If you are out of putting greens, you are out of business."

Intended Outcome — The goal of every pest management program is to produce putting greens that are healthy and enjoyable to play. To achieve this outcome, turf managers must be on the lookout for weeds, insects, diseases, and hard-to-detect pests such as nematodes. Perhaps most important, turf managers must find ways to manage pests within the realm of affordability and efficiency.

Steps to Take — Education is the underpinning of sound pest manage-



Putting quality and turf health decline when diseases are left untreated. Well-timed applications of plant protectants help control diseases such as dollar spot.



A properly maintained and calibrated sprayer is required to uniformly apply plant protectants at the correct rate.

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Green Section Record Vol. 55 (5) March 3, 2017 ment decisions. Superintendents must be knowledgeable about pests common to their area, when pests are likely to become problematic, and what control options are available. USGA agronomists and university extension services are valuable sources of information on local pests. Many states also provide pest-control guides that review common local pests along with available pest-control options and their relative effectiveness. In addition, there are numerous university turf pathology labs that provide disease diagnosis for a small fee. Textbooks, articles, and product manufacturers can also provide valuable pest-control information.

Is It Working? — The goal of a cost-effective pest-management program is not an absence of pests; rather, it is to keep pest activity at a level that does not significantly compromise the playing experience. Scouting for pests is an effective way to assess pest-management programs. However, some pests such as nematodes are difficult to scout because of their size or location. For example, lab tests are often required to determine the presence of nematodes, identify the types of nematodes that are present, and estimate the size of nematode populations.



Scalping occurs when too much turf is removed during any one mowing. The damage has a negative impact on both plant health and putting conditions.

Adapting to Local Conditions — Budgets and pest pressure vary widely among golf courses. In some areas, superintendents can follow a curative pest-control program, whereas other areas require a preventative approach. Following the path of education first, pest identification second, and selecting a control method third will lead to the best outcome regardless of budget.

Additional Resources — The USGA Collection, Turfgrass Disease Management, includes excellent materials on identifying, diagnosing, and managing diseases of cool- and warm-season turf.



The process of grinding reels and bedknives is time consuming for the equipment technician, but it is critical for providing quality putting conditions.

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MOWER SETUP

Purpose — Mowing a putting green is a precision-oriented practice designed to alter turf height and manipulate canopy texture. Adjustments to mowing heights are made in thousandths of an inch. Even the slightest change in mowing height can result in scalping or unmown turf. The hallmarks of an excellent mowing program are sharp reels, sharp bedknives, and precise mower setup.

Intended Outcome — Mowing has a tremendous impact on putting green health and playing quality. Ideally, all the mowers in a fleet will be set up to produce the same result on all the putting greens — i.e., smooth, true ball roll.

Steps to Take — To make an immediate improvement in the quality of mowed turf, first focus on maintaining sharp reels and bedknives. A reeland-bedknife setup that is sharp enough to cut paper will not remain razor sharp for very long. A system of backlapping, reel grinding, and adjustment must be in place for mowing to deliver excellent playing quality. In other words: sharpen, mow, check, and repeat.

Is It Working? — Answering these key diagnostic questions will help assess the effectiveness of your mowing program:

- Are all mowers able to cut paper when they are sent onto the course?
 If the answer is no, there is an opportunity for improvement.
- How often are the mowers backlapped or the reels and bedknives

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Spin topdressers are an efficient way to apply topdressing sand. A light rate can be applied to the putting greens ahead of the first group of golfers with minimal disruption to play.

sharpened? Frequent backlapping and sharpening yields more consistent results.

- When inspecting a putting green after mowing, is there any distinction in color from one side of a mower pass to the other? If the color fades from one side to the other, chances are the mower setup can be improved.
- Is mechanical damage such as scalping present? If so, doublecheck for inconsistencies in the height of cut at both ends of the bedknife. Look for any physical damage to the bedknife, reel, or rollers. Be aware that the problem may not always be mechanical. Sometimes a finely tuned, sharp mower scalps because the grass is growing too fast.

Adapting to Local Conditions — Ideally, every facility would have a state-of-the-art reel grinder and a technician dedicated to checking and adjusting the putting green mowers every day. In reality, access to such equipment and expertise is limited, so the principle of "sharpness first, repeatability second" should be applied. Improved putting green mowing starts by obtaining the basic equipment that can improve mower sharpness. Most golf courses can afford backlapping machines, and it is often possible to arrange off-site reel grinding with equipment distributors once or twice per season. Also, consider taking continuing education courses on maintaining and sharpening equipment. Finally, work to develop systems that allow you to focus more attention on daily mower setup.

Additional Resources — The USGA Collection, Managing Equipment for Golf Courses, includes excellent materials on mower setup and daily mower maintenance.

TOPDRESSING

Purpose — Applying light rates of topdressing to putting greens at regular intervals helps maintain a proper balance between air and water porosities by diluting organic matter as it is created. Consistent applications are critical to produce the desired results of a successful topdressing program.

Intended Outcome — The goal of topdressing is to create resilient turf and consistent playing surfaces that are less susceptible to ball marks,



scalping, and wear. Selecting a quality sand and applying it at the proper rates and times can minimize the short-term negative impact that topdressing occasionally has on playability while maximizing the beneficial long-term effects on playing conditions and turf health.

Steps to Take — What qualifies as quality topdressing sand? Following these guidelines is recommended:

- The majority of particles should fall between 0.25mm and 1mm in size
- No particles larger than 2mm
- Less than 3 percent clay content
 - Less than 5 percent silt content
 - Low uniformity coefficients should be avoided (Moeller, 2015)

Once a sand is chosen, a sample should be sent to an independent soil testing lab to ensure that the analysis provided by the producer is accurate. Continue to test topdressing material annually to ensure that it remains consistent. Visit <u>www.a2la.org</u> for a list of accredited physical soil testing laboratories.

Topdressing should be applied to putting greens every one to three weeks at a rate that matches turf growth. Proper organic matter dilution

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©2017 by United States Golf Association. All rights reserved. Please see Policies for the Reuse of USGA Green Section Publications. Subscribe to the USGA Green Section Record. will be achieved when sand is applied at a rate between 100 and 150 pounds per 1,000 square feet.

Topdressing applications can be effectively made using a variety of equipment. However, uniform sand distribution should be the priority, no matter which type of equipment is used. Otherwise, additional brushing will be required to disperse unevenly applied sand.

Sand incorporation is best achieved with a cocoa mat, pull-behind brush or tennis court brush. The putting surface should only have to be brushed once or twice after a light, uniform application of sand. A small amount of irrigation after brushing will help to further incorporate sand into the turf canopy.

Is It Working? —

Visually inspecting the soil profile is a quick and easy way to determine if a topdressing program is effective. The presence of alternating light and dark layers indicates that there are inconsistencies in the topdressing program, while a uniform distribution of sand indicates that the proper amount of topdressing is being applied.

Adjusting to Local Conditions — Kiln-dried sand should be used if it is available. While there is a higher cost associated with sand that has gone through a drying process, the ease of incorporating dried sand into the turf canopy is well worth the added investment. Also, designate an area for sand storage to protect topdressing sand



A light, uniform application of sand can be incorporated into the putting green turf canopy with one or two passes of a cocoa mat.

from moisture and contamination. Covered bins and sand silos are two common and effective methods of storing topdressing sand.

Increased wear on mower bedknives and reels is a drawback to putting green topdressing programs. As sand is picked up by mowers, the quality of cut diminishes because the reels and bedknives become dull. If putting greens are regularly topdressed, additional backlapping or grinding will be necessary to maintain sharp reels and bedknives.

Additional Resources — The USGA Collection, <u>Managing Soil</u> <u>Organic Matter</u>, includes useful information about managing organic matter

on all golf course playing surfaces. The articles "Quit Fooling Yourself" and "Don't Guess —

<u>Check the Numbers</u>" provide information specific to topdressing putting greens. Also, the article "<u>The Size of</u>

Topdressing Sand, Does

it Matter?" provides information on topdressing with finer-than-typical sands from research conducted at Rutgers University.

CONCLUSION

Managing putting greens that provide maximum golfer enjoyment within an available budget epitomizes the art and science of greenkeeping. The fundamentals presented in this article never go out of style. They may seem mundane or basic, but considering

them within the context of your maintenance operation and executing them on a consistent basis will always produce good results.

RESOURCES

Moeller, Adam. "The Value of Sand Topdressing Putting Greens." Bulletin for Sports Surface Management, issue 271, autumn 2015, pp. 38-40.

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