



COURSE CONSULTING SERVICE

Onsite Visit Report

Sun City – Cowan Creek Georgetown, TX

Visit Date: May 15, 2019

Present:

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The USGA Green Section develops and disseminates sustainable management practices that produce better playing conditions for better golf.

Background

It was a pleasure to visit Sun City on behalf of the United States Golf Association. The purpose of my visit was to assist with the agronomic program of the golf courses. All three golf courses will be evaluated in 2019 during separate onsite visits. At the conclusion of each assessment, separate reports detailing my findings and site-specific recommendations will be provided to the leadership.

The focus of this initial visit was Cowan Creek—specifically the putting greens which had recently declined as a result of disease infection. We began the day reviewing recent environmental challenges and how that has negatively impacted turfgrass health for a number of golf courses in this region. A variety of agronomic topics were discussed along with common questions that have arisen among the membership. This discussion was followed by a tour of the golf course and review of recent management practices. I was also provided recent soil nutrient and water quality test results.

The following report summarizes our discussions and findings from Cowan Creek on Wednesday, May 15th. Please note that several of the recommendations herein may require several weeks or months before the desired result is achieved. Where appropriate, I have tried to provide a reasonable timeline that can be expected.

Please do not hesitate to contact me should you have any questions regarding the contents of this report or if any new playability issues occur. I look forward to being of service to Sun City.

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Abnormal Rainfall and Saturated Soil Conditions

Observations

1. Since September of 2018, much of Texas has been inundated with rain. Austin-Bergstrom International Airport received 38.95 inches of precipitation from September 1, 2018 through May 21, 2019. This is 13.39 inches above average.

Many places around Central Texas have received similar amounts of rainfall. Some locations received even more.

2. The unseasonable wet weather has weakened turfgrass, diminished playing conditions and complicated golf course maintenance practices for many golf courses.

- Too much of a good thing is never good for turfgrass. When soil conditions are saturated for extended periods, plant health declines. Turfgrass root cells require oxygen and waterlogged soils can only be tolerated for short periods of time before root dieback occurs. Similarly, wet conditions predispose plants to infection from a variety of fungal diseases and nematodes.
- Golfers can fully appreciate the frustration of having soft, muddy conditions that impede ball roll and limit the use of golf carts. What is often underappreciated is the length of time needed for soils to drain and the cumulative effect frequent rain events have on delaying recovery.
- Excess rainfall makes keeping up with regular maintenance practices quite difficult. The inability to keep pace with turfgrass growth or complete necessary cultural practices like aeration and sand topdressing can lead to future issues. Not to mention the number of labor hours that must be allocated to repair damage to bunkers and cleanup debris that is common following a heavy rain event.

3. Excess rainfall is only part of the story; limited sunlight is another contributing factor to the poor quality turfgrass conditions and slow recovery from damage experienced in the spring of 2019.

- Bermudagrass requires ample sunlight to grow and develop. A good rule of thumb is eight hours of sunlight, and at the very least six hours, each day.
- Numerous rainy and cloudy days over the past several months have hindered bermudagrass growth. As a result, many thin weak areas have persisted.

4. Rootzone samples were examined from several putting greens.

- On average, turfgrass roots extended 2 to 3 inches in depth. This is typical for ultradwarf bermudagrass. There was evidence of new white roots in each sample, which is a promising sign. Fine root hairs were also visible which is ideal.
- A layer of organic matter was present in the upper 3 to 4 inches of the soil profile. This layer had a less than recommended amount of sand, indicating that more cultivation is needed to offset organic matter accumulation. Too much organic matter leads to soft, wet conditions that can be problematic for root health and lessen playability.

Recommendations

While nothing can be done to control the amount of rainfall that is received, some adjustments can be made to help lessen the damage that occurs during such stressful periods.

1. Ensure adequate surface drainage is present for each putting green.

- Any low areas that are prone to puddling during heavy rain events should be corrected.
- This is best accomplished by eliminating collar dams that impede water movement. There are basically two approaches for correcting such elevated areas and which approach is most appropriate depends on the severity and size of collar dam.
- For collars that are noticeably high, such as those areas adjacent to a bunker where sand splash has built up, removal of material using a sod cutter is suggested. (See the USGA article [Strip 'em Bare](#)). A good example of this is near the front bunker on hole No. 8.



- Less noticeable collar dams should be alleviated through aggressive core aeration and rolling. I recommend double aerating these areas using the largest diameter tines available. Once the cores have been collected and discarded, wet the soil to lubricate and roll with a heavy roller. I suggest renting a 1-ton pavement roller to easily collapse the soil. Repeat this process monthly during the growing season until the collar dams are fully corrected. This gradual approach causes minimal surface disruption and should not negatively impact playability.

2. Improve water infiltration within the rootzone by increasing the amount of aeration that occurs each year.

- Periodic aeration and sand topdressing are vital for maintaining adequate porosity in the soil.
- Based on the concentration of organic matter that was visible in root samples, I would try to impact 20 to 25 percent of the surface through aeration this year. This could easily be achieved during the course of two aeration events if you double-aerate.
- For the first aeration event, I would deep-tine using 0.5-inch solid tines at a 6 to 8-inch depth. Immediately follow this up with a conventional aeration using 0.5-inch coring tines on a 2 x 2-inch spacing at 3 to 3.5-inch depth. Offset this second pass 30 to 40 degrees to avoid hitting the exact same holes. Remove all the cores and backfill with sand.
- Wiedenmann® and Redexim® both produce excellent machines for accomplishing deep-tine aeration. The other option is to work with a contractor to have the service provided. Obviously, having access to your own machine allows for greater flexibility with scheduling. Given the fact that you are managing three golf courses, I would encourage you to purchase your own unit.
- Doing both aeration events in conjunction will provide tremendous benefits without adding inconvenience to golfers or delaying the time it takes to recover. Simply run a deep-tine aerator and follow immediately behind with your Toro ProCore® 648. Most golf courses can complete both aerations in one to two days. See the USGA update [Double Aeration Doesn't Mean Double Trouble](#).
- For the second aeration event later in the summer, I would once again use 0.5-inch hollow tines with the Toro Procore 648 and repeat. The first pass should be at a 3.5-inch depth and the second pass should be at a slightly shallower depth, say 2.5 inches.
- It is important that enough days are provided to complete the aeration events and get the course ready for play. I would also suggest you have backup dates on the calendar in the event of rain. See the USGA update [Balancing Priorities](#).

Disease Outbreak

Varying amounts of damage from Pythium root rot was present on the putting greens at Cowan Creek. The weakest areas were stripped and will be sodded with new turf.



Observations

1. Symptoms consistent with Pythium blight and Pythium root rot were present on the putting greens. Disease diagnosis was confirmed by Mississippi State University.

- This makes sense given the amount of rainfall that has occurred this spring. I have witnessed several other courses this spring that have also experienced turf injury from Pythium.
- 2. Pythium is a very devastating disease and widespread damage can occur in a matter of a few hours when conditions are ripe.**
- The fact that the putting greens were healthy one day and injured the next illustrates this point. It is a good thing that the maintenance team reacted in short order as damage could have been much worse.
 - Mr. Wilson indicated that the other golf courses also started to show similar symptoms but did not advance as quickly. This is likely the result of slightly different growing environments.
- 3. This disease is commonly associated with extended periods of leaf wetness and saturated soil conditions.**
- Controlling moisture and improving drainage is the best way to prevent disease outbreaks. This is especially true for Pythium, which only shows up during saturated periods.
 - Fungicide treatments can help to protect and stop infections, but judicious use is needed to avoid the development of fungicide-resistant populations. In addition, the cost of these fungicide treatments can add substantial expense to the maintenance budget so only using them when deemed necessary is important.
- 3. Some evidence of nematode injury was also observed in disease samples. This is not surprising as nematode outbreaks tend to be worse in saturated conditions.**
- A single nematicide treatment was made using the product Divanem® at 12.2 fluid ounces per acre.
 - Results from a nematode assay two weeks after treatment indicated that the population was no longer a major concern.
- 4. The putting greens at Cowan Creek varied in the amount of damage, but in general those putting greens on the front nine sustained more damage.**
- At least three of the putting greens will require substantial sodding. The rest of them should be able to fill in over the course of the next one to three weeks. Based on the current condition, I suggest opening the putting greens once sod is secured.
 - Temporary target greens were established in the fairways so the most heavily damaged putting greens can stay closed.
- 5. Unfortunately, securing ‘MiniVerde’ sod at present has been a challenge. King Ranch has been unable to fulfill Cowan Creek’s order.**
- The amount of rainfall that has occurred throughout Texas has delayed the turf producers’ ability to cut and sell sod. It will likely be one to two weeks before they are even able to begin cutting.
 - Further complicating matters are the number of courses that have also experienced turf injury this spring. Mr. Olson indicated that Cowan Creek is currently third in line for receiving MiniVerde sod, despite placing an order several weeks prior.

Recommendations

- 1. Continue to fertilize the putting greens every five to seven days to promote growth.**
 - Apply quick-release nitrogen sources at 0.25 pounds of nitrogen per 1000 square feet.
 - Rotate between a complete fertilizer (e.g. 10-10-10) and a nitrogen-only fertilizer (e.g. ammonium sulfate).
- 2. Monitor soil moisture and only apply another fungicide treatment for Pythium in the event that the forecast calls for heavy rainfall or multiple days of rain.**
 - The threat of further disease infection has subsided. As such, I would no longer treat with Banol® or Segway® at this time.
- 3. Begin making monthly application of a phosphite fungicide such as Appear®.**
 - This type of fungicide can protect plant roots against Pythium related issues when applied on a preventative schedule. However, it is only effective when disease pressure is low to moderate.
 - If an outbreak occurs, I recommend treating with Subdue Maxx® since you haven't used that chemistry recently.
- 4. Continue to test for nematodes at least once per season to establish a baseline population. This should be done in accordance to lab instructions in order to achieve the most accurate count.**
 - A single sample should be comprised of several small samples that were taken from varying parts of a given green.
- 5. In the event that a nematicide treatment is needed, I recommend tank mixing Divanem® with Heritage® as this combination has shown synergistic benefits in research trials at the University of Florida.**

Improving Fairway Playability

Observations

- 1. One comment that came up during the course of our discussion was the fact that the fairways are very tight and make for difficult shot for most golfers.**
 - This is a common complaint this time of year on bermudagrass fairways and not unique to Cowan Creek.
- 2. On average, 40,000 rounds of golf are played annually at Cowan Creek.**
 - The amount of traffic from golf carts that the fairways are subjected to each winter when bermudagrass growth is nonexistent is the main reason for the tight lies.
- 3. Mr. Wilson indicated that there is some interest in overseeding the golf course in the fall of 2019 in order to improve winter playing conditions and help increase organic matter levels within the underlying sand layer.**

- Overseeding with ryegrass would certainly accomplish these goals, but I would be very cautious of embarking on such a program for several reasons.
- If you decide to overseed, be prepared to use substantially more water and more fertilizer. Additional costs that must be accounted for include added labor during establishment and transition, yearlong mowing, herbicide treatments to assist with ryegrass removal, and lost revenue during course closure for seeding.
- Not to mention, overseeding will complicate weed control efforts for *Poa annua* and could lessen the quality of the bermudagrass stand. Added cultural practices will likely be required to ensure the bermudagrass is able to recover from the stress of overseeding.

Recommendations

1. Increase the amount of nitrogen that the fairways receive each year.

- 2.5 to 3.5 pounds of nitrogen per 1000 square feet is a reasonable goal for 2019.
- Do not apply more than 0.75 pounds of nitrogen per 1000 square feet at a given time to avoid flushes of growth and numerous clippings. Ideally, 0.5 pounds of nitrogen would be delivered each month from April through September.
- I recommend making slow-release granular applications to avoid the amount of applications that are required.

2. Overseed Establishment.

- The first week of October, the fairways, tees and practice tee will be overseeded with 400 pounds per acre of perennial ryegrass seed. Given the desire to have excellent fairway playing quality throughout the season, aggressive fairway preparation (i.e. verticutting or scalping) is not recommended.
- To minimize the competition of the existing bermudagrass in the fairways with the perennial ryegrass overseeding, use of the plant growth regulator, trinexapac-ethyl (e.g. Primo Maxx®) is suggested. Treat the areas one to three days prior to overseeding at 0.5 fluid ounce per 1000 square feet. One week after the first mowing of the perennial ryegrass, apply trinexapac-ethyl at 0.35 fluid ounce per 1000 square feet. This can help to improve the density of the newly established ryegrass stand.
- New seedlings are susceptible to damping off diseases caused by *Pythium* and *Rhizoctonia* spp. To prevent infection and limit the likelihood of a disease outbreak, I would consider applying a preventative fungicide application at the time of seeding or shortly thereafter. For more information on damping off and chemical control options, please click [here](#).
- To limit the prevalence of *Poa annua*, I would plan on treating the overseeded areas with prodiame (e.g. Barricade® 65WG) four to six weeks after overseeding at 0.58 pounds per acre. Perennial ryegrass plant roots need be in the second inch of the soil to avoid injury.

3. Transition.

- Spring transition refers to the period of time when the playing surface moves from perennial ryegrass back to bermudagrass. Under ideal circumstances, this process occurs gradually with limited disruptions to playability. However, sometimes environmental conditions can create a poor transition, resulting in areas of weak turf.

- The key to spring transition is timely removal of perennial ryegrass, thereby allowing full bermudagrass recovery. Full recovery includes not only 100 percent ground cover, but also sufficient rhizome and stolon growth to provide surface strength. It has been reported that bermudagrass needs approximately 100 days of growth to recover in the absence of perennial ryegrass competition. Failure to do so can result in significant shading of the bermudagrass canopy and lead to substantial bermudagrass stand loss.
- During the beginning of April, I would apply a quick release nitrogen source at 0.75 to 1.0 pounds per 1000 square feet. Follow up with a second application at the same rate 21 days later. Ample water is needed during this period to promote bermudagrass growth and recovery. The combination of nitrogen and moisture will stimulate growth of not only the bermudagrass but also the perennial ryegrass, so frequent mowing will be needed. A 1/2-inch height of cut is recommended.
- To limit perennial ryegrass completion, I suggest you treat the overseeded areas with Sapphire® (i.e. penoxsulam) applied at 8 fluid ounces per acre in conjunction with the first nitrogen application. A follow up application should be three to four weeks later at the same rate.

Irrigation Quality and Soil Nutrient Testing

Observations

1. **Cowan Creek utilizes a combination of water sources for irrigation. The sources include recycled water from a nearby water treatment facility, well water from an aquifer, and some surface water that naturally drains into the irrigation holding pond.**
 - It is important to note that Mr. Olson said that irrigation has not been required, with the exception of watering in a product, since October of 2018.
2. **A 2016 water analysis report was provided for review.**
 - Based on the data included in that report, the irrigation water appears suitable for growing healthy turfgrass. There are no alarming issues that would restrict use.
 - Conductivity and sodium adsorption ratio values looked good, and individual ions were below toxic levels.
3. **The water analysis report did not include any information on nitrate levels, which is of particular interest given the fact you are using some recycled water.**
 - In general, recycled water will have elevated amounts of nitrate and ammonium which influence turfgrass growth. Understanding the exact amounts that are routinely applied over the course of a year is important to avoiding issues associated with flushes of growth.
 - You may be surprised to see how much nutrients you are applying just from watering. (See the USGA article [Reclaimed Irrigation Water Recycles More Than Just Water](#)).
4. **The soil nutrient analysis report provided was also from 2016 and was based on a Saturated Paste Extract Test.**
 - Saturated paste extraction is not the best method for determining soil fertility levels and can be very misleading. It should be used simply for measuring soil salinity (ECe).

- Oftentimes, the saturated paste extraction test is what fertilizer salespeople do because it underestimates nutrient availability and allows them to sell more fertilizer.

5. Data from the Saturated Paste Extraction indicate a SAR of 3.5 and Adjusted SAR of 3.9.

- This is a slight concern and can be overcome through a sound cultivation program, periodic addition of gypsum and flushing.
- Salinity levels should be monitored with a portable meter each month to determine when such practices are needed.

Recommendations

- 1. Submit three new water samples—one from the well, one from your reclaimed line, and one from an irrigation head on the course—so you can get a better idea of the two water sources and a better understanding once they are combined.**
 - Logan Labs offers this information in a separate test called an Irrigation Water Suitability test (\$42).
 - Make sure the irrigation water submitted directly from an irrigation head is located somewhere farther down the line away from the pump station as this will give a more accurate picture of the water characteristics after blending the two sources.
- 2. Complete a standard soil test using the Mehlich-3 method.**
 - Logan Labs offers a Complete Soil Test Package (includes standard Mehlich-3 test and Saturated Paste) which cost \$55.
 - Submit at least one fairway sample and one putting green sample. It is recommended that you continue to use the same soil testing lab going forward for consistency and accuracy.
- 3. Please forward me the new test results once you get them back so I can provide further guidance.**

Summary

It is important to realize that even with sound agronomic practices, disease outbreaks can still occur when conditions are conducive. The unseasonable wet weather has certainly been very challenging this year for not only the golf courses at Sun City, but throughout the state.

Although the current state of the putting greens at Cowan Creek is not ideal, they are showing good signs of recovery and should be fully healed in the coming weeks as temperatures warm. The front nine should be able to fully reopen once sod can be secured and planted. Based on communications with the sod producer, this should hopefully occur by the end of May. After planting, the seams and scars should knit together in a couple of weeks' time.

Going forward, increasing the amount of cultivation that occurs on the putting surfaces each year, alleviating collar dams and investing in a larger putting green nursery will help to limit the potential for turf injury during wet periods and lessen disruptions in play when injury does occur. I am very pleased with the steps that were taken in response to the turf damage resulting from Pythium at the end of March. Quick thinking by Mr. Olson and Mr. Wilson certainly helped to limit what could have been even more widespread damage by a serious fungal pathogen.

Respectfully submitted,



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Additional Considerations

USGA Green Section Record

If you would like to receive the USGA's electronic publication, the *Green Section Record*, [click here](#). It is free, informative and sent directly to you via email every two weeks. In it you will find numerous articles and videos pertaining to golf course management created for turf managers and golfers alike.

About the USGA Course Consulting Service

As a not-for-profit agency that is free from commercial connections, the USGA Course Consulting Service is dedicated to providing impartial, expert guidance on decisions that can affect the playing quality, operational efficiency and sustainability of your course.

First started in 1953, the USGA Course Consulting Service permits individual facilities to reap the benefits of on-site visits by highly skilled USGA agronomists located in Green Section offices throughout the country.



For questions regarding this report or any other aspect of the USGA Course Consulting Service, please do not hesitate to contact our office.

