COURSE CONSULTING SERVICE

Onsite Visit Report

Recreation Centers at Sun City

Sun City, Arizona

Visit Date: April 30, 2021

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

Executive Summary

Thank you for your kind hospitality and the invitation to return to the Recreation Centers at Sun City (RCSC) to conduct a Course Consulting Service visit on behalf of the USGA Green Section. Despite what turned out to be an extremely challenging overseed season due to the prolonged heat, it was good to see that on all golf courses visited, the overseed quality was good. It was even better to see the bermudagrass emerging and beginning to recover from overseeding. The change to the intermediate ryegrass has really worked well for these golf courses to deliver a good surface and yet also allow the bermudagrass to recover from overseeding better than when compared to perennial ryegrass. In this report, we will open with a discussion on the issues surrounding water, then discuss topics for each golf course we were able to tour, then finally end with summary comments applicable to all the golf courses. A brief summary of the topics discussed in this report is included below:

- **Water reductions.** All golf courses within the five active management areas in the state of Arizona will see changes to their water allotments in the Fourth and Fifth Management Plans upcoming within the next few years. Those courses with turf acreage in excess of 90 acres will see the biggest reductions. Obviously, this very much applies to the golf courses at RCSC, and we will discuss several ways in which to implement changes to address these future water restrictions. We will discuss the most proven way to reduce water use, which is removing irrigated turf. We will also discuss the Arizona pilot study using in-ground soil moisture sensors to potentially reduce water use. Participation from Michael Murphy and Chuck Hyppa for the study has been outstanding. We will also discuss an idea to upgrade to TifTuf bermudagrass, which also has the potential to reduce water inputs while still producing a quality golf course experience.

- **Individual course visits.** We were able to spend a little bit of time on the following golf courses: Willowcreek and Willowbrook Golf Courses, Riverview Golf Course, Lakes East and West Golf Courses, the North Golf Course and Quail Run Golf Course. The overarching topics for these golf courses are:

  - Conducting some type of solid tine aeration on fairways, roughs and green surrounds all 12 months out of the year.
  - Continuing vertical mowing and sand topdressing on putting greens on a routine schedule.
  - Keeping up with preemergence and postemergence herbicides in nonoverseeded bermudagrass roughs and especially green surrounds.
  - Only supplying enough nitrogen for healthy turf and avoiding excessive nitrogen that will only create undesirable organic matter and growth.
  - Finally, we will discuss the importance of limiting the frequency of overhead irrigation on all golf course areas, especially putting greens, to allow the surfaces to dry out in between irrigation events.

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Water Reductions

Observations

1. **Fourth Management Plan**

   The Fourth Management Plan imposed by the Arizona Department of Water Resources (ADWR) will go into effect January 1, 2023. This plan requires courses to reduce water use from 4.9 acre-feet to 4.75 acre-feet per acre. While this plan will reduce the water allotments at RCSC, there will still be enough water to irrigate the golf courses without turf reduction. However, in the Fifth Management Plan, the allotments will change substantially.

2. **Fifth Management Plan**

   While the irrigation negotiations are ongoing regarding the Fifth Management Plan, it appears that golf courses in excess of 90 acres will see significant water reductions. The current proposal is to provide enough water to overseed about 70 acres, and to be able to irrigate nonoverseeded bermudagrass for another 20 acres. It appears the allotment will also include 18 acres of low-water-use landscape at 0.74 acre-feet per acre. Ms. Ek reported that the Fifth Management Plan will impose a significant water reduction to most all golf courses in the RCSC umbrella, and a golf course such as the South Golf Course will lose about 400 acre-feet of water, which is enough to irrigate an entire golf course.

3. **Ten-Year Plan**

   In recent discussions with the ADWR, it seems as though they have expressed willingness to work with RCSC on a ten-year plan to implement turf reduction strategies, and hopefully this will be the case.

4. **In-Ground Moisture Study**

   Just this year on behalf of the USGA, I am facilitating a pilot study to evaluate the impact of using in-ground soil moisture meters as a tool to base irrigation scheduling decisions, rather than evapotranspiration (ET). I'm happy to report that Michael Murphy on the North Golf Course and Chuck Hyppa on the Lakes East and West Golf Courses have eagerly agreed to participate in this study and, in fact, have been the cooperators who have made the most progress so far. We have about 20 golf courses participating in the study.

   - We are using a handheld soil moisture meter called a POGO™ to map moisture in one fairway on each golf course over a period of several weeks. We are using these moisture maps to determine where to place three in-ground soil moisture sensors, one in a dry area, one that represents the majority of the fairway in a moderate moisture zone, and one that will be placed in a wet area representing a high-moisture zone. These sensors should be available soon and placed within the next few weeks.

- Once these sensors are in the ground, the courses will determine thresholds for each zone and will assign all the sprinklers on the fairway to a low, medium and high moisture zone. Once this is complete, courses can then utilize these three in-ground sensors to base irrigation scheduling decisions.

- This will likely be a two-year study to determine if courses are able to successfully irrigate with the in-ground soil moisture sensors to produce the same level or even better turf quality and playability and hopefully, courses will be able to reduce water use. I want to sincerely thank RCSC and especially Mr. Murphy and Mr. Hyppa for their willingness to participate in this study.

Above: This is a moisture map produced by the POGO software on No. 9 North after collecting about 80 samples one day last week. Most of the fairway is in the "green" which is ideal. A few isolated areas are in the tan/red which is dry, and very few areas are dark blue which are areas with high moisture.

Right: This is a moisture map of No. 1 fairway on Lakes West on April 30th. Most of the fairway is in the green zone while a few areas in the middle of the fairway and within about 50 yards of the green are in the dry to very dry zone. Very few wet areas, which is great!

Recommendations

1. **Turf Reduction**

Reducing irrigated turf and replacing with extremely low- or no-water-use landscape will be necessary for all golf courses with turf in excess of 90 acres.

- The infrastructure is already in place to remove turf on the Willow Creek Golf Course and therefore it would make sense to begin here. While there have been discussions about using low-water-use native grasses, it does not appear that this will be an option given that the ADWR has only allowed for 18 acres of low-water-use landscape at only 0.74 acre-feet per acre. In my experience, these native grasses require from 1 foot to 18 inches of water annually after establishment. You simply won't have enough water to irrigate the native grasses.

- It was good to hear that on the Quail Run Golf Course, there is very little or no water applied to the approximately 13 acres of desert landscaping installed in 2014. This is a good example of what could be implemented. Unfortunately, it is expensive to convert irrigated turf to this model and will cost approximately $20,000 to $25,000 per acre for the infrastructure, the rock, and the landscape plants.
- Another option would be to install no plants and no irrigation and simply remove turf and cover the ground in decomposed granite. Unfortunately, many would argue that this is not a very attractive look; however, it is better than no landscaping and bare ground.
- Another option we discussed would be to install low-water-use or eventually no-water-use desert-adapted trees over bare ground. While these trees would need irrigation for one to two years after planting, irrigation could then be shut off. Included below are some tree species you may consider for this purpose:
    - Acacia (*Acacia spp.)*
    - California pepper *(Schinus molle)*
    - Eucalyptus/gum tree *(Eucalyptus spp.)*
        - Lemon-scented gum (*E. citriadora)*
        - Sugar gum (*E. cladocaylyx)*
        - Red flowered malee (*E. erythonema)*
        - Swamp mahogany (*E. robusta)*
    - Evergreen ash (*Fraxinus uhdei)*
    - Jacaranda *(Jacaranda mimosifolia)*
    - Olive (*Olea europa)*
    - Afghan pine *(Pinus elderica)*
    - Palo verde (*Parkinsonia*)
    - Mesquite (*Prosopis*)
    - Holly oak (*Quercus ilex)*
    - Cork oak (*Quercus suber)*
    - African sumac (*Rhus lancea*)
    - Southern live oak (*Quercus virginiana*)
    - Tipu tree (*Tipuana tipu*)

2. Consider Upgrading to TifTuf

Bermudagrass research at sites all over the southern portion of the United States has determined in a scientifically significant manner that the TifTuf bermudagrass can survive on 20%, and maybe even 30%, less water than common bermudagrass.

- The TifTuf bermudagrass also is much denser than common bermudagrass and therefore the surface quality of the playing surface improves with this turf, and there is potential to not overseed this grass and still have a good surface on which to play during the winter months.
- The TifTuf would go dormant and turn to a straw color from probably mid-December through the end of February. However, if painted, the color retention can still be quite good and the TifTuf will deliver a much better dormant surface when compared to common bermudagrass.
- There is a significant challenge to killing the existing common bermudagrass and planting the TifTuf bermudagrass without the common returning.
- Other courses who have undergone this process typically use sodding and this will cost from $25,000 to $30,000 per acre. Of course, there is the potential to sprig the renovation areas rather than sod at roughly 60% of the cost of sodding; however, utilizing this process, we would expect greater resurgence of the common bermudagrass.
- It appears that the McCormick Ranch Golf Club will likely undergo a TifTuf renovation as soon as next year, and the golf courses at RCSC can use a wait-and-see approach to determine if this may be an option for your golf courses.

Drought imposed on Tifway 419 (left) and TifTuf (right) shows the TifTuf performs much better under drought conditions – up to 38% less water in this study.

Willowcreek and Willowbrook Golf Courses

Observations

1. **Healthy Bermudagrass Recovery in Fairways**

   A soil sample collected from No. 18 fairway on the Willowcreek Golf Course revealed a very healthy and robust bermudagrass population ready to emerge from the winter overseeding. It is clear that the transition overseed seeding mixture is working well and is beginning to die out with the onset of the heat to coincide well with the common bermudagrass emergence.

2. **Algae on Putting Greens**

   Similar to our observations in November, we did see algae on the surface of the putting greens. This is an indication that the immediate surface of the greens is holding water and remaining chronically wet.

Algae was visible on the surface on the Willowcreek greens due to chronically wet surface conditions. There is a thin layer of organic matter accumulation near the surface.

3. **Rootzone**

   Rootzone profile samples collected on the Willowcreek greens revealed a healthy rootzone with no indication of layering, although we did observe a very shallow, thin layer of organic matter accumulation at the immediate surface.

4. **Purple Nutsedge**

   We did observe purple nutsedge in putting green collars and some in the first few feet of the greens.

Recommendations

1. **Drying the Surfaces**

   It is important to allow the putting green surfaces to dry between irrigation events. This likely means watering three to four times per week. With healthy roots that were found at the 4- to 5-inch depth, the infrequent irrigation pattern will work very well.

2. **Monitoring Moisture**

   It would be very helpful to use a moisture meter on the greens at Willowcreek to better determine when irrigation is needed and when you can hold off on overhead irrigation and simply use hoses to address localized dry areas.

3. **Algae Control**

   Over the next month or so, it is recommended to use a steady rotation of mancozeb and Daconil Ultra® to reduce algae on the surface of the putting greens. A fact sheet on algae control has also been included with this report for your reference.

4. **Vertical Mowing and Sand Topdressing**

   As we observed on the Lakes East and West Golf Courses, the North Golf Course and Quail Run Golf Course, it is recommended to conduct routine vertical mowing and sand topdressing at Willowcreek and Willowbrook. The combination of vertical mowing and sand will help to decrease the algae at the surface, and the sand is critical to help dilute the shallow organic layer.

5. **Purple Nutsedge Control**

   We discussed using Monument® or Manage® herbicides for the next few months and including Vexis® as a spot treatment for the purple nutsedge. After mid-July, it is recommended to switch to Celero® herbicide to provide a greater level of control when the nutsedge begins to move the carbohydrates down to the underground nutlets. While this program can be labor intensive and expensive, it is suggested to pay very close attention to control in green surrounds as this area is the second most important area of the golf course next to putting greens.

Riverview Golf Course

Observations

1. **Excellent Putting Green Condition**

   The greens on Riverview Golf Course were in excellent condition on the day of the course tour. Soil profile samples revealed the more routine sand topdressing events have begun to help dilute the organic matter layer that developed following regrassing the greens.

The Riverview greens were in good condition with bermudagrass recovering well from overseeding. It is good to see adequate sand dilution at the greens surface.

2. **Soil Compaction**

   Soil compaction levels in the roughs and green surrounds on the Riverview Golf Course have been elevated since the renovation, and the recent increase in rounds and golf cart traffic has only made conditions worse.

3. **No. 6 Fairway**

   There are complaints about No. 6 Riverview from golfers missing right of the fairway and golf balls running down the hill and coming to rest in close proximity to the homes and in a low-lying wet area. The mound well to the right of the centerline of play has little turf due to compacted soil and very steep slope.

Golfers who try to cut the dogleg on No. 6 Riverview often find their ball down in this low-lying area that holds water. This area is 60 yards right of the centerline of the fairway.

Recommendations

1. **Putting Green Aeration**

   It is recommended to continue with your plans to conduct a double aeration in July. It is also recommended to continue with your plans to use small-diameter solid and hollow tines on a routine schedule throughout the year to open up the greens to improve water infiltration and oxygen exchange.

2. **Continuous Solid-Tine Aeration**

During the course tour, we were able to see a small demonstration of the AERA-vator® machine which shakes when the PTO shaft is engaged to rupture the soil. When not engaged, the tines roll along the ground and punch a hole that we observed at about 1½ inches deep in a very compacted area. It was reported that there are three or four of these machines among the seven golf courses, and there are also three or four of the larger Toro® 864 fairway aeration machines.

- Research on fairway aeration revealed that the benefits from these aeration events typically only last four to six weeks and therefore it is critical to continue to use some form of solid tine aeration continuously throughout the entire year.
- The message here is there is never a bad time to conduct solid tine aeration. If needed, we discussed either purchasing another AERA-vator or a drum-type solid-tine aerator which can be run at a fast pace and given that there are no moving parts, this is a very reliable machine.

Riverview superintendent Rick Stoffel gave the board members a demonstration of the AERA-vator machine during the course tour to show how this tool helps to mitigate soil compaction.

Lakes East and West Golf Courses

Observations

1. **Soil Moisture Sensor on No. 1 West**

It was great to hear that Mr. Hyppa has been using the POGO soil moisture sensor to map No. 1 fairway and that he has already made some irrigation adjustments to improve soil moisture consistency based on this information. As previously mentioned, we will use this information to determine where to place three in-ground soil moisture sensors on this fairway, hopefully in the near future.

2. **Bunker Renovation**

It was good to hear that the bunker renovation that was deferred last year will be completed this year. It was also good to hear that you will be using a modified design to the Better Billy Bunker™ to work around the perched water table that results in chronic wet conditions in the low areas of the bunkers.

3. **Turf Care Facility**

   It was excellent to hear that the new turf care facility will be installed this year on the Lakes East and West Golf Courses. This is obviously well overdue and will be a great upgrade to this facility. It's been interesting to hear from several golf course superintendents who have either renovated or built new turf care facilities within the last couple years that their ability to attract and retain new employees and the culture of their agronomic teams have improved since the renovations.

4. **Greens Vertical Mowing and Sand Topdressing**

   Apparently, there were some negative comments about the sand on the greens at the Lakes West Golf Course from golfers. A close observation of these greens revealed ball roll is excellent on these greens and just as good or better than the other greens we visited. The greens were recently vertically mowed and sand topdressed, which is a very necessary practice and one that is done to deliver a smoother and higher-quality putting surface.

A profile collected from a green on Lakes West shows a darker soil with more organic matter than other greens. However, notice there are no distinct layers and roots are healthy and growing to 5 to 6 inches.

Recommendations

1. **Continued Vertical Mowing and Sand Topdressing**

   It is recommended to continue with your routine plans for vertical mowing and sand topdressing. For the next vertical mowing, you may consider raising the blades slightly to a marginally less aggressive setting. If possible, it is recommended to run the vertical mowing machine up and back on the same pass, but this may be difficult given your limited amount of time in front of play.

2. **Bunker Renovation**

   I believe that we have already cleared up the details on the bunker renovation process, but if you should have any questions, please do not hesitate to reach out as you begin the process and I will be happy to stop by and discuss with you if possible.

North Golf Course

Observations

1. **Number 17 Green**

   Last November, No. 17 green had rippling from washed seed during the overseed process. Now in late April, it is great to see all the work Mr. Murphy and his team deployed to improve the putting surfaces has worked very nicely and the green is now in great health and ball roll is excellent.

No. 17 green North has improved substantially since our last visit in November where the overseed did not initially go as planned.

2. **Soil Profile**

   A soil profile collected from No. 17 green revealed there is some organic matter accumulation within the top 2 inches on these greens that were built in 2014. It was good to see that the top 1/4 to 1/2 inch is now lighter in color and is a reflection of the more routine sand topdressing program.

There is a slight amount of organic matter accumulation in the top 2 inches on the North greens, but it is good to see the top 0.5 inch contains a healthy mixture of sand and organic matter.

3. **Number 9 Fairway**

   We were able to evaluate the potential locations of the in-ground soil moisture sensors that will be installed in No. 9 fairway. It was great to see that like Mr. Hyppa, Mr. Murphy has already made some changes to his irrigation scheduling based on the portable soil moisture mapping to deliver an improvement in moisture consistency.

Recommendations

1. **Continued Programs**

   The recommendations for the North Golf Course reflect what we have already discussed, and the emphasis will be to continue with vertical mowing and sand topdressing on putting greens and conduct frequent solid tine aeration on fairways, roughs and green surrounds. We also again discussed the need to remain diligent in your efforts to control purple nutsedge around putting greens.

Quail Run Golf Course

Observations

1. **First Visit Since 2014**

   It has been at least seven years since I was last able to see the Quail Run Golf Course. It was great to see that this golf course is currently in excellent condition across all playing surfaces.

2. **Soil Profile**

   Soil profile samples collected on putting greens revealed a very deep root system, in fact, the deepest of all the greens we were able to sample, with roots extending beyond 7 inches. It was also good to see a lighter sand color near the surface of these greens, again indicating a routine sand topdressing program.

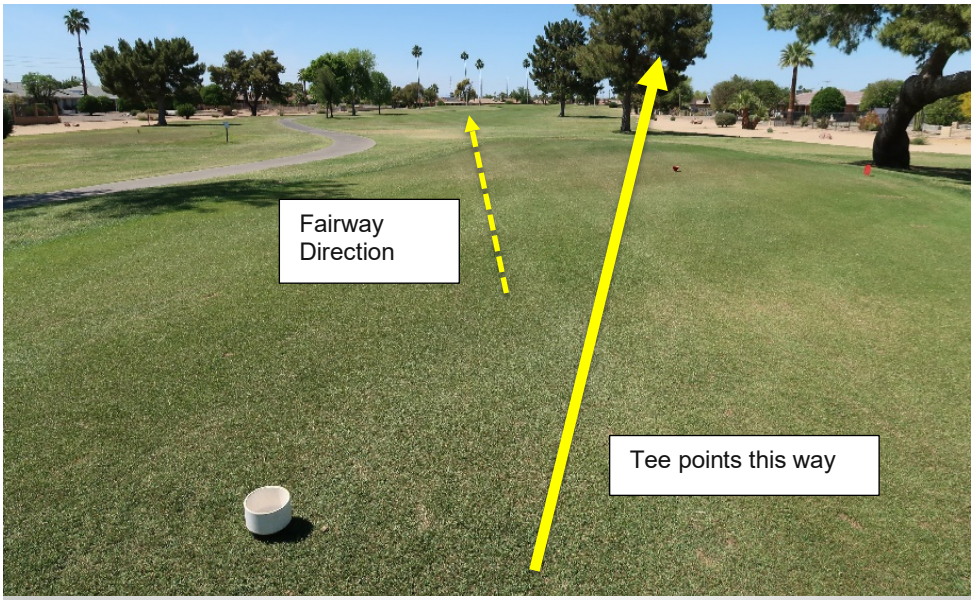
Roots were found at 7+ inches on the Quai Run greens and the rootzone does not contain any limiting layers.

3. **Desert Areas**

It was good to see the desert areas comprise about 13 acres on the Quail Run Golf Course and, after seven years, these areas now require very little or no water. It was interesting to hear that the decomposed granite has not been amended since first installed, and good to hear that preemergence herbicides are routinely used to help combat weeds. While expensive initially, this is potentially a good example of what can be deployed on the other golf courses.

4. **Crowned Tees**

We observed a severely crowned tee on No. 7. This tee also is oriented away from the fairway and points the golfer towards the houses on the right side of this hole.



The 7th teeing ground points towards the homes on the right, but the fairway is well left (dotted line).

Recommendations

1. **Tee Leveling**

It was good to hear that strategic tees will be stripped and leveled on the Quail Run Golf Course as well as some tees on the Lakes West Golf Course this summer. When leveling tees, this is actually a great opportunity to consider an alternative grass such as TifTuf on possibly one or two tees. In addition, we have found that when releveling tees, this is an excellent opportunity to install inline subsurface drip irrigation.

- The golf courses at Las Campanas Golf Course in Santa Fe, New Mexico, have installed subsurface drip irrigation in about 20 to 25 tees over the past few years, and the board recently approved installation of this irrigation technology on all the tees on both golf courses. The subsurface drip irrigation can be expected to yield a tremendous amount of water savings on a per area basis and will save 40 to 70% water when compared to overhead irrigation.

Summary of Recommendations

In this section, I would like to offer a few additional comments for adjustments to the agronomy program that are applicable to all the golf courses.

1. **Nitrogen Inputs**

   Excess nitrogen only encourages surplus growth and organic matter production, which ultimately leads to poor water infiltration. As such, it is recommended to apply only enough nitrogen to grow healthy greens that are able to recover from traffic. Do not apply nitrogen for color. When conducting summer aeration, apply only about 1/4 to 1/3 pound of nitrogen per 1,000 square feet. A good guideline is to apply about 4 pounds of nitrogen per 1,000 square feet annually.

2. **Aeration and Sand Topdressing**

   We discussed that the once-annual core aeration is working well and should continue as planned.

   - Utilize 1/2-inch or 5/8-inch diameter tines on a tight spacing and conduct two passes over the greens. There will be no problem using the same size tines and spacing when conducting the second pass. Many courses are already doing this. In addition, many courses are utilizing a third pass with a solid, deep-tine aerator.
   - Also, continue with routine vertical mowing at light intensity, and immediately before aeration, conduct a slightly more aggressive vertical mowing at about 1/8 inch below the bottom of the rollers.
   - It was great to hear that some courses are quantifying the amount of sand applied during sand topdressing. A good guideline is to apply an annual total of about 2,500 to 3,000 pounds per 1,000 square feet, or 25 to 30 cubic feet of sand per 1,000 square feet.

3. **Solid-Tine Aeration**

   Ideally, the golf courses would increase their frequency of solid-tine aeration on fairways, roughs and green surrounds. This practice can be conducted all 12 months out of the year.

4. **Purple Nutsedge Control**

   Unfortunately, the nutsedge is prevalent at all golf courses, but some worse than others. While you may only make two or three applications in roughs adjacent to fairways and tees, it is recommended to make four or five applications or more in green surround areas.

Conclusion

Thank you for the invitation to spend the day with board members and golf course leadership staff to discuss both short-term and long-range agronomic planning for the Recreation Centers at Sun City. While the labor resources on these golf courses are less than what private golf courses or higher-end public courses utilize, the product delivered day in and day out at these golf courses is excellent. The golfing members, who pay very little compared to many other courses in the Southern Arizona area, are receiving an excellent value. Furthermore, it is worth noting that the course leadership have done an excellent job of continuing to upgrade these golf courses over the past decade. The biggest challenge moving forward will be to work with the Arizona Department of Water Resources to come to an agreement to phase in turf reduction and potentially other changes to the golf courses that will ultimately allow you to meet the water duties imposed under the Fifth Management Plan. I look forward to continuing to work with you to meet these goals and working with Mr. Murphy and Mr. Hyppa on the pilot soil moisture study. Thank you for your continued support of the USGA Green Section. Please do not hesitate to contact my office should you have any further questions or concerns.

Respectfully submitted,

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Distribution:

Brian Duthu, Director of Golf and Grounds

Additional Considerations

The USGA appreciates your support of the Course Consulting Service. Please visit the *Green Section Record* to access regional updates that detail agronomist observations across the region. Also, please visit the Water Resource Center to learn about golf's use of water and how your facility can help conserve and protect our most important natural resource.

USGA *Green Section Record* and @USGAGrnSection on Twitter

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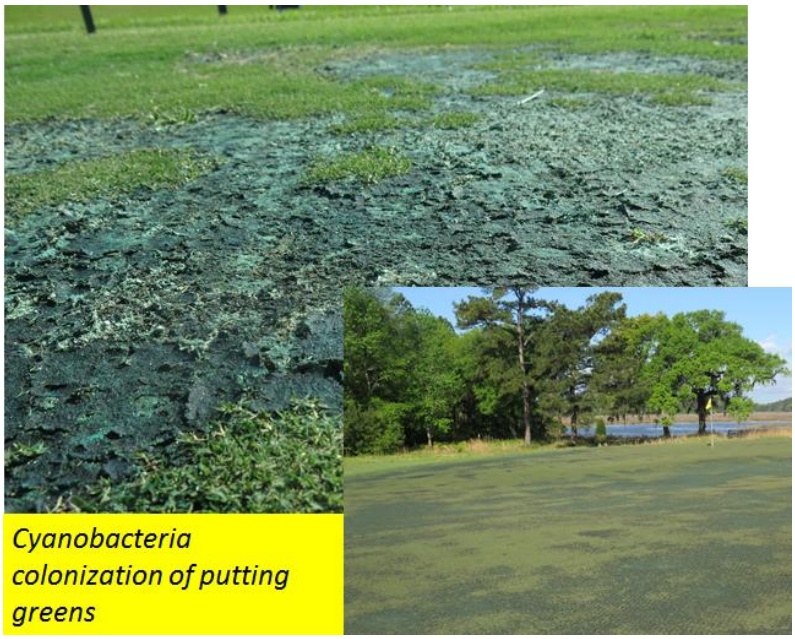
About the USGA Course Consulting Service

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.



Cyanobacteria colonization of putting greens

Cyanobacteria or blue-green algae

- Sometimes referred to as algae or algal slime
- Not a pathogen but an opportunistic colonizer of close-cut putting greens
- Can "seal" soil surface, preventing water penetration into soil (hydrophobicity) for turfgrass roots
- Produce toxins which can slow recovery
- **Symptoms:**
  - Black or greenish-black mats under turfgrass surface or in canopy
  - With high powered hand lens, green tendrils apparent under leaf sheaths
- **Conducive environmental conditions:**
  - high and prolonged surface and soil moisture
  - high nitrogen and phosphorous levels
  - high shade, limited air movement

- Cyanobacteria are usually introduced and establish on golf course putting greens from irrigation ponds.
- Mancozeb and chlorothalonil products were tested in trials in 1997 and found effective, but rates of these products have since dropped significantly, reducing their curative effectiveness.
- Hydrogen peroxide based products applied on short intervals (7 to 14 days) have been the most effective and economical means of controlling existing populations with a high degree of turfgrass safety.

Educational Tips for Success:

- Modify cultural practices first
- Some fungicides, especially systemic fungicides and those with PGR side effects, can lead to increased cyanobacteria colonization
  - If problem is pervasive, substitute or alternate to contact fungicides containing chlorothalonil or mancozeb for prevention
- Utilize hydrogen peroxide (dioxide) products for curative control
  - Hydrogen peroxide is an oxidizing agent, so it is important to apply these products as quickly as possible following their addition to the spray tank (water)
- Apply fungicides with nozzles that deliver coarse to very coarse spray particles and at spray volumes of 2 gallons per 1,000 ft^2 to maximize soil coverage (see Spraying for Success for additional information)

- **Cultural Practices:**
  - Frequent aeration to promote venting, drying and to facilitate drainage
  - Prevent collar sand "dams" that impede surface drainage from green
  - Avoid high levels of readily-available nitrogen or phosphorous
  - Prevent turfgrass loss from other diseases, nematodes, insects or scalping
  - Frequent sand topdressing helps shade out low-levels of cyanobacteria
    - Perform after fungicide applications
- **Fungicides:**
  - Prevention:
    - Mancozeb products such as Fore® or Dithane® at highest rates every 14 days
    - Chlorothalonil products such as Daconil® at highest rates every 14 days
  - Curative (and preventive):
    - Hydrogen peroxide products such as ZeroTol® or JetAg®
      - ZeroTol 2.0 at 3 – 6 fl oz/1000 ft^2 every 7 days (curative) at 2.0 gallons spray volume, 14 days preventive

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