

May 17th, 2012

Windmill Ridge Golf Course
Monett, Missouri

DATE OF VISIT: May 9th and 10th, 2012

PERSONS PRESENT:

Mike Knight, Golf Course Manager
Dave Gillaspay, Golf Course Superintendent
Michael D. Vogt, CGCS, CGIA

Overview of Greens Conditions

Upon arrival at Windmill Ridge Golf Course I made contact with Golf Course Superintendent Gillaspay.

Turf condition on greens continues to improve. A reasonable amount of turf population is present on most greens at the time of my visit.



Photo 1 #16 Green, Taken on May 9, 2012

Many of the areas that were void of turf have recovered very well. The contrast between Photo #1 and Photo #2 illustrates just how much green #16 has recovered. Upon close examination much of the turf that continues to fill-in the voids is desirable creeping bentgrass rather than *Poa annua* (Photo #3).

Fertilization seems to be aiding in the recovery at a proper rate for the situation. Superintendent Gillaspay mentioned that scalping was being noticed just a week before my visit. After raising the height of cut, vertical mowing and light topdressing, scalping was less of a problem.

Overview of Greens Conditions (continued)



Photo 2 #16 Green, Taken on September 15, 2011



Photo 3 Close-up of small voids filling from tillering of adjacent turf

Overview of Greens Conditions (continued)

The recovery and health of new sod installation remains to a problem on several areas. Greens #2, #6, #8 and #11 remain the slowest to show complete signs of sod recovery.

Water Management

Careful water management is extremely important to golf greens. It is excepted best practice to water heavily and supplement with hand watering and only the areas that need cooling during the high temperatures of the day. Also heavier deep hand watering of only dry hillsides or humps should occur between subsequent heavy waterings. An example of heavy deep watering would be to water greens for 45 minutes to 1 hour every 5 to 10 days. During times of low humidity and warm temperatures the shorter interval between watering is appropriate. Watering with overhead sprinklers for short run times should not be considered under any circumstance unless an overwhelming wilt situation is occurring without the required manpower to cool the greens and only until the plant regains normal turgidity. The decision to water greens should be made based on root-zone moisture, not on the calendar, number of days between waterings or scheduled manpower for certain days. The important take-away here is to keep greens dry on the surface and moist in the lower root-zone.

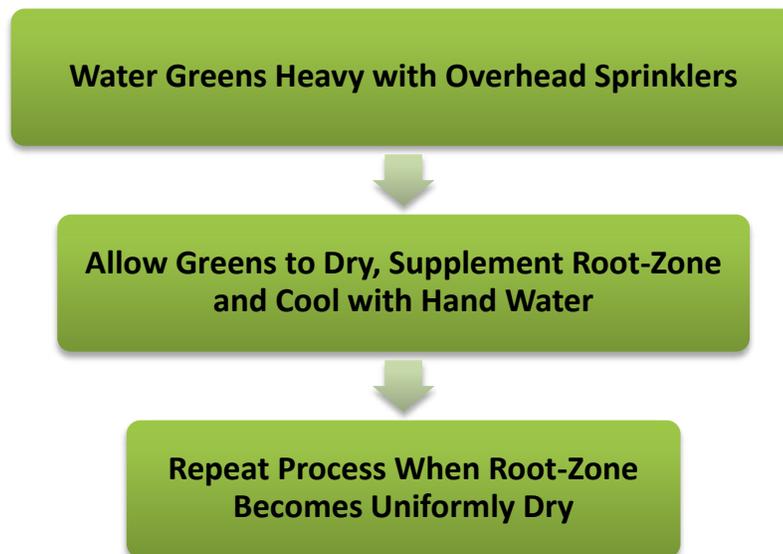


Figure 1 Best management practice for greens watering

Hose end water can be supplemented with wetting agents in a pellet or disc form to aide in water penetration into the root-zone. Check with your local distributor for product availability. Hydro-Wet Pellets from a company named KALO or similar would be beneficial. Hose end applicator is available through Underhill Products, 949-305-7050, product A-PPWA50 or similar.

Venting Greens

The venting of greens is nearly as critical for proper turf performance as the use of water. Extensive, deep turfgrass rooting, prior to high summer temperatures will aide turf survival. The root system not only collects nutrients from the soil but acts as a carbohydrate storage structure. The more root mass the better the turf plant can store food and survive during low food production during days of high soil temperatures. Venting of green surfaces will encourage deep fibrous turfgrass root structures, especially in spring when root production is greatest. During the venting process a solid tine penetrates the green surface creating a pencil sized void in the root-zone below.

A mowing or rolling after venting will produce a smooth surface and all but eliminate any tufts of turf created by this procedure (Photo #4). Photo #5 shows Windmill Ridge Superintendent Gillaspay operating a machine to vent the greens. This venting operation will not adversely affect the green surface as core aerification would

It is important to note a slightly dry green will except this venting procedure better than a wet green. For this reason venting should take place several days after a heavy watering, as explained in the section, Water Management above.

The machine used to vent has addition space for more tines. As noted in Photo #5, additional tines should be added to increase the number of holes per pass. By adding 15 additional tines to the machine, an increase of 75% in additional holes could be realized.



Photo 4 The green surface immediately after venting

Venting Greens (continued)



Photo 5 Venting greens with solid tines

Each year demonstrates that the most successful greens maintenance programs, especially in the Transition Zone, venting and water management are the two most important factors in greens survival during the summer months.

Both of these practices, if preformed correctly leads to better rooting and in-turn a turf plant that has the ability to withstand high root-zone and air temperatures (see Photos 6 and 7).

The venting of greens should continue with all greens being vented twice per month if possible. The venting operations should also continue until temperature or turf conditions no longer allow safe venting without turf damage. Typically during the months of July, August venting should only occur if weather moderates for several days (highs below 90° F).

Venting Greens (continued)



Photo 4 Root mass growing in a vent hole



Photo 5 Root mass growing in vent holes

Sod Installation on Greens

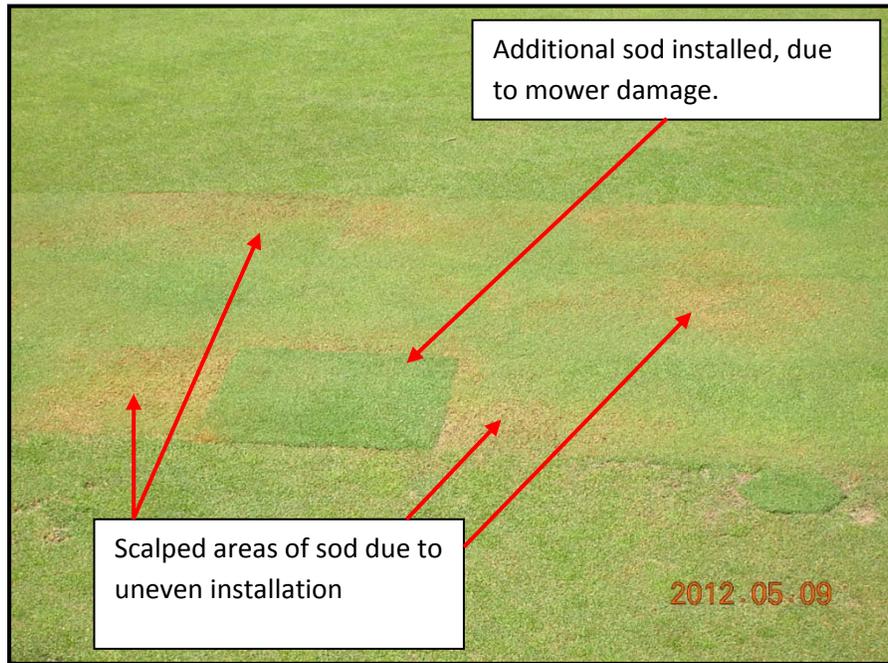


Photo 6 Sod installation and scalping

Several of the sodded areas on greens remain weak due to unevenness in the green-to-sod surface. Perhaps additional rolling would be beneficial before the onset of high temperatures. Due to low mowing heights it is imperative that a perfectly level sod installation occur. Rooting of new sod will take at least 30 to 60 days, under ideal conditions. During high soil temperatures (above 85° F, rooting will no longer occur), it is critical that healthy rooted sod be present before summer stresses if a chance of survival is expected.

Continue spot plugging on greens as needed. This should be practiced as often as necessary.

Greens Root-Zone Soil Tests

On May 10th I have taken greens root-zone samples on #2, #3, #6, #8, #11, #14 and #16 for laboratory analysis. Results and recommendations will be forthcoming before my next visit.

Spray Applications of Primo MAXX™

Primo MAXX™ is a generally accepted chemical application to regulate and pre-stress condition turf. Primo MAXX™ has been used for years at Windmill Ridge, but note: On greens to minimize possible turf injury, apply Primo MAXX™, then wait at least 4 hours before mowing or mow first, wait at least 1 hour, then apply Primo MAXX™.

Schedule of Green Renovation Events

April / May, 2012 - Greens Maintenance Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
5/20/2012	Vent Greens ¼ inch needle tines		Sea Blend, 12-4-5 >½ N/1000 ft²	Vent Greens ¼ inch needle tines	
WEEK 12					
5/27/2012	Memorial Day	Daconil, 26019, 3336, CPR, N, N-P-K, K, Mg, Mn	3rd (final) Pre-Emerge Application Dithiopyr 1.12 OZ per 1000 ft²	Vertical Mow one direction, ⅛ inch below level-then <u>Light Sand</u>	Tournament, Chamber, June 1st
WEEK 13					
6/3/2012	Vent Greens ¼ inch needle tines	Vogt Visit	Vogt Visit	Vent Greens ¼ inch needle tines	Spray .125 oz Primo / 1000 ft²
WEEK 14					
6/10/2012	Fungicide and liquid fertilizer application- TBD			Vertical Mow one direction, ⅛ inch below level-then <u>Light Sand</u>	Tournament, Hot Rod Memorial June, 15th and 16th
WEEK 15					
6/17/2012	Vent Greens ¼ inch needle tines			Vent Greens ¼ inch needle tines	
WEEK 16					
6/24/2012	Fungicide and liquid fertilizer application- TBD			Vertical Mow one direction, ⅛ inch below level-then <u>Light Sand</u>	
WEEK 17					
7/1/2012	Tentative/Weather Vent Greens ¼ inch needle tines		July 4th	Tentative/Weather Vent Greens ¼ inch needle tines	Spray .125 oz Primo / 1000 ft²
WEEK 18					
7/8/2012	Fungicide and liquid fertilizer application- TBD			Tentative/Weather Vertical Mow one direction, ⅛ inch below level-then <u>Light Sand</u>	Tournament, NEA, July 14th, 15th
WEEK 19					
7/15/2012	Tentative/Weather Vent Greens ¼ inch needle tines	Tentative/Weather Vent Greens ¼ inch needle tines			Tournament, Relay For Life, July 21st
WEEK 20					

Schedule of Green Renovation Events (continued)

All of the operations outlined on the above schedule have been discussed and agreed upon in method, supplies needed and execution with Superintendent Gillaspy. It is our mutual opinion that this schedule will enable the best opportunity for recovery and sustainability of the greens turf surfaces at Windmill Ridge Golf Course. During the next four weeks weather conditions will vary and decisions on the greens renovations programs may not be perfectly aligned with the dates outlined, I will be in contact with Superintendent Gillaspy weekly to assist in scheduling these programs as needed.

Fans

Promoting a healthier turf environment through improved air circulation and the alleviation of heat stress are the primary reasons most golf course superintendents use fans on their greens. Solar heat can have a devastating effect on turfgrass. When a green's subsoil temperature reaches high levels, turfgrass roots begin to shrink, diminishing the quality of the putting surface. Fan use can lower the surface temperature of a green up to 10° Fahrenheit, which in turn, lowers the soil temperature approximately 4° to 6° F.

Fan use increases turfgrass transpiration, cooling the plant internally and keeping it healthier overall. As an added benefit, fans can be used to evaporate excess moisture from heavy morning dew. Although thinning trees works best, fans have shown to improve the quality of shaded greens.

On greens #2, #6, #8, #11, #14 and #16, fans may be beneficial to the overall health of the greens turf. If considering the purchase of fans it is important to size the fan appropriately, the small fan on #2 green is of little use.

Conclusion and Recap

Water greens for complete deep wetting of the root-zone, do not use overhead watering unless absolutely necessary. Supplemental water should be applied only with hand applied sources such as hose and nozzle in areas of moisture stress or high temperature stress.

Continue **venting operations** on an ongoing basis. Windmill Ridge has less active play times generally on Mondays and Thursdays, accomplishing 8 to 10 greens each day, every other week until temperatures begins to remain high (sustained daily highs greater than 90° F) would accomplish this goal. Venting of the root-zone is critical to the health of the turf plant. Venting encourages root growth, gas exchange and supports water infiltration and evaporative cooling. I cannot stress enough the value of this program of venting. If properly accomplished these small vent holes will not interfere with putting if the greens are either rolled or mowed immediately after the venting process.

Conclusion and Recap (continued)

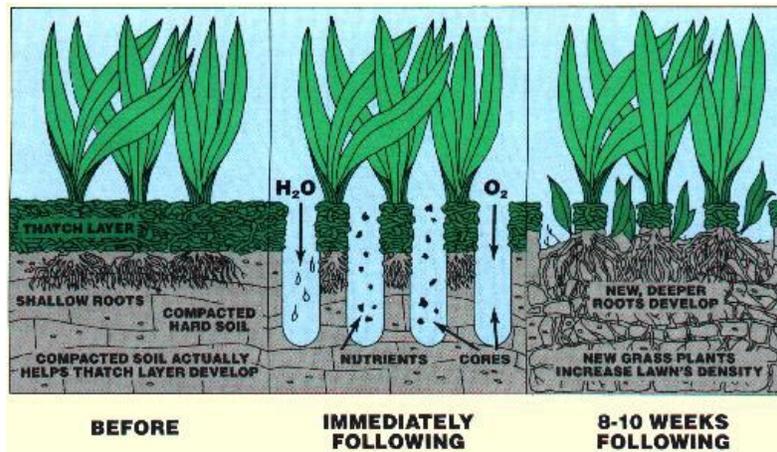


Figure 2 Benefits of venting

Vertical mowing is a sound cultural practice to aide in the thinning of the turf canopy. Deep vertical mowing should be avoided until late October. While vertical mowing may be used to slightly thin the leaf blade, avoid cutting into the crown area of the turf plant. When vertical mowing from now until late October these rules should be followed:

- Vertical mow once per every two weeks, in only one direction per mowing,
- Set the vertical mower reels no deeper than 1/8 of inch below roller level,
- Do not vertical mow when daytime high temperatures are expected to be above 90° F.

Mowing height is to remain at .160 of an inch. On May 10th Superintendent Gillaspay and myself measure the greens for speed after mowing at .160 of an inch, the average of 12 ball rolls on four separate areas was 7.4 feet. New bed knives were installed and mowers were lapped to renew sharpness the day before we measured speed. In Figure #2 I have illustrated a mowing height of cut (HOC) diagram for greens, this diagram points out proper heights of greens without regard to:

- Operating budget
- Type of turf
- Geographic location
- Type of green construction
- Type of mower being used

Conclusion and Recap (continued)



Figure 3 Mowing heights for greens

While HOC is certainly one measure we use in the equation of greens management the ultimate measure is a combination of player satisfaction and turf survivability, striking this balance should be our goal.

To enable the greens at Windmill Ridge to have the best chance of survival, I recommend remaining at a height of cut that will encourage the turf to have enough leaf to manufacture food for the plant and still provide an acceptable putting surface. A ball roll measured between 7 and 8 feet is highly desirable for most daily play, tournament or special occasions that warrant higher ball roll speeds can be achieved by additional rolling. Be warned that a HOC below .160 for Windmill Ridge greens, in their current condition, during the heat of summer, will stress the turf and may result in turf loss.

The desire for fast greens is part of the game today. The big question that needs to be answered is, "What should be our daily green speed goal?" On too many occasions, golfers do not know how fast they want the greens, and the superintendent doesn't know how fast they should be. If you do not have a reasonable green speed goal, the push for an arbitrary "faster ball roll" has no end. Unfortunately, mowing grass too closely, especially during hot humid summer weather, can result in the rapid decline of the greens. I have witnessed this situation far too often.

Conclusion and Recap (continued)

The Greens Management Pyramid is a helpful diagram to help explain, address and solve greens problems (Figure #1). The abbreviation PGR = Plant Growth Regulator such as Primo MAXX™ used by Windmill Ridge.

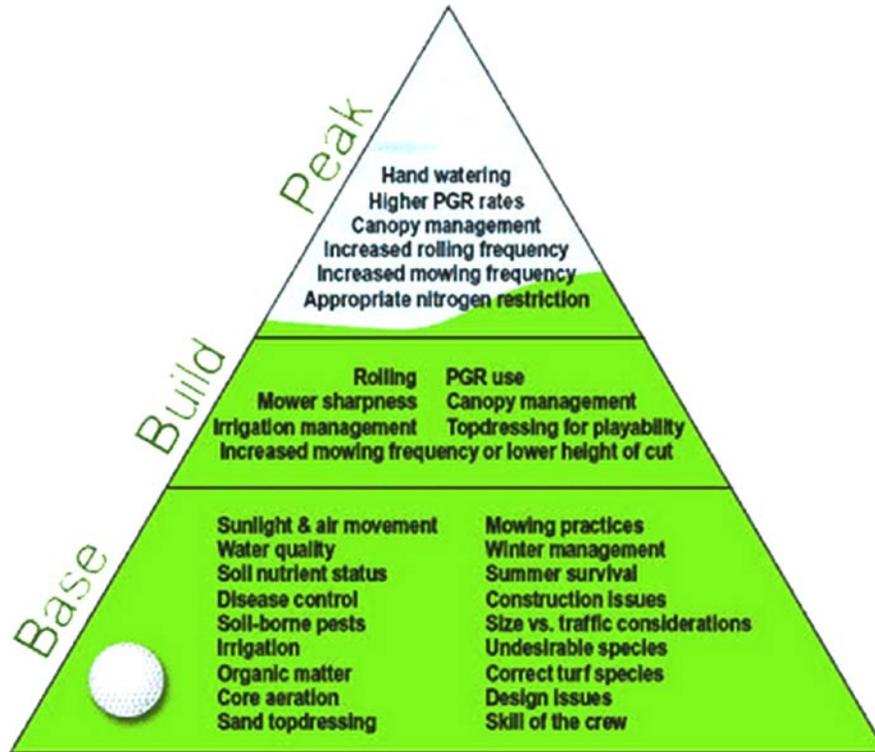


Figure 4 Greens Management Pyramid

Generally working from the bottom of the pyramid to the top is a conservative course of action that in most cases will yield fine results. None of these steps should be overlooked or circumvented for best possible results.

My next scheduled visit is June 5th and 6th. During this visit we will examine how the renovation schedule is progressing and make any maintenance modifications if needed. We will also plan a greens maintenance program for the next 5 weeks.

Any questions or comments, please feel free to contact me at your convenience.

Respectfully submitted,

Michael D. Vogt, CGCS, CGIA