

YARN # 26

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Plants need oxygen & standing water is not a good thing

My mentor twenty-one plus years ago was and is one of the most intelligent and knowledgeable people of the sports turf industry. His name is Leon Howard and his master's thesis, under the guidance of Dr. Marvin Ferguson at Texas A & M became the USGA specifications for the physical properties of sand based greens, which are still used today. While Leon and I were fabricating a piece of equipment for the lab those twenty-one plus years ago, he stopped in the middle of welding a leg onto a frame, looked up at me and said, and I quote: "Dave, I don't know what you will learn with this research in the future, but I can tell you this for sure..... **Plants need oxygen and standing water is not a good thing.**"

Twenty-one years later and after thousands of physical properties tests, I have learned two things. **Plants need oxygen and standing water is not a good thing.**

The USGA specifications [now referred to as recommendations] are designed to provide sufficient oxygen pores and water pores [pores are the spaces between the solids] the larger pores hold gasses [oxygen etc] and the smaller pores retain moisture thus assuring that the plant has a sufficient amount of oxygen to breath and a sufficient amount of moisture with which to cool itself.

In USGA greens there are drain tiles under the greens mix which are imbedded in trenches filled with gravel which remove excess water/moisture from the greens mix. If the physical properties of a green are in balance and if the drain tiles are not compromised than it is impossible to overwater a USGA green. Any water not held in the small pores travels through the larger pores downward from the pull of gravity into the drain tiles and is thus removed from the greens area.

Once the drain tiles are compromised [crushed, capped, filled with tree roots, cut etc.] water is trapped in the tiles and becomes anaerobic, producing CO₂, methane and other bad guy gasses [sewer gas]. These gasses than travel up through the drain tiles and if those drain tiles are capped and the gasses cannot escape, they then travel up through the larger air pores in the greens mix to the surface and in many cases cannot escape due to a higher than desired organic matter content in the top inch or two of the greens mix. Even if the organic matter in the top inch or two of the greens mix is not on the high side the bad guy gases have filled our larger pores replacing the oxygen the plant needs to breath

and results in the plant being stressed and in many cases results in the plants death. What caused the plant to die? **LACK OF OXYGEN**

A number of years ago when I started to realize that this lack of oxygen in the larger [air] pores was causing turf failure I started to work with superintendents throughout North America on ways to eliminate this cause of turf lose. This research has resulted in healthier turf and better putting surfaces, without, in most cases the necessity of purchasing expensive equipment.

Last week I was in the mountains of North Carolina working with some superintendents to find drain tiles under greens and one of the superintendents was nice enough to send me the following pictures and e-mail. With his permission I am able to share this e-mail with you.

*****Pictures and e-mail here please*****

The turf on the two greens mentioned was extremely stressed and the root system was very unhealthy and straggly. You will notice in the first picture the lack of soil/greens mix on the roots, indicating a lack of root hairs and an unhealthy plant. In the second picture you will notice a much denser root system with millions of root hairs holding the soil from the greens mix. This was accomplished by sealing off all of the outlets of the green except for one and in that one we inserted a back pack blower and blew air up through the drain tiles, which then traveled through the gravel layer and up through the larger air pores of the greens mix resulting in us being able to supply much needed oxygen to the plant. The healthier root system in the second picture was a result of the back pack blower being run for just one hour each morning for three mornings.

COST: Three guys, one day's labor to find the drain tiles.

RESULTS: Two healthy greens and many happy golfers.

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