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Effective Course Agronomic Programs Require Science

By Dave Doherty

How can we achieve the healthy putting and playing surfaces golfers seek so much today?

Since founding the International Sports turf Research Center, Inc. (ISTRC), [pronounced: is-trik] 16 years ago, my staff and I have had the opportunity to look at the physical properties of thousands of greens to try and understand the role physical properties play in the healthiness of the turf. Since 1999 ISTRC has provided service to over 2,000 golf courses including the majority of the top 100 ranked courses.

ISTRC's sole purpose is to monitor the physical properties of sand and soil based root zones and to understand what the **real** life physical properties are that lead to healthy putting and playing services and what **real** life physical properties lead to the failure of our turf. ISTRC SELLS NO PRODUCTS OR EQUIPMENT.

We've analyzed greens from some of the oldest courses in the world including courses designed by Herbert Leeds, Willy Parks Jr., Donald Ross, and Alister Mackenzie, as well as modern day courses designed by Jack Nicklaus, Tom Fazio, Arnold Palmer and Robert Trent Jones Jr., to name a few.

From the old and the new we've had the opportunity to monitor the aging process of all types of golf greens throughout the world, and from this experience we have compiled and continue to compile information that has proven to be of tremendous value to the golf course superintendent, general manager, green committees, owner and anyone else who has the responsibility of making decisions affecting the quality of our course.

The USGA recommended guidelines are a very good starting point for new green construction. However, as greens age the physical properties change and this change in physical properties is what must be understood in order to maintain the quality of putting surfaces we all like to play on.

Over the years I have been asked many times to write about the ideal physical properties for golf greens and how to achieve them. I have always been hesitant and declined, due to the complexity of the subject and the large number of variables involved. I have preferred instead to work with individual superintendents, GM's and green committees. However events over the last 18 months lead me to believe written information is now possible.

Every article I've read over the last 16 years about physical properties has alluded to physical properties being maintained but never have I read an article to accomplish that task. This lack of knowledge in regards to physical properties

as they exist in the field is no ones fault. I'd like to point a finger at someone for this lack of information but there's no one to point a finger at.

Over the years the topic of **real** physical properties has been swept under the rug and only referred to in broad terms, much like my aunt sally who the family would rather not acknowledge the existence of.

It's important that we all understand the three properties involved in maintaining turf on a golf course: 1) physical, 2) chemical and 3) biological. If the physical properties are out of balance than we can forget the chemical and biological because they cannot perform the functions for which they are intended.

Everything is dependent on the physical properties being balanced and it is the one area that's been misunderstood for the last 50 years, because of lack of knowledge.

For the last 50 years [since the inception of sand based greens] we've been dictating to the greens what we are going to do for aerating and other practices. That's like performing surgery on a patient when we don't know exactly what the problem is.

It's time we started listening to our greens by monitoring their physical properties on a regular basis and using that information to make decisions for the next 12 months or until we monitor again.

ISTRC's data base, which is the largest and most complete record of on-going **real** physical properties in the world, is our most valuable resource for an effective monitoring program.

How can we have an effective agronomic program from year to year to year without monitoring? We can't. The future based on science begins here.
In future issues we'll cover in detail the three major causes of green failure and what we can do about it.

1. Organic Matter
2. Gasses
3. Irrigation

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PART II/OUTLINE

1. In the spring of 1991 I was on a golf course with a very well known and respected superintendent on the day he was aerifying and I asked him why he aerified.

Being a member of a Country Club for many years I never understood why the superintendent would tear up the greens in the spring and the fall when they were looking so good. If the greens needed to be destroyed for the shear enjoyment of the General Manager and the superintendent why not destroy them in July or August when they were in bad shape anyway. If the GM and GCS wanted to play Russian roulette with there job security twice a year that was their business but why did they have to do it with my greens? When I asked my friend the well known superintendent why he aerified, his response was "I need to oxygenate the greens", when I persisted and asked how much oxygen he needed there was complete silence. This same lack of knowledge in regards to why we do some of the things that we do is still very common in our industry. It seems that we do them because it has alwaysbeen done that way. WOW what a waste of resources.

2. Over the years I have been dealing with physical properties I have come to understand that we are only dealing with two things. Solids and Pore space. I don't think that those two things are as complicated as I was led to believe by all the so called experts back in the late 80's. Solids are the sand granular and the pore space is the space between each granular or solid. Small pores hold water and the larger pores hold air. Roots cannot live in solids/granules and they cannot live in water, which brings us to the logical conclusion that our root system can only exist in the **air pores** of our greens, tees and fairways. [326}

3. DRAWING!

4. In 1995 ISTRC's independent research showed that the bent and Bermuda grasses of that time needed to have at least 15% of the total greens mass to be air pores. ISTRC's later research showed that the air pores needed to be in the 18% to 20% range for the **newer** grasses, both bent and Bermuda. The reason for additional air pores needed for the newer grasses is due to the fact that there is a much denser root system that comes with all of the newer grasses. USGA funded research at different universities later confirmed these original ISTRC numbers. I like to think of air pores as "Rooms at the Inn". If for example we have a million roots, we need a million rooms [air pores] for those roots to live in comfortably. If we have only 800,000 rooms [air pores] for the million roots than the million roots will not have enough oxygen to sustain themselves in a healthy manner and will be unable to provide the golfer with the putting service he desires. [503]

5. My friend the well known superintendent should have been able to answer my original question with an answer along the lines of: Based on the scientific results obtained from a study conducted by an independent soils lab we know that our greens do not have enough air pores to support the oxygen needs of our grass; therefore I am removing some of the old material and replacing it with new material that will increase our air pores and begin the process of providing more oxygen for our turf, enabling it to function in a more healthy state. [601

6. No answers based on science were available to superintendents back in 1991, however they are now. Greens Committees, Owners, GM's and anyone who is responsible for making decisions concerning greens is entitled to an answer that is based on science and not guess work. Questions such as: How often our greens

need to be aerified and are the tine sizes and spacing the most effective they can be. Are we wasting money by using the wrong techniques? Do we need additional or different equipment? Are we filling our holes with the best material available? Do we need to fill the aerifying holes or should we leave them open? Should we sometimes fill the holes and sometimes leave them open? With the knowledge that we have available to us now the superintendent can answer questions with the different options available to each course. [744]

***ISTRC's contributions to the industry. PhysicalProperties/(Real Time) Displacements & solutions (smaller tines and closer spacing). Gasses & solutions (Mention Dr. Milts comments at the Oklahoma conference this month/Nov. 06 about gasses but no solutions.)