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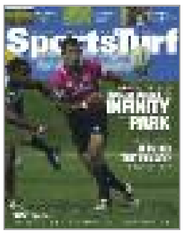

On the cover:
"Our city management team trusts us to make decisions on the playing surface and is always concerned how many hours the field is being used. This trust allows us to make the best decision possible not only for the short term but also future of our facility."-Noel Harryman, manager, turf operations, Infinity Park, Glendale, CO.

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From the Sidelines

Eric Schroder
Editorial Director
eschroder@specialtyim.com
717-805-4197

Why aren't you a member?

As spring sport athletes began hitting the fields here up North after the brutal, forever winter, thousands of folks whose job responsibilities include preparing and maintaining those fields were and are working overtime. Heck, even many of you fortunate enough to live in warmer climates have probably faced different problems than normal following the USA's SOB Old Man Winter.

How many people are facing problems that they really aren't sure how to handle? And if so, where do they turn for help? Conditions such as we're seeing now provide a terrific example of why ponying up the dough for membership in the Sports Turf Managers Association is money well invested (plus your employer might reimburse you—ever asked?).

The STMA founders got together initially because they wanted to improve the sports turf industry through sharing knowledge and exchanging ideas. And that's still the true core mission of the association. Conference attendees' discussing their field issues and offering advice to one another over coffee or beers is a great STMA tradition treasured by members. But you don't have to attend the Conference to have access to this advice; your membership alone can do it.

Here are just a few of the topics about which the STMA provides information, and the sources of this info are the best minds in the industry: professional development; turfgrasses; construction and renovation; recordkeeping; environmental stewardship; cultural practices; turfgrass insects, weeds, and diseases; and university research.

The biggest resource though is the membership itself. For example, I have yet to hear a story about a member responsible for 20 acres of parks and fields in a small town calling the guy or gal who manages Division I fields at the state university and being told, "I'm too busy to help you" or "I'm too good to return a call from a parks and rec guy." I'm not saying it's never happened but if anyone reading this knows of such a situation please let me know and I'll report it here, aka eat my hat.

Of course there are other benefits to membership as well, such as access to the Members Only section on www.stma.org where you'll find a Career Center that offers help in finding or filling positions in the industry, as well as resume and interviewing tips and other career advancement assistance specific to our industry. There's also the Playing Conditions Index, a tool developed to assess the playability of your fields at specific points in time. Using it can provide guidelines to maintenance practices, assist in communicating with user groups, and prove to your boss why you need more resources.

And of course there are normal association benefits of membership like a directory of members (to find that Division I person who won't rebuff you) and awards programs. Perhaps the most important among these benefits is the Certified Sports Field Manager program, an earned designation that signifies you as a serious professional with expert credentials.

I am sure there are plenty of turf managers out there who consider themselves serious and professional who aren't members; maybe it's time to show your family, friends, bosses and co-workers just how serious and professional you are by joining the STMA. ■

SportsTurf

1030 W. Higgins Road
Suite 230
Park Ridge, IL 60068
Phone 847-720-5600
Fax 847-720-5601

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SportsTurf MANAGERS ASSOCIATION

STMA OFFICE
805 New Hampshire Suite E
Lawrence, Ks 66044
Phone 800-323-3875 Fax 800-366-0391
Email STMAinfo@STMA.org
www.STMA.org

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Direct Mail List Sales
MeritDirect, Jim Scova
Phone: (914) 368-1012
jscova@MeritDirect.com

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Phone: (847) 763-9565
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Reprints
Debra Welter
dwelter@specialtyim.com

Group Publisher
Jeff Patterson
Phone: (763) 383-4458
jpatterson@epgmediallc.com

Account Representatives:
Chris Pelikan
Senior Account Manager - East
Phone: (954) 964-8676
cpelikan@epgmediallc.com

Peggy Tupper
Senior Account Manager - Mid-West
Phone: (763) 383-4429
ptupper@epgmediallc.com

Leslie Palmer
Senior Account Manager - West
Phone: (248) 731-7596
lpalmer@specialtyim.com

President's Message

David J. Pinsonneault, CSFM, CPRP
dpinson@lexingtonma.gov

Spring thoughts: "Can Do" does not always mean "Yes"; don't hide

Spring has finally arrived after such a long winter of being cold and confined indoors. Spring invariably brings a multitude of practices and games of soccer, lacrosse, baseball, softball and even track meets. Hopefully the hard work you did in the fall coupled with your renewed energy from Conference has your fields ready to shine for users young, old and in between. Safe and playable is what we do. This profession also brings a positive "can do" attitude to our jobs. It sets us apart from other professions. We always try to accommodate our user groups and stakeholders; sure you can play today; sure we can prep the field after a rain storm; sure we can set up portable lights for extended play; sure we can mow the field again for proper ball roll or to put in a pattern; and so on.

There are many other examples of how we as professionals accommodate our user groups so they can go out and enjoy their activities without having to worry about the playing surface. All of this is done while keeping the fields safe and playable. The spring season brings time crunches and bad weather so we have to elevate our games so they can play theirs.

Here in Lexington the Public Grounds Division is the "can do" provider of fields for sports and special events. But "can do" cannot always mean "yes." For example, we are in the planning stages for the Lions Club Carnival. This event used to be held every year on our varsity baseball and softball fields. Each July for a week there are large rides (Ferris wheels are big), food and game trailers, and thousands of people enjoying the grass fields and leave their mark. When the carnival leaves on Sunday the fields have to be repaired for our semi-pro baseball team to use on Wednesday. In 2010 the Town approved a $1.5 million capital project to reconstruct all of the fields at this complex. Our "can do" became you cannot use these fields due to the investment and the elevated quality of the field. But our "can do" attitude did not leave the group hanging and we helped them find another park area to use that, although requires turf repairs after use, does not impact play. "Can do" means we will try everything to get a game or event in but it does not mean sacrificing a season for that one game or event. There has to be a balance.

My second thought is "don't hide." You all do great work, often with limited budgets, staff, resources, and time while still providing quality fields. Be the visible "go to" person that is the expert in all matters relating to your fields. Actively communicate with your user groups so they know and understand your maintenance program, what their responsibilities are and how you handle inclement weather. Let them know that if issues arise you need to be the first to know.

There are appropriate times to remain hidden in the background but not when it comes to field maintenance and use. It took years of discussion but we finally have teams picking up their own trash, not hitting or throwing into fences and not taking batting practice from the front of the mound. We also have soccer teams realigning their fields to spread out wear areas. Being visible and up front makes it easier to get buy-in and lets them know that what you do provides them with safer fields. It also makes it easier to say to no a game or practice when the condition of the field is at stake. This is budget time for many of us so being the leader and promoting what you do helps to secure the resources you need to provide safe playable fields. This profession is very humble which is good but we need to be visible at the right times so we have a say. Remember to make an impact and not an imprint. Enjoy the spring! ■

WHAT DID THAT PROFESSOR SAY?

Statistics made easy

We are surrounded by numbers every day. You may not realize it, but statistics plays a large role in our daily lives as well. Weather forecasting takes numbers and makes predictions about the weather based on weather models. Disease models for predicting turfgrass diseases do a similar service. Based on numbers related to temperature, humidity and leaf wetness, these models can forecast the startup of a turfgrass disease. We know that pest control products are tested for their effectiveness to control pests. Statistics are behind every medical study and batting average you hear about. Soon we will be bombarded with those political voter polls.

Statistics are sets of mathematical equations that are used to analyze what is happening in the world around us. It is a science of decision making. It is a science of "chance" or "probability." It is the science of collecting, organizing, and interpreting data whether it is numerical or non-numerical. We live in an information and technological age where we have everything at our finger tips. H.G. Wells, the father of science fiction, predicted that statistical thinking would be as necessary for daily living as reading and writing. Statistics may seem intimidating at first, but it is not once you develop a clear understanding of this simple subject.

BASIC UNDERSTANDING OF TERMS

Before we start, a discussion and understanding of some basic terms are needed. *Descriptive statistics*[are used to describe sets of numbers such as plants heights achieved due to applications of fertilizers. Researchers can organize these numbers into tables and graphs called *requency distributions* (the frequency a number may occur due to a factor involved). The following data set illustrates measurements of plant heights in centimeters after a fertilizer application). We will use this data to help us define some terms.

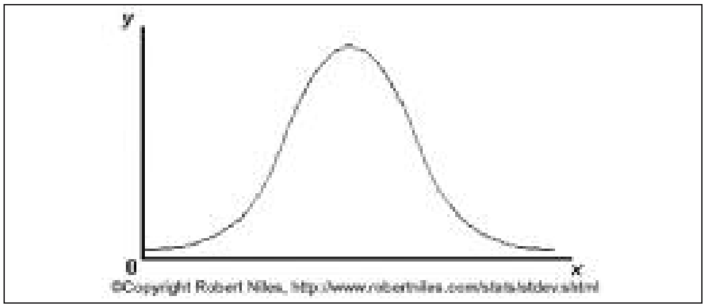
Plant Heights (cm) due to Fertilizer Applications				
10	14	11	12	15
15	12	13	14	13
12	8	12	9	10
13	11	12	8	10
9	16	7	11	9

As we look that this simple data set, we can determine a **median**, a **mean**, and **a standard deviation**. The median is the measurement that lies in the middle of the data, at the 50th percentile. In this example, it is 12 (range is 7-16). At times, it is better to express the median rather than the average (also known as the mean, see below), especially if the data contains outliers. The median could be a better indicator of true center especially when NBA salaries are being discussed.

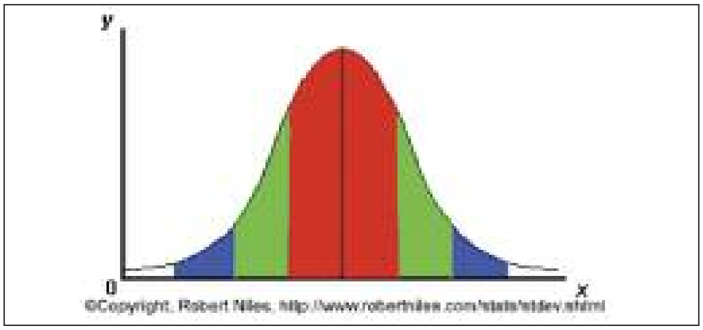
Plant Height (cm)	Frequency	Percent	Percentile
7	1	4	4
8	2	8	12
9	3	12	24
10	3	12	36
11	3	12	48
12	5	20	68
13	3	12	80
14	2	8	88
15	2	8	96
16	1	4	100
Totals	**25**	**100**	

The mean is simply the average (plant height x frequency observations = 286 cm / 25 frequency observations = 11.44 cm) for the data set. The standard deviation (SD = 2.38) indicates the average difference individual data varies from the mean; how concentrated the data are around the mean. So why is this important? Without standard deviation, you cannot get a feel for how close the data are to the mean or whether the data are spread out over a wide range. Without standard deviation, you cannot compare two data sets effectively. Two data sets can have the same mean, but vary greatly in the concentration of data around the mean; therefore different standard deviations.

The **distribution** of a data set can be a graph of all values and their frequency of occurrence. One of the most common distributions is called the normal distribution or *bell-shaped curve*displaying numerical data in a symmetrical curve.



The center of the bell is the mean and most of the data is usually centered on the mean.



The red area represents this data and one standard deviation +/- from the mean, 68% of the data (34% on either side of the average). The green area represents two standard deviations +/- from the mean or 95% of the data (red plus green) under the curve. The blue area then represents three deviations +/- from the mean or 99% of the data. Since every set of data has a different mean and standard deviation, an infinite number of normal distribution curves exist.

Confidence intervals (CI), usually set by the researcher, establish a level of confidence or reliability to an end result based on some treatment perhaps to a human being or plant in repeatable trials. The CI is represented by a percentage, so when we say, "we are 95% confident that the result of this herbicide application will provide 98% control of dandelion," we express that 95% of the observations will hold true. In practice, confidence intervals are typically stated at the 95% confidence level. However, they can be shown at several confidence levels like, 68%, 95%, and 99%. When a research trial is conducted, the confidence level is the complement of the respective level of significance, i.e. a 95% confidence interval reflects a significance level of 0.05, referred to as alpha (α). The level of confidence is often dependent on the number of observations with more observations yielding a higher level of confidence.

When data is collected, researchers typically look for something unusual or out of the ordinary and often ask if this is significantly different from a norm. Will it or does this happen with a very small probability of happening just by chance? **Least Significant Difference** (LSD) is a measure of significance usually with a level of significance (α= 0.05) denoted as $LSD_{\alpha= 0.05}$=0.05 or $LSD_{0.05}$. We will revisit the use of this term when we show an example of a data table and bar graph.

EXPERIMENTAL DESIGNS

How an experiment is designed can make the difference between the collection of good data and bad data. The objective of experiments is to make comparisons of *treatments* that will support a thought or hypothesis about an area of interest. Treatments can include the applications of fertilizers or pesticides, the incorporation of a cultural practice or the evaluation of disease resistant turfgrass cultivars or combinations thereof. While comparisons of treatments are important, so are comparisons to an untreated control to determine the true effects of each treatment if nothing was being applied. The untreated control establishes a baseline for comparison. Collecting good data and then applying the proper data analysis is important for drawing or making appropriate conclusions about the experiment.

In experimental designs, data (measurements/observations) are usually subject to various, uncertain external factors. Treatments and full experiments are usually repeated, *replications*, to help identify any sources of variation, to better estimate the true effects of the treatments thereby strengthening the reliability and validity of the experiment. Statistically, replications help to reduce experimental error due to unknown or uncontrollable factors (i.e. variations in soils). Replicating treatments within an experiment is as important as repeating entire experiments to see if results can be repeated with confidence. **Randomization** is also an important component to experimental design. One way to minimize bias in an experiment is to randomize treatments. This will become clearer as we look at some experimental designs.

Two common experimental designs that you may hear of in a seminar or conference presentation are illustrated below.

Complete Randomized Block Designs are one of the simplest, most common experimental designs for field trials. Here, you may be looking at the effects of one type of treatment, i.e. herbicide effectiveness. Treatments can be replicated three, four or more times dependent on the type of trial it is. Disease trials tend to have more replications due to the high variability among treatments from replication to replication. Treatments also remain in single blocks.

Complete Randomized Block Design							
Replicate 1	7	4	6	1	3	5	2
Replicate 2	6	4	1	7	5	3	2
Replicate 3	5	7	2	3	1	4	6

You will note that seven treatments are completely randomized in each of three replications or blocks. The treatment numbers can correspond to a treatment list.

Treatment No.	Treatments
1	Untreated control
2	Herbicide A, Rate 1
3	Herbicide A, Rate 2
4	Herbicide B, Rate 1
5	Herbicide B, Rate 2
6	Herbicide C, Rate 1
7	Herbicide C, Rate 2

Again, it is the randomness of the treatments that will eliminate bias of plot location within each block along with replicating the treatments that will help to increase reliability of the data.

Split Plot Designs are a special experimental design when several factors are being evaluated or some constraint (i.e. turfgrass species) prevents you from using a complete randomized block design. A variable could be the application of fungicides to test disease control on these specific turfgrass species. The diagram above demonstrates a split plot design.

Split Plot Design

Replicate 1	A 5	A 2	A 1	A 4	A 3	B 1	B 3	B 5	B 4	B 2
Replicate 2	B 3	B 5	B 1	B 2	B 4	A 4	A 3	A 2	A 1	A 5
Replicate 3	A 4	A 3	A 5	A 1	A 2	B 2	B 1	B 3	B 5	B 4

In many cases you need to fit the experiment into existing resources, like an established stand of grass. You will note that blocks A and B (i.e. two turfgrass species) are planted in blocks as a constraint of the experimental design, but are randomized within each replication. Within each replication, fungicide treatments are then randomized within each species. Treatment 1 may correspond to an untreated control, while treatments 2 through 5 may correspond to four different fungicides.

Additional experimental designs are available dependent on the number of factors being looked at; however, the more factors (i.e. species, fertilizers, pesticides, cultural practices, etc.), the more difficult it is to analyze, make comparisons, and draw conclusions.

ANALYZING THE DATA

After all the data has been collected, the choice of analysis is just as important as the experimental design. This is often considered the black box of statistics. The wrong analysis can lead to wrong conclusions. Researchers need to ask themselves this, "Will I be able to legitimately and correctly answer the questions that I set out to answer after the data has been analyzed?" **Regression and Correlation** can be used to test a cause and effect relationship and how well that relationship is correlated. An **Analysis of Variance** (ANOVA) can be used to test the effectiveness of one product to another and how well that data may fit a regression line.

Regression is all about relationships answering questions like, "Does nitrogen fertilizer cause turfgrasses to grow taller?" Here we can relate two variables like fertility and growth and understand that we may observe a positive slope on a graph—turfgrasses will grow taller with increasing rates of nitrogen

Continued on page 44