



## Demystifying 'Turf Quality'

by Doug Brede, Ph.D..

"Turfgrass quality" is a term we use all the time. But there are a few things about turf quality that may surprise you. In this issue I'm going to share with you some of the puzzling questions about turf quality posed to me by turf growers and landscapers over the years. This article is a condensation of one I wrote for the Sept./Oct. 2010 *TPI Turf News*. I think you'll learn a thing or two about an old term you thought you knew.

**Q: Why is turf quality scored on a 1 to 9 scale rather than on the traditional 0 to 10 or 0 to 100 scale?**

A couple years ago I was sorting through some old dusty correspondence when I came upon a rare 1963 letter – typed in green ink, no less – from Bill Daniel of Purdue University to Howard Kaerwer, a pioneering turf breeder at Northrup King. In the letter, both scientists agreed on a one-digit rating system (i.e., 1 to 9) because using the numbers 10 or 100 tied up additional spaces on the old IBM punch card. But why no zero? (Remember it's not a 0 to 9 scale.) The zero, as it turns out, wreaked havoc on early computer programs. Even a whiff of a "division by zero" and they immediately crashed.

Bill Daniel added the finishing touch to the 1 to 9 scale by suggesting that 9 stand for best quality. Howard had argued for 1 to be best, similar to what plant pathologists use. Bill overrode him and the rest is history.

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## Utilizing New Chemistry During Kentucky Bluegrass Renovation

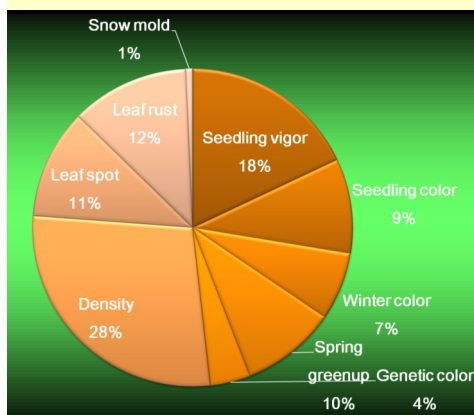
by Christian Baldwin, Ph.D..

Kentucky bluegrass is a desired turfgrass species on golf course fairways and athletic fields due to its aggressive rhizome growth habit and quick recover from divots and traffic damage. In Northern climates, *Poa annua* is competitive and can contaminate a stand of Kentucky bluegrass. Turf managers run into problems when renovating sites with an existing *Poa annua* seed bank in the soil. They often find limited success in keeping *Poa annua* at bay the following spring.

A relatively new chemistry to the market, Tenacity (a.i. mesotrione, Syngenta), has pre- and post-emergence activity on a wide variety of weeds, including *Poa*. Tenacity is absorbed through both shoot and root tissue. Tenacity inhibits the enzyme necessary for carotenoid synthesis. Carotenoids protect the light harvesting complex of plants, chlorophyll, from excessive sunlight. Therefore, after an application of Tenacity, the shoot tissue of a sensitive species bleaches, or turns white. A unique property of Tenacity is that applications at the time of seeding and during Kentucky bluegrass seed germination do not injure the new seedlings. Previous work by other researchers has demonstrated success in minimizing *Poa annua* in a newly seeded Kentucky bluegrass field. Previous work has also demonstrated the effectiveness of Tenacity in selectively removing creeping bentgrass following multiple applications. Recently approved label amendments will allow future use of Tenacity on golf courses, sod farms, athletic fields, parks, commercial areas, and home lawns. As always, consult the product label prior to an application.

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**What attributes go into 'Turf Quality?' To answer that question, I**



**analyzed a dataset of 3000 Kentucky bluegrasses, rated for many traits over 1991-95 at our Jacklin Research Farm. Turf density correlated strongest with quality. Surprisingly, genetic color made up only 4% of quality. Results were published in the International Turfgrass Research Journal, Sydney, Australia.**

**Quick quiz:** What one attribute of high quality turf has never been rated in NTEP? Hint: It's considered a key part of turf quality but has never been evaluated separately. Answer p.2.



**A research project was initiated in Post Falls, ID seeking an improved method for converting a mixed stand of *Poa annua* and Kentucky bluegrass into a *Poa*-free stand of Kentucky bluegrass.**

### Quality, continued

**Q: If raters use the whole 1 to 9 scale, why do all varieties wind up averaging between 4 and 6 in turf quality?**

It does seem odd that two measly quality points can separate the #1 state-of-the-art turf variety from one that was bred for a 1950's pasture. However, that is not what this 2-point spread is telling us.

Raters are encouraged to use the full 1 to 9 scale in each of their monthly ratings. The bottleneck comes when you average sites together. For example, in site A, Glade Kentucky bluegrass does well. In site B, it does poorly. When you average sites A and B together, what turns out is mush.

That's why NTEP has recently started using AMMI groupings to average sites together. An AMMI group is a set of sites where varieties perform similarly. That can sound weird when two sites are far apart. But it's the best way to keep the results from turning into mush.

**Q: Do turf scientists get together periodically to synchronize their rating skills, so that a "5" in Arizona equals a "5" in Rhode Island?**

Years ago during my grad school days in 1979 I attended a pre-NTEP training workshop at Rutgers University. We didn't know it at the time, but we were actually laying a lot of the groundwork for what was to become NTEP.

As part of our training, we all were given blank charts and asked to score a set of bluegrass and fescue turf plots. Afterwards, we all walked plot by plot as the moderator read off his own ratings: "This one I scored a 6. Everybody okay with that?" And we would chime in with our contrary numbers and reasons.

I remember one particular fine fescue plot that confounded the raters, garnering everything from a 3 to an 8 in quality. "Look, it's got a humongous rhizoc spot in it," expressed one gentleman who happened to be a pathologist. "None of my plots up in New England ever look this good," said the guy who gave it an 8.

NTEP has held several rater-training sessions over its 30-year history, aimed mainly at indoctrinating newbie's who are still open to new ideas. "We have held five training workshops, with about 150 participants total, including most NTEP evaluators (there are always new people)," says Kevin Morris, NTEP's director. "These workshops include classroom instruction, field instruction, Q&A with experienced evaluators and before-training and after-training rating exercises that help the participants see how their ratings are compared to the others."

Gerald Horst, Milt Engleke, and Bill Meyer published a paper in 1984 on rater evaluations in Oregon and Texas. Ten turf researchers at each site were asked to rate a set of bluegrass and tall fescue plots. Results showed that raters were



**The puzzle:** How do you rate a plot with one big ugly spot in it?

remarkably consistent, differing by only a point or two amongst themselves with a really good variety or a really bad one. Where opinions conflicted were with middle-of-the-road varieties – ones rating a 5 or 6. In that case, individual ratings were across the board, with opinions ranging from 3 to 9 on the same plot.

**Q: Why do varieties bounce around in rank as they go through the 5 years of a quality trial?**

I can always tell when a new NTEP report hits the web because my phone will start ringing with messages like this: "What's going on? My variety just dropped 10 places from last year. Are the genetics breaking down?" (Of course, I never hear from them when their variety goes up 10 places.)

First let me assure you that genetics do not "break down." (If they did, you and I wouldn't be here right now). But there are a number of valid reasons why varieties bounce around a lot in test trials, some causes of which have nothing at all to do with genes.

**The number of sites changes** – As you go through the 5 years of a multi-state trial, the number of sites submitting data changes. For example, in the 2000 Kentucky bluegrass NTEP, in 2001 31 sites submitted numbers. In 2002, 32 sites. In 2003 and 2004, 28 sites did. And in 2005 only 21 sites entered. While that doesn't sound like much, it's easily enough to sway a variety 10 places or more.

**A slow germinator picks up speed** – Sometimes an otherwise good variety can have a slow start, perhaps due to a seedlot that was harvested too early. It can take 2 or 3 years of thickening up to overcome that initial deficit.

**Pests take a while to fire up** – Diseases like necrotic ring spot and summer patch take 2 or 3 years to build up and impact varietal ranking. Before that happens, all varieties look equally good.

**Thatch accumulates over time** – Thatchy varieties harbor insects and are prone to drying. Thatch builds gradually, becoming important only in the last year or two of a trial.

**Random error is bigger than you think** – Experimental error is measured by the size of the lsd (least significant difference) value. Bigger lsd's mean more error was in the test, and this affects how varieties jump around. As an example, in Schedule C (home lawn maintenance) of the 2000 bluegrass NTEP, **Nu Destiny** ranked #1 in quality. But due to the sizable experimental error, 51 other varieties bounced around inside the range of the lsd value.



### Renovation, continued

In 2009 we initiated a research project to determine the possibility of converting a *Poa annua* contaminated field to a clean stand of Kentucky bluegrass. We wanted to find out the best rates and application timing of Tenacity that will result in the least amount of *Poa annua* the following spring. The results were impressive. Stay tuned for our next **NewsFlash** that will detail the research project and provide recommendations turf managers can use to **renovate to Kentucky bluegrass, while minimizing *Poa annua*.**



**Answer to quick quiz:** The key component of high quality turf that has never been rated separately in NTEP is uniformity. NTEP includes uniformity as part of turf quality. During NTEP's formation, breeders argued that a separate uniformity rating was unfair because most seedlots submitted to NTEP are hand harvested and hand sieved in small batches, making uniform turf at best a challenge.