Research Newsflash

Simplot Turf and Horticulture

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# Plot Ratings Go High Tech

by Jonathan Schnore

Everyone knows what good turf looks like, and they know what bad turf looks like, it's the little differences that are hard to see. But it's those little differences that mean the difference between a top-10 variety in NTEP and a run-of-the-mill variety. So here at Jacklin Seed we're always looking for new angles for quantifying color and quality.

In research, two main tools have been used to determine color in turf trials other than visual ratings: The FieldScout CM 1000 chlorophyll meter, which we use periodically at Jacklin Seed, and SigmaScan Pro software combined with a Canon digital camera light box, which is used by another company.

The FieldScout was adopted by Jacklin Seed due to its ease of use in the field. It owes its technology to NASA's attempts to identify life on other planets. To test the FieldScout, I took color values on our 2006 Post Falls perennial ryegrass turf trial, along with visual ratings on a 1-9 scale (1 being yellow or dead, 9 being darkest green).

Statisticians use a "correlation coefficient" as a measure of association. A correlation of 1.0 is perfect lock-step correlation,

*cont. p.2.*

Plot Rating Methods

| | Human Eye | FieldScout CM 1000 | Canon Camera and SigmaScan Pro |
|---|---|---|---|
| **How it works** | Training and practice are required to produce consistent results | Sensor detects reflectance of infrared laser from chlorophyll A in plant tissue | Computer program subtracts non-plant pixels from plant pixels in a photo to determine color and density |
| **Limitations** | Data from different raters can vary | Does not detect pigments other than chlorophyll | Requires a light box and digital camera which are bulky and require a power source |
| **Rating values** | 1-9 scale (scientists estimate humans can discriminate 7 million different colors) | 0-999 scale | 1-9 scale |
| **Time per plot** | 3-5 seconds | 10-20 seconds | 30 second photo plus 20 minutes of computer processing time |

# Winter Traffic Impacts on an 'L-93' Creeping Bentgrass Putting Green

by Christian Baldwin, Ph.D.

*It's lonely work putting out frost wear treatments every morning at 7 am. But that's what it takes to learn new information on how to manage golfers and mowers on a frosty autumn morning.*

In the transition zone, L-93 creeping bentgrass is a desirable putting green turfgrass because of year-round green color, ball roll, and playability. However, bentgrass putting greens present many management challenges throughout the summer as well as winter seasons. During winter months, decisions regarding course setup and play are important when temperatures approach 32°F. Often, tee times are delayed or cancelled resulting in lost revenue and tension between players and superintendent.

In response to this winter golf course management issue, Professor Haibo Liu and I initiated a research project at Clemson University from December 2005 to 2007 on an L-93 creeping bentgrass putting green to determine the impacts of foot traffic, mower traffic and time of traffic (7am vs. 9am) on L-93 creeping bentgrass winter, spring, and summer performance.

Time and type of traffic significantly influenced bentgrass winter performance. On all quality rating dates, mower traffic at 7am significantly reduced visual quality compared to foot traffic at 7am. Mower traffic consistently had more surface discoloration throughout the study than foot traffic as a result of heavier impacts of the mower. The walk-behind mower had nearly three times the pressure than foot traffic.

*cont. p.2.*

***Plot ratings, continued***

while 0.0 indicates no relationship. In our study, there was a weak correlation, 0.21 to 0.28, between visual color ratings and the FieldScout. That was a lower association than expected. For example a FieldScout reading of 500 had visual color ratings ranging from 5 to 8. One reason for the discrepancy is that there are other substances in plants that may contribute to color besides chlorophyll. One substance is anthocyanin – the red-purple pigment in autumn leaves that may also contribute to the dark color of ryegrasses.

There are many physical causes for the colors we perceive, such as dead plant matter that the FieldScout does not detect. The FieldScout is a good tool for judging plant health, and response to fertilizer inputs, and in my opinion is one of the easiest such tools to use in the field. In fact, some golf superintendents use a FieldScout to tell them when to fertilize greens. But it was not as perceptive as the human eye in detecting color variability among perennial ryegrass turf plots.

***Frost and L-93, continued***

Regarding time of traffic, foot or mower traffic at 9am consistently had greater visual quality than foot or mower traffic at 7am. By April, regardless of winter traffic treatments, all treatments had acceptable quality.

Turfgrass practitioners should cautiously proceed when allowing traffic on an L-93 creeping bentgrass putting green immediately after frost melt. Although foot traffic was less damaging than mower traffic, some surface discoloration was noted. However, once temperatures moderated, late spring and summer differences were not detected. Therefore, if winter injury occurs in the transition zone, full recovery should expected by late spring and summer.

**Turfgrass quality of L-93 creeping bentgrass without (control) and with twenty-one foot and mower winter traffic treatments at 7am or 9am recorded after treatment applications from December 1, 2005 to March 1, 2007.**

| Traffic | Day 3* | Day 9 | Day 15 | Day 21 |
|---|---|---|---|---|
| | *Turfgrass quality (1-9)* | | | |
| Control† | 7.6a‡ | 7.3a | 7.1a | 7.0a |
| Foot 7am | 6.6b | 6.3b | 5.4c | 5.0c |
| Foot 9am | 6.8b | 6.9a | 6.4b | 6.3b |
| Mower 7am | 5.7c | 5.3c | 4.3d | 3.8d |
| Mower 9am | 6.8b | 6.3b | 6.2b | 5.8b |

*Day 3 refers to the third traffic application; day 9 refers to the ninth traffic application, etc. Although turfgrass quality was measured after each traffic application, data for every sixth day are presented to give a representative sample. Turfgrass quality score of 6 was considered the minimal acceptable turfgrass.

†Control = No traffic. Foot traffic was simulated by a 165-pound researcher wearing SP-4 Saddle Nike golf shoes (soft-spike sole) and taking ~75 steps within each plot to ensure complete coverage of the plot. A 203-pound Toro® Greensmaster® 800 walk behind mower with an 18-inch roller was used for mower traffic.

## Meet Christian Baldwin, Ph.D.

### A new Research Scientist at Jacklin Seed

*Dr. Baldwin joined the Research team at Jacklin Seed in July. Since that time, he has been initiating a host of new research studies examining the agronomic benefits of improved cultivars. The following is an introduction to our new scientist in his own words:*

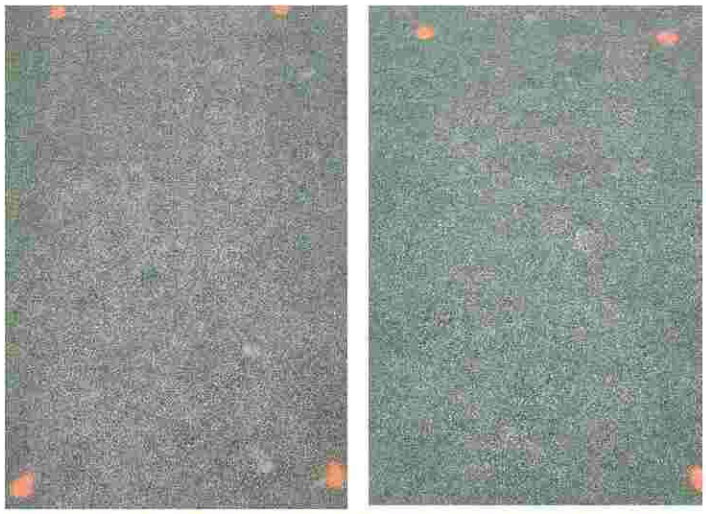
My first experience working with turfgrasses occurred when I was 10 years old volunteering at a soccer complex in New Orleans, LA, watering, laying sod, and filling in low spots. I continued to work at various athletic field complexes in the New Orleans area throughout the summer during high school and college.

I received my B.S. in business management from Clemson University in 2000. I then moved to Charleston, SC, and worked for Goer Manufacturing as an assistant account manager. Following a year in Charleston, I decided to return to the turfgrass world. I went back to Clemson University to study turfgrass science where I received a master's degree in 2004 and a doctorate degree in 2008. My research at Clemson University focused on warm- and cool-season turfgrass responses to environmental stresses, such as drought, shade, and salinity.

My hobbies include running marathons, playing guitar, mountain biking, and playing soccer.

***Dr. Baldwin can be reached at 208 777-6102 or at christian.baldwin@simplot.com***

One mower pass was made per plot, ensuring complete coverage. Traffic treatments were applied at 7am and 9am when surface temperatures were below 32°F at 7am. Plots were always rolled and not mowed when surface temperatures were below 32°F. The decision to apply treatments was based on temperature. Frost was present during nearly all applications, but there was no frost present on a few of the treatment days.



***Comparison of 7 am mower traffic (left) versus 7 am foot traffic. Results showed that early morning mowing on a frosty day was more damaging to an L-93 putting surface than allowing golf play on frost. Photos taken February 20, 2006.***