National Turfgrass Evaluation Program (NTEP) Testing of Cultivars and Experimental Selections

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National Turfgrass Evaluation Program

Objectives:

1. To evaluate commercially available cultivars and experimental selections of various species for their usefulness on golf courses.

Start Date: 2004
Project Duration: three years
Total Funding: $60,000

An important function of the National Turfgrass Evaluation Program (NTEP) is to improve the science of turfgrass evaluations. NTEP is continuing the investigation of the 'AMMI' procedure, conducted by Dr. Scott Ebdon, University of Massachusetts and Dr. Hugh Gauch, Cornell University, to analyze turfgrass data. Past research has shown that accuracy was increased two- to five-fold using AMMI analysis compared to our current statistical analysis procedure, 'ANOVA'.

Data from the first two years (2004, 2005) of Kentucky bluegrass field validation trials were pooled from six locations and analyzed using the AMMI and ANOVA procedures. Compared to AMMI, ANOVA predictions over-estimated statistical gains in actual turfgrass quality of ANOVA selected top-performing grasses. Also, AMMI was twice as likely to recommend the actual top-performing grasses than ANOVA, while the ANOVA model was twice as likely as AMMI to recommend the actual poorest-performing grasses.

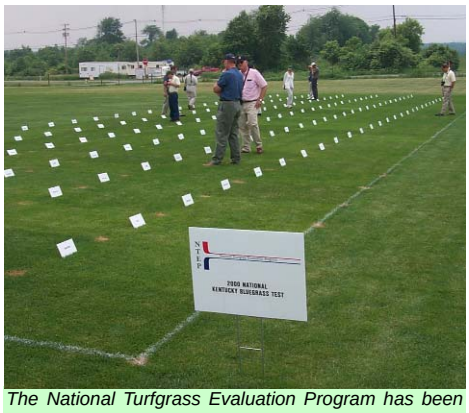
Another aspect of improving the science of evaluations is investigating the use of instrumentation to automate turfgrass field data collection. The goal is to eliminate or reduce subjective human evaluations, increase accuracy, and improve efficiency in data collection. Two studies, initiated in spring 2004, were conducted by Dr. Michael Richardson and Dr. Douglas Karcher at the University of Arkansas and Dr. Thomas Fermanian at the University of Illinois.

Data from the first two years of Kentucky bluegrass field validation trials were pooled from six locations and analyzed using the AMMI and ANOVA procedures.

In Illinois, two hand-held color meters were shown to adequately correlate with human evaluations of turf color. A multispectral imaging system was less useful in collecting color ratings and could not be refined to collect accurate density and texture ratings. While there appears to be great potential for the use of imaging sensors for collecting a wide range of data on turfgrass performance and health, their value for determining standard turfgrass quality was minimal. The longer time required to capture images compared to current methods, along with significant post processing only makes this technique valuable with extremely accurate and precise data. Since the quality of turf is largely subjective, the cost of this technique outweighs its value.

In Arkansas, digital images have been collected for many rating dates and software (SigmaScan) is being used to analyze uniformity, texture, and density. The results of the digital image analysis (DIA) are then converted to conventional rating values. A turfgrass quality score was then computed from the characteristics collected and analyzed by the digital image system. The digital image quality ratings were compared and correlated with visual ratings collected by human evaluators.

DIA was capable of producing quality scores on a 1 to 9 scale, based on turf cover, color, and density. These evaluations were significantly correlated with visual quality ratings, but correlations were lower than among human evaluators. However, image analysis quality data were more repeatable than the visual quality ratings (human evaluators). In addition, final inferences were very similar between visual ratings and DIA for variety effects. DIA may be useful for turf quality scoring as well as individual characteristics such as color, ground cover, and density.



The National Turfgrass Evaluation Program has been instrumental in the evaluation of experimental and newly release turfgrass cultivars.

Summary Points

- In the first two years of data from six Kentucky bluegrass trial locations, a new statistical analysis procedure, 'AMMI',was found to more accurately predict top-performing grasses than the standard statistical procedure 'ANOVA'. These results may help users of turfgrass data to better identify the best grasses.
- A study at the University of Illinois showed that two hand-held color meters accurately measured color and correlated well with human evaluations. A multispectral imaging system was less accurate in assessing turf color, was difficult to calibrate for density, texture, and quality ratings, and was slower to operate. Considering the additional time needed to collect ratings, the multispectral imaging system is not recommended to replace human visual evaluations at this time.
- Researchers at the University of Arkansas used a digital camera system and software to collect and analyze turfgrass data. Data on various characteristics, such as color and percent ground cover, are statistically repeatable using digital image analysis and correlate well with human evaluations (visual ratings). Turfgrass quality ratings computed from digital image analysis had a weaker correlation with human evaluations, although the digital quality ratings were more repeatable (consistent).