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

Kevin Morris
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: 2003
Project Duration: four years
Total Funding: $80,000

One of the missions of the National Turfgrass Evaluation Program (NTEP) is to improve the science of turfgrass evaluations. Our goal is to produce the best quality data that is most usable to the industry. To that end, the USGA Research Committee has in the past provided funding for five statistical projects investigating our current statistical procedures compared to new techniques.

To follow up on one of the most promising statistical projects, 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 year of Kentucky bluegrass (field validation) trials were collected from six locations and analyzed using the AMMI and ANOVA procedures. The AMMI procedure accurately predicted (statistically significant) the top-performing grasses at two of the six locations. In contrast, the ANOVA procedure predictions (statistically significant) for top-performing grasses actually were the lowest-performing grasses at two of six locations. At the other four locations, ANOVA predictions were uncorrelated with the actual top-performing grasses. In summary, for the first-year data, AMMI did a reasonably good job of predicting top-performing grasses, while ANOVA often selected the 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, are being conducted by Dr. Michael Richardson and Dr. Douglas Karcher at the University of Arkansas and Dr. Thomas Fermanian at the University of Illinois. 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 was much slower to deliver ratings. The multispectral imaging system could not be refined to collect accurate density and texture ratings in 2004.

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 are then converted to conventional rating values. As soon as the digital image analysis techniques are finalized, results will be compared with human evaluations. Both studies are being conducted through fall, 2005.

One 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

Summary Points

● In first-year 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 during the first year, 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 and texture ratings, and was slower to operate.

● Researchers at the University of Arkansas used a digital camera system and software to collect and analyze turfgrass data. The results from 2004 are encouraging and could possibly be used to replace some human evaluations.