NTEP traffic testing results

AT ANY ONE TIME, the National Turfgrass Evaluation Program (NTEP) is evaluating more than 600 cultivars and experimental selection in nationwide tests. Data collected and summarized from these trials can be found on our website, www.ntep.org. Our data is also published on a CD, in exactly the same format as the NTEP website, which can be purchased.

NTEP collects data on overall turfgrass quality, appearance characteristics like color and texture, disease and cold tolerance and many other traits. In recent years, however, NTEP has focused more on testing specific performance traits, such as traffic tolerance and saline irrigation performance. This article provides insight on NTEP testing and an update on improved cultivars of the most commonly used species for athletic fields.

2010 CULTIVAR UPDATE

The following is an overview of the latest traffic tolerance and other pertinent information on commercially available and experimental cultivars of the four main species used on athletic fields - Kentucky bluegrass, perennial ryegrass, tall fescue and bermudagrass.

KENTUCKY BLUEGRASS

This year we have data from the fifth and final year of the 2005 Kentucky Bluegrass Test. Since bluegrasses may take several years to develop significant levels of thatch and disease, the fourth and particularly the fifth year of a bluegrass trial can yield interesting results. We have witnessed this phenomenon with 2010 data, as disease, drought and heat have taken their toll on these grasses. Therefore, 2010 data is very useful for understanding how these grasses withstand these stresses. We advise that you investigate closely this fifth year of data, which is available on the NTEP web site, as well as the 5-year final summary report, which will be available later this year.

For those field managers that irrigate with salty water, salinity tolerance evaluations are now in the fifth year at the Las Cruces, NM site. The site irrigates

Traffic simulation

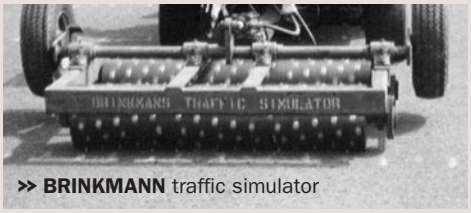
For any turf evaluation, applying a stress uniformly is necessary to obtain consistent, and thus accurate data. Consistent application is particularly important for traffic data, since research efforts on in-use athletic fields almost never produce consistent results. In addition, there are many different types of 'traffic', i.e. damage caused by golf spikes or cart use is different from damage caused by a soccer goalie, or a large-bodied football lineman.

"Traffic" can be separated by its various factors, as described by Dr. James Beard in his seminal textbook, *Turfgrass Science and Culture*. Beard writes the following about turfgrass *wear*: "Direct pressure on the turf tends to crush the leaves, stems and crowns of the plant. Damage is greatly accentuated by the scuffing and tearing action frequently associated with traffic." Beard also discusses another aspect of traffic, *compaction*: "The mechanical pressure applied by human and vehicular traffic results in varying degrees of soil compaction." Compaction results in restricted air and water movement through the soil profile. Both wear and compaction require evaluating to determine effective cultivars and strategies to minimize traffic damage.

Since necessity is the mother of invention, the turf research community has developed equipment to simulate wear, traffic and/or compaction on trial areas at universities. Each machine simulates somewhat different aspects of traffic stress. A particular NTEP species trial may therefore, receive different traffic damage at different locations.

The most popular traffic simulator in the US is the "Brinkman," developed at UC-Riverside. The Brinkman is pulled by a small tractor and consists of two rollers that are fitted with cleat-like spikes. The rollers can be filled with water to add compaction stress and can be set to travel at different speeds from each other, thus enabling a ripping and tearing action in the

The Brinkman offers a relatively quick and easy method to apply traffic stress.



>> **BRINKMANN** traffic simulator

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TOP KENTUCKY BLUEGRASSES FOR SELECTED TRAITS, 2010 NTEP TRIAL DATA

Traffic Tolerance "N. Brunswick, NJ"	Traffic Tolerance "E. Lansing, MI"	Traffic Tolerance "Madison, WI"	Saline Irrigation "Las Cruces, NM"
A00-247	Aura	Avid	Barrister
Aries	Award	CPP 822	Beyond
BAR VV 0709	Baron	Dynamo	Blueberry
BAR VV 4650	Barrari	Empire	Emblem
Barduke	BAR-VK 0710	Greenteam	Ginney II
Bariris	BAR VV 0709	Harmonie	Gladstone
Barrari	Corsair	LS 4000	Hampton
CPP 822	J-1334	MSP 3724	
Emblem	Juliet	POPR 04594	
Greenteam	LS 4000	Sombrero	
Julia	POPR 04594	SW AG 514	
Jump Start	RAD-762	Touche	
MSP 3722	Skye	Washington	
Prosperity	STR-2485		
Sombrero	Washington		

"NOTE: Bluegrasses are listed alphabetically and are either the top 15 entries for that year/location, or all of the entries"

in the top statistical grouping. Numbered entries are often still experimental and not yet commercially available.

"N. Brunswick, NJ - Traffic was applied May 6th. The rankings are based on turf quality ratings taken May 6th," immediately after traffic was applied.

"E. Lansing, MI - The rankings are based on the mean of monthly turf quality ratings. Traffic was applied"in fall 2009 and late August 2010.

"Madison, WI - the rankings are based on the mean of monthly turf quailty ratings."

"Las Cruces, NM - the saline irrigation water used had a Sodium Adsorption Ratio (SAR) of 2.06."

the 2005 NTEP Kentucky bluegrass trial with saline water (Sodium Adsportion Ratio (SAR) =2.06 in 2010). In previous years, this moderately low saline level did not produce large cultivar separation. In 2010 however, much great entry separation was noted with 'Hampton' leading the way. Other entries in the top statistical group include, 'Gladstone', 'Barrister' and 'Emblem', and five other entries.

Traffic tolerance was evaluated at three locations in 2010, using different types of traffic simulators. The North Brunswick, NJ location (Rutgers University) applied traffic in May 2010, nine months after the last traffic 'season', using the "Slapper," which causes leaf abrasions but not soil compaction. The entries that rated 6.0 or higher (scale is 1-9; 9=best) after the May simulation include 'Greenteam', 'BAR VV 0709', 'Bariris', 'BAR VV 9630', 'Sombrero', 'Emblem' and 'Julia'. Canopy fullness, expressed as a percentage, was evaluated after the initial 36 passes of wear on May 6th. All of the above entries plus 'CPP 822' and 'Barduke' had the highest canopy fullness ratings (51.7 to 71.7%).

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turf. Two passes with the Brinkman have been correlated to approximate the number of cleat marks created during one NFL game between the hash marks at the 40-yard line. The Brinkman offers a relatively quick and easy method to apply traffic stress. However, the Brinkman design has been criticized because, 1) the tractor pulling the apparatus causes additional compaction and damage and has to be disregarded when evaluating plot damage, and 2) the Brinkman does not produce the compressive force needed to adequately replicate an athlete's force and pressure at the playing surface.

To compensate for the Brinkman deficiencies, Michigan State University developed the "Cady" traffic simulator. The Cady is a modified Jacobsen Aero King 30 aerator (a self-propelled unit) that has had the steel aerating tines removed and replaced with cleat-fitted pieces of rubber tires (to simulate a cleated foot). Since the aerator consists of four shafts connected to a cam that delivers a vertical action, the Cady features more vertical downward pressure than the Brinkman. A Ryan GA-30 aerator has also been used in modifications to produce a Cady simulator.

>> THE CADY, this one developed at the University of Florida and modeled after the one built at Michigan State.

Other simulators have been developed that either offer variations on the Brinkman and Cady, or simulate other traffic such as golf cart wear. The Europeans have long used the Differential Slip (DS2) machine, which is a cleated walk-behind unit. Also being used in Europe is the SISIS unit, as well as a unit developed by the Sports Turf Research Institute in England to simulate damage from tennis players at Wimbledon. The University of Georgia modified a Brouwer T224 ride-on roller by adding cleats to the roller drums. Iowa State and Ohio State have each modified and used a Brouwer roller simulator as well. Scuffing units, which consist of a brush on a frame that is dragged across the plots, are being used in some locations,

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The Madison, WI location used a pull-behind cart of water-filled drums with golf cart tires to impose traffic stress. This led to excellent cultivars differences, led by 'SW AG 514', 'Harmonie', 'Sombrero', 'Greenteam' and 'Dynamo'.

Compaction was applied to the Rutgers trial on May 6, and percent ground cover was rated 8, 22 and 49 days after the compaction and wear treatments. 'Greenteam' had the highest canopy fullness ratings eight days after traffic, with 'BAR VV 0709' having the highest canopy fullness ratings 22 and 49 days after treatment.

Traffic tolerance was also evaluated at East Lansing, MI in 2010. Michigan saw much damage from the traffic, applied in fall 2009 and again in late summer 2010, using the Brinkman simulator, which compacts the soil as well as causing plant shearing. Cultivar separation as shown in overall turf quality ratings was not that large, with just over one-half of the entries performing statistically equivalent to the top entry, 'BAR VV 0709'. However, as in the Rutgers trial, 'BAR VV 0709' exhibited outstanding traffic tolerance by finishing with the highest percent ground cover in five of seven rating dates. Entries also showing high percent cover ratings on one or more dates include 'Skye', 'Washington' and 'Washington II'.

The Madison, WI location used a pull-behind cart of water-filled drums with golf cart tires to impose traffic stress. This led to excellent cultivars differences, led by 'SW AG 514', 'Harmonie', 'Sombrero', 'Greenteam' and 'Dynamo'. Interestingly, most of the traffic tolerant grasses were also the best performers where no traffic was applied.

Poa annua is a weed problem in Kentucky bluegrass, particularly on athletic turf. Cultivars that can withstand *Poa annua* are valued by sports turf managers, golf course superintendents and lawn care operators in northern states. After 5 years, plots are often damaged or thinned such that *Poa* can invade. In 2010, two trial locations were able to rate percentage *Poa* invasion. In both Amherst, MA and Madison, WI, the range of ratings was quite large, from 0.3 – 33.3% *Poa* (LSD=15.9) at Amherst and from 2.3 – 81.7% *Poa* (LSD=23.8) in Madison. 'CPP 822' and 'Washington II' had the least *Poa annua* in Amherst and 'Harmonie' had the smallest percentage of *Poa* in Madison.

TALL FESCUE

This is the fourth year of data collected on the current NTEP tall fescue trial. This is a large trial with 113 entries established in 2006. Year one data typically reflects establishment rate, year two data usually reflects broader cultivar performance, while years three and four often allows us to determine if trends seen in year two are still viable.

Tolerance to stresses, such as traffic, shade, drought and saline irrigation, are being evaluated by NTEP in this tall fescue trial. Intensive traffic is applied, suing the "Slapper" on the tall fescue trial at North Brunswick, NJ. Wear and compaction were applied in July, with

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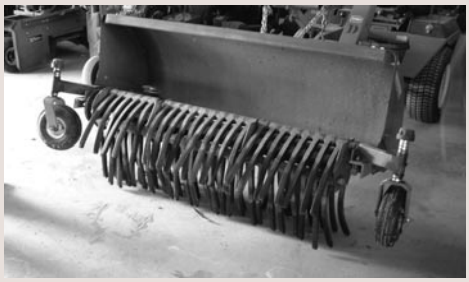
simulating the scuffing damage that occurs on a golf course putting green.

A new machine, recently developed by Rutgers University and nicknamed the "Slapper," modifies a Toro Sweepster unit by replacing the wire brush with rubber "fingers," or paddles from a potato harvester. The Slapper bruises and damages leaf tissue (simulating wear only), therefore a roller must be used along with the Slapper to provide compaction stress. Each of these units, and others that have been developed, play a different role in simulating and evaluating traffic tolerance.



>> THE "SLAPPER" developed by Rutgers.

Testing procedures

NTEP trials are established at university locations and evaluated for 4-5 years. Species such as Kentucky bluegrass, perennial ryegrass and bermudagrass have been tested by NTEP for more than 25 years. Each new trial includes recently developed cultivars, experimental entries that may become commercialized, and well-known standard cultivars. With each trial, NTEP and an industry advisory committee develops testing protocols and important characteristics to be evaluated. Trials are established at locations that are important use areas for that species, or where a disease, insect or other problem is prevalent, such that NTEP can adequately evaluate the test entries for that problem. Also, NTEP establishes tests where particular stresses can be evaluated, i.e. a location that can impose simulated traffic, saline irrigation or consistent drought stress.

Evaluation procedures are developed for each of the traits, in some cases these procedures are very detailed. For instance, when testing traffic tolerance, we must consider the species being tested, its typical use patterns, the region of the country, the traffic simulation equipment available and other factors. Only then can NTEP decide how and when to impose simulated traffic and the best data collection procedures and timing for that trial. ■