



COLD TOLERANCE OF BERMUDAGRASS CULTIVARS, AND BREEDING SELECTIONS - REPORT FROM THE 1997 NTEP BERMUDAGRASS TRIAL

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IMPACT STATEMENT

Bermudagrass (*Cynodon dactylon*) continues to be the predominate turfgrass species used on Arkansas golf courses, sports fields, home lawns, and utility turf situations. Identifying adapted cultivars for the region remains a central focus of the turfgrass research program. A bermudagrass cultivar trial planted in 1997 at Fayetteville, Ark., was exposed to severe winter temperatures during the winter of 2000-2001. Several cultivars survived the harsh conditions with minimal injury, while other cultivars were almost completely eradicated by low-temperature injury. Promising cultivars for low-temperature sites included 'Riviera', 'Blackjack', 'Midlawn', OKC 81-4, OKC 19-9, and 'Cardinal'. These studies will help turfgrass managers identify bermudagrass cultivars with improved adaptability to areas that routinely experience winter injury.

BACKGROUND

Bermudagrass remains the most commonly used turfgrass for golf, sports, lawns, and other activities in Arkansas and throughout southern and transition zone environments. Bermudagrass has many positive attributes that have made it a successful turfgrass species, including good heat and drought tolerance, pest resistance, traffic tolerance, and tolerance to a wide range of soil types and water quality. However, a major weakness of bermudagrass is a lack of cold tolerance, especially as turfgrass managers move this species farther into the northern transition zone.

Major breeding efforts with bermudagrass have been conducted over the past several decades at sites in southern Georgia, Oklahoma, and New Mexico, while minor efforts have been ongoing at various sites throughout the country. Although these efforts have led to many new cultivars of bermudagrass with improved quality, color, and adaptability to low mowing heights, there are currently only one or two cultivars with any degree of cold weather tolerance. The cold tolerant cultivars Midlawn and Quickstand have been shown to have good adaptability to northern environments, but they lack specific attributes that make them usable in a wide range of applications.

The National Turfgrass Evaluation Program (NTEP) is an organization within the U.S. Dept. of Agriculture that annually oversees turfgrass cultivar evaluation experiments at various sites throughout the U.S. and Canada. The most recent NTEP bermudagrass trial saw a significant increase in the number of cultivars in the trial and many of those cultivars have shown excellent turfgrass quality (Morris, 2001). However, there has not been significant winter injury on these plots since their planting in the spring of 1997. In this report, we describe the winter injury ratings of 17 seeded bermudagrass cultivars and 10 vegetatively planted bermudagrass cultivars at Fayetteville, Ark.

RESEARCH DESCRIPTION

The cultivar and breeding selection experiment was planted on 1 June 1997 at the University of Arkansas Research and Extension Center, Fayetteville. The plot size was 4 x 8 ft and there were three replications of each entry. The vegetative geotypes were planted as small plugs (1-2 in. diameter) on 12-in. spacings within the plots, while the seeded entries were broadcast-planted at a seeding rate of 1.0 lb/1000 ft². Plots have been maintained under golf course fairway conditions, with a mowing height of 0.5 in., annual nitrogen applications of 5-6 lb N/1000 ft², and irrigation was supplied as needed to prevent stress. Plots have been rated for turfgrass quality parameters over the past 4 years and those data have been reported elsewhere (Morris, 2001). Winterkill was assessed using digital image analysis of the amount of green turf present in a plot (Richardson et al., 2001), as observed on 1 May 2001.

FINDINGS

The winter of 2000-2001 was noted to have an extended period of low temperatures and an extended period (~45 days) of snow and ice cover (Richardson et al., 2001). These conditions led to severe winterkill on bermudagrass golf courses, sports fields, and home lawns throughout the region. The turfgrass areas in the region that were most affected were sites that had either experienced shade, drought, or traffic during the prior season. However, it should also be noted that winter injury was also observed in areas where no other stresses were obvious.

In our experiment, there was a wide range of winter injury observed on the bermudagrass genotypes (Table 1). As a general observation, the vegetatively established hybrids experienced less winter injury than the seeded entries, although certain entries within each propagation type were severely injured. Of the vegetative cultivars, Midlawn and Cardinal experienced minimal winterkill, while 'Tifgreen' and 'Mini-verde' both had over 70% winterkill. Three breeding selections, CN2-9, OKC 81-4, and OKC 19-9 also had very good winter tolerance, which indicates that

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additional cold-tolerant cultivars should be available in the near future.

Of the seeded cultivars, 'Riviera' was the only cultivar that experienced minimal winter injury (3%), although 'Blackjack' and 'Mirage' also had acceptable levels of injury (Table 1). All of the remaining seeded cultivars had unacceptable winter injury in this test, with some cultivars experiencing over 80% winter injury. More work remains to be done on seeded bermudagrasses to enhance the winter tolerance of those strains. One cultivar, Yukon, was not in this specific test but showed very high winter survival in another test during the same winter (Richardson et al., 2001, in review).

Genetics remains a key issue relative to bermudagrass winter tolerance in the upper transition zone. Although progress has been made relative to cold tolerance, the number of available cultivars remains low. However, there are now both seeded and vegetative options available to turfgrass managers that produce both a high-quality turf and have excellent cold tolerance.

LITERATURE CITED

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Table 1. Percent winterkill of seeded and vegetative bermudagrass cultivars at Fayetteville, Ark. Plots were established under the National Turfgrass Evaluation Program, 1997 bermudagrass trial.

<u>Seeded</u>		<u>Vegetative</u>	
Genotype	Winterkill (%)	Genotype	Winterkill (%)
Majestic	98	Tifgreen	80
Savannah	89	Mini-verde	73
Pyramid	87	Tifway	52
Jackpot	86	Tiftsport	25
Princess	79	Shanghai	20
Shangri La	77	CN2-9	10
J-540	75	Midlawn	8
SW1-7	74	OKC 81-4	8
SW1-11	73	OKC 19-9	7
Arizona Common	70	Cardinal	3
Blue Muda	65	LSD (0.05)	27
PST-R69C	55		
Nu-Mex Sahara	53		
J-1224	53		
Mirage	33		
BlackJack	20		
Riviera	3		
LSD (0.05) ^z	27		

^z Least significant difference (P=0.05) between means within each column.