Advances in Seeded Bermudagrasses Could Spark Wider Use

By Michael D. Richardson

Bermudagrass has been the backbone of the Southern turfgrass industry for the past century. The various uses of bermudagrass have been almost endless and include golf greens, fairways, tees, roughs, sports fields, home lawns, commercial sites and roadsides.

The wide adaptation of this species reflects a broad range in genetic diversity, from very dwarf, dense putting green selections such as TifEagle or Champion to cultivars that have been selected for their ability to produce massive amounts of foliage.

The genetic advances in the turfgrass quality of seeded bermudagrass will likely increase its use on high-maintenance turf surfaces.

Although these new cultivars should provide a quick, easy and economical way to establish a high-quality bermudagrass turf, several drawbacks do exist, including establishment weed control and the issue of cold hardiness, especially during the establishment year.

Many of the improved cultivars are hybrids. Until recently, most of the improved cultivars or hybrids available to the golf and sports turf industry were infertile and had to be planted using vegetative techniques such as sod or sprigplanting. The bermudagrasses available by seed were generally considered "common" and didn't produce the superior turf surface of the sterile hybrids and selections.

In the 1980s, a handful of turfgrass breeders began a concerted effort to find, cross and develop cultivars of bermudagrass that would produce fertile seed and also produce an acceptable turf. Some of the earliest work was done in New Mexico under the direction of Dr. Arden Baltsenberger and resulted in the release of NuMex Sahara, a seed-propagated bermudagrass with a slight improvement in quality over common.

Further work by breeders at International Seeds in Oregon led to the release of the cultivar Mirage, which had improved performance over NuMex Sahara, but was still inferior to the popular vegetative cultivars.

In the late 1990s, Oklahoma State University and Charles Taliaferro released Riviera, a cultivar with significant improvements in turfgrass quality relative to earlier seeded types. In addition, further work from Baltsenberger's program led to the release of Princess, which also had turfgrass performance that was comparable to industry standards such as Tifway.

Establishment weed control

The ability to control weeds during the first six to eight weeks after emergence is a key factor to the success of seeded bermudagrasses.

Summer annual grasses such as crabgrass and goosegrass are particularly competitive in a new bermudagrass seeding and broadleaf weeds may also create problems through shading of young bermudagrass seedlings. Therefore, competition during the seedling stage could significantly inhibit the establishment rate and reduce overall stand density.

Dennis Martin of Oklahoma State University has provided good information regarding pre-emergent herbicide tolerance of established and newly emerged seeded bermudagrass cultivars. However, pre-emergent control in new seedings often produces poor or inconsistent results due to the nonselective nature of pre-emergent herbicides.

With regard to postemergent weed control, little is known about herbicides that can be effectively used during the critical period for stand establishment.

Work at the University of Arkansas has focused on investigations of postemergent herbicide tolerance of newly seeded bermudagrass, initiated in June 2000, using Princess. At seven, 14 and 28 days after seedling emergence, individual plots were treated with one of seven postemergent

THE EMERGENCE OF SEEDED VARIETIES

A sample of the results from the past three National Turfgrass Evaluation Program bermudagrass trials.

Cultivar	1986 Trial Final Report	1992 Trial Final Report	1996 Trial 2000 Report
	Quality		Turfgrass
Tifway	6.6	6.0	6.5
Midlawn	6.0	6.0	6.2
Tifgreen	6.5	6.1	6.1
TifSport	*	*	6.5
NuMex Sahara (seeded)	4.9	4.6	4.9
Mirage (seeded)	*	5.4	5.0
Yukon (seeded)	*	5.4	*
Riviera (seeded)	*	*	6.6
Princess (seeded)	*	*	6.4
Guymon (seeded)	4.4	5.0	*
Arizona Common (seeded)	4.4	4.2	4.6

* not entered into that particular trial

turf herbicides at recommended rates, including monosodium methanearsenat; dicamba; metsulfuron; 2,4-D; chlopyralid; diclofop and quinclorac, as well as an untreated control. This study was repeated during the 2001 season, with seeding occurring on May 24.

Genetic advances in the turfgrass quality of seeded bermudagrass will likely increase its use on high-maintenance turf surfaces.

Over both years of the trial, significant injury was observed with most herbicides at the one, two and four weeks after establishment timings. The injury was similar regardless of the application timing, so combined the data from the three timings for this report.

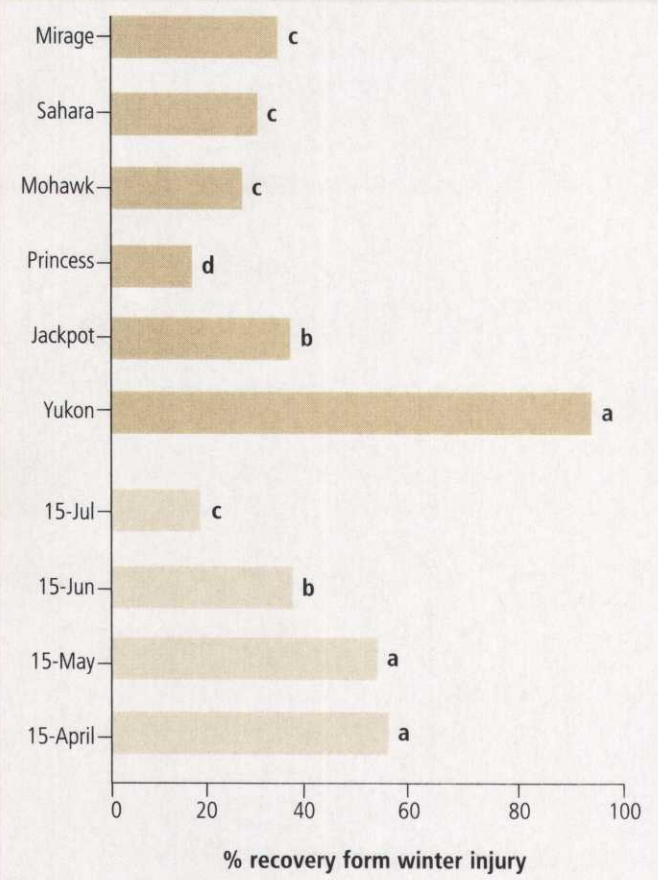
Metsulfuron and diclofop generally produced the highest levels of herbicide injury on Princess bermudagrass, although significant injury was also observed with dicamba and 2,4-D.

These findings were similar from both years of the study. Although the injury observed at each timing was considered harmful, the turf quickly recovered from the injury.

Plots sprayed with metsulfuron and diclofop were only slightly distinguishable from other treatments at 30 days after treatment. During the 2001 growing season, herbicide injury was overall not as severe as 2000, and recovery occurred much quicker. These differences likely reflect a significant difference in temperature and solar radiation between the two seasons.

During 2000, June was cloudy, wet and cool, while June 2001 had less frequent rain and 4° C to 8° C higher average temperatures compared to 2000. The results of these two studies indicate that several, common postemergent herbicide programs that are effectively used on mature

FIGURE 2



Winter recovery of seeded bermudagrasses, as affected by cultivar (top) and planting date (bottom). Different letters indicate a significant difference between treatments according to their lowest statstical difference (LSD).

bermudagrass can also be used to establish bermudagrass from seed.

Future studies are in place that will investigate the use of herbicide combinations in combination with repeated applications of chemicals on seedling bermudagrass during establishment.

Winter injury

A second limitation to seeded bermudagrasses, especially in the upper transition zone, is a potential for winter kill following the establishment year.

Winter survival of bermudagrass has been an important issue in this region for many years, with major emphasis on cultivar variability (Anderson et al., 1993), fertility management (Reeves et al., 1970), and the underlying physiology associated with cold tolerance (Dunn and Nelson, 1974).

Unfortunately, most of the research in the literature has focused on established bermudagrass turf with particular emphasis on vegetatively propagated hybrids.

Crown and rhizome development are critical for winter survival in bermudagrass ,and a short growing season can restrict the development of bermudagrass seedlings prior to the onset of chilling temperatures. Philley and Krans (1998) reported that several new seeded bermudagrass cultivars suffered significant winter damage in Mississippi during the establishment year following a June seeding.

Problems associated with weed control and first-year winter survival can be solved with proper management.

A study in Arkansas (Hensler et al., 1999) evaluated the effects of five seeding dates (April 15, May 15, June 15, July 15, Aug. 15) on morphology and cold tolerance of several seeded cultivars. In the following December's establishment of new plots, rhizome development was virtually absent in all seeded cultivars.

Collectively, these studies suggest that a minimum period of favorable weather will be required to successfully establish a seeded bermudagrass turf that can survive the first winter.

Research at the University of Arkansas has focused on the effects of cultivar selection and seeding dates on the morphology and freeze tolerance of newly seeded bermudagrass.

The overall approach for this study was to plant a replicated test containing six seeded bermudagrasses cultivars (Princess, Yukon, Mohawk, Jackpot, Mirage and NuMex Sahara) on a monthly basis through the growing season.

The experiment was planted near April 15, May 15, June 15 and July 15 in 2000 and on the same dates in 2001. Each plot

was seeded at one-half pound of seed per 1,000 square feet.

These plots were evaluated during the dormant season for morphological development, and winter recovery was evaluated during the spring green-up period. The 2001 study is still underway and will not be discussed in this report.

The 2000-2001 winter was one of the most severe on record for Fayetteville, Ark., and bermudagrass winterkill was observed throughout the region. Morphology analysis of these plots included evaluations of stolon density, stolon mass and weight per stolon.

In addition, rhizome quantification was attempted in these plots, but none were observed for any cultivar across all seeding dates, similar to earlier reports (Hensler et al., 1999).

The most important data obtained from this study was the recovery of the plots from the significant winterkill that occurred during the harsh 2000-2001 winter.

Weight per stolon was affected by both cultivar and planting date. To summarize, Yukon had the highest weight per stolon of any seeded cultivar across all planting dates, while an April seeding led to significantly higher weight per stolon than any of the other planting dates.

Stolon number was more affected by planting date than by cultivar, but Yukon, Mohawk and Jackpot were able to maintain more uniform stolon densities across all planting dates than did Mirage, Sahara and Princess.

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During the months of December and January, temperatures at the Fayetteville location routinely dropped into the low single digits, and the plots experienced a snow/ice cover for more than 40 days during that period.

The cultivar Yukon had much higher recovery from winter injury compared to any other seeded bermudagrasses, followed by Jackpot (Fig. 2). Princess bermudagrass had the lowest overall recovery from winter injury, with less than 20 percent recovery by early May.

Planting date also had a significant effect on winter survival and recovery, with April and May seeding dates producing much higher recovery from winter injury than June or July seedings (Fig. 2).

This study demonstrates that early seeding dates are critical in the upper zones of bermudagrass use. In addition, these data also demonstrate that great advances in cold tolerance have been made in recent years and the cultivar Yukon will have great potential in regions where other bermudagrasses have not been adapted.

Dr. Michael Richardson is a turfgrass physiologist in the department of horticulture at the University of Arkansas in Fayetteville, Ark. He received a Bachelor of Science degree from Louisiana Tech University, a Masters degree from Louisiana State University and Ph.D. from the University of Georgia. Prior to joining the faculty at the University of Arkansas in 1998, he was a member of the faculty at Rutgers University and was also the director of research at Turf Merchants, an Oregon-based turfgrass seed company.

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