

Sod Production Using Seeded Bermudagrass

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Summary. The development of improved seeded bermudagrass cultivars has led to an increased interest in these grasses for numerous areas of turfgrass use. One area that has yet to be investigated is the potential to produce sod using a seed-propagated bermudagrass, rather than the standard practice of vegetative propagation, which is currently used. To this end, a series of studies are underway to investigate the effects of various production techniques on seeded bermudagrass sod production. A study was established during the 2003 growing season at a sod farm in Little Rock, Ark. An area was seeded with 'Riviera' bermudagrass at a seeding rate of 56 kg purelive-seed (PLS) ha-1 (50 lb PLS A-1). Plots were split into treatments that received either netting (Conwed fibers) or no netting immediately after planting. In addition, plots were treated with either 1.16 or 0.58 l ha-1 (16 or 8 oz. A-1) of trinexapac-ethyl (TE; trade name 'Primo'). At 10, 12, and 14 weeks after planting (WAP), strips of sod were harvested form each plot and the amount of harvested crop was determined from each treatment. In addition, harvested sod was tested for sod strength. The results of these studies indicated that netting was the critical component for producing sod with seeded bermudagrass. The netted plots had greater than 90% harvest at all harvest dates, while the non-netted plots had less than 20% harvest at any of the harvest dates. The TE had no effect on sod harvested or sod strength. These studies demonstrate that sod can be produced using seeded bermudagrass, but netting will decrease the time required to produce a marketable crop and reduce the amount of waste.

In the past decade, a number of new seeded bermudagrass cultivars began to appear on the market as several commercial and academic breeding programs continued to search for new germ plasm and make new crosses. Although some of the earlier cultivars such as 'Guymon', 'Sonesta', and 'NuMex Sahara' suggested promise, most failed to produce a turf quality that was better than 'Arizona Common' and certainly not within the quality range of the established hybrids. However, in the 1997 National Turfgrass Evaluation Program bermudagrass trial, new seeded cultivars such as 'Princess' and 'Riviera' ranked at the top of this trial for both seeded and vegetative types of bermudagrass (Morris, 2000). These grasses have the potential to revolutionize the sod industry by offering a seeded option for sod growers which may considerably increase the production volume of warm-season sod farms.

The University of Arkansas has done a considerable body of research on the improved, seeded bermudagrasses, investigating the effects of planting date, planting rates, and weed control strategies to successfully establish this crop. We have observed that a full stand of bermudagrass can be established in as little as 4 weeks (J.H. McCalla, unpublished). However, it is uncertain whether this young stand has the tensile strength to be harvested as sod, as there have been no studies using seeded bermudagrass for sod production. In addition, techniques such as netting, which are commonly used on cool-season sod crops (Beard et al., 1980), may also be applied to seeded bermudagrasses, further reducing the production period and increasing the strength of the bermudagrass sod.

Studies on cool-season grasses have shown that netted grasses can be lifted and transplanted in as little as 12 weeks (Beard et al., 1980) and a local sod producer has indicated that netted sod has been effectively harvested as early as 8 weeks (Roger Gravis, Quail Valley Grasses, personal communication). The cost to net sod is approximately \$.05 / yard, so this technique does not add considerably to the price of production. In addition, netting has been shown to reduce the amount of waste product during harvest of sod, as the tensile strength of the net will hold marginal sod together. Bermudagrass typically has weak sod quality, especially in late summer (Anonymous, 1995) and the addition of net to the production process should improve the overall quality and quantity of harvested sod

Another technique that has been used to enhance sod strength in seeded grasses is the application of plant growth regulators to enhance lateral development and increase tensile strength. Work on Kentucky bluegrass has indicated that sod strength can be enhanced using trinexapac-ethyl (TE) (Henderson et al., 1999) and this compound can be safely used on bermudagrass (Richardson, 2002).

The overall goal of this project is to determine a set of best management practices for using improved seeded bermudagrasses for sod production. Under that goal, several objectives will be addressed. The

Across the southern United States and throughout the transition zone, bermudagrasses (*Cynodon* spp.) continue to be the major turfgrass species for golf courses, sports fields, lawns, and utility turf areas. Although hybrid (*C. dactylon* x *C. transvaalensis*) bermudagrass cultivars such as 'Tifway', 'Tifgreen', and 'Midlawn' have been the most widely utilized for high-maintenance turf sites, these grasses carry the sterile characteristics of the *C. transvaalensis* parent and subsequently have to be vegetatively propagated. These grasses have been the backbone of the southern U.S. sod industry.

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first objective is to determine the minimum time from planting to harvest of the seeded bermudagrass cultivar Riviera. The second objective is to investigate the effects of net-planting and TE on seeded bermudagrass production. The last objective is to determine the effects of re-seeding on the recovery of harvested bermudagrass and the production of a second crop. This report describes the first year of research dealing with the first two objectives.

Materials and methods

A 0.40 ha (1.0 acre) area was seeded with 'Riviera' bermudagrass at Quail Valley Farms in Little Rock, Ark. The area had been fallow for a full season and cleaned of weeds with 3 successive applications of glyphosate. The seeding rate was 56 kg PLS ha⁻¹ (50 lbs PLS A⁻¹). The plot area was laid out in a strip-split-plot design, with netting being the first main effect and trinexapac-ethyl (TE) at either 1.16 or 0.58 l ha⁻¹ (16 or 8 oz. A⁻¹) being the second split. The entire area was seeded with a mechanical seeder and the netting, which was 4.6 m (15 ft) wide, was laid immediately after seeding.

The plot area was maintained to promote germination and rapid establishment. The plot area was mowed twice weekly at 2.54 cm (1.0 in) and fertilized bi-weekly with 56 kg N ha-1 (50 lb N A-1) as urea. The plot area had excellent germination and establishment and had formed a complete turfgrass cover at approximately 6 weeks after planting. Due to weather constraints, the first harvest was not attempted until 10 weeks after planting (WAP), but successive harvests were made at 12 and 14 WAP.

During the harvest, two passes were made down the length of the netted or control plots with a Brower sod harvester, cutting sod into pads that were approximately 45 cm (18 in) wide x 76 cm (30 in.) long. Sod within the three TE treatments was handled separately. Two parameters were measured within each net x TE plot: 1) Percentage of pads that were able to be handled without damage and 2) sod strength of the harvested pads.

Results and discussion

The analysis of variance indicated a significant effect of netting at all harvest dates, while TE was not significant at any harvest date, nor was there a significant netting x TE interaction (data not shown). The overall results of this trial were very interesting in that the seeded bermudagrass plots that had been netted could be harvested completely at 10 weeks after planting with less than 10% waste, while the control

(non-netted) plots had very poor sod quality and <20% could be harvested even at the last harvest date (Table 1). For the netted plots, sod quality remained very high, with almost 100% harvest from the netted plots at the 12 and 14 weeks after planting harvests.

Sod strength was measured at each harvest using a sod harvester designed originally at Michigan State University (Sorochan et al., 2001) and modified slightly for these purposes. The machine operates by initiating a lateral pull on an immobile pad of sod and recording the maximum shear force required to break an individual piece of sod. Within each net x TE plot, eight pads were collected (if available) and analyzed with the sod stretcher. The sod stretch data did not yield any significant findings during this trial, in that the netted plots had similar sod strength across growth regulator treatments, while the non-netted sod had very poor sod strength regardless of growth regulator (data not shown). *Conclusions*

From this study, it was obvious that netting will be a major factor for producing bermudagrass sod from seed, but these plots will be monitored through next season to determine at what point non-netted turf produces a sod crop. With netting, sod can be harvested as soon as 10 weeks after planting under good growing conditions. TE had no effect on sod strength in this study, which is different from trials conducted on cool-season grasses.

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Table 1. Percent harvested bermudagrass sod, as affected by netting treatment. Sod was harvested at 10, 12 and 14 weeks after planting (WAP).

	10 WAP	12 WAP	14 WAP	
		% harvested sod		
Netted	96.0	98.8	100	
Control	19.0	2.0	10.9	
LSD (0.05)	17.1	3.7	10.9	