Dormant seeding: a new option for establishing bermudagrass

Seeded bermudagrass in the transition zone may be planted earlier than once thought.

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Worldwide, bermudagrass (*Cynodon* species) is the most commonly used turfgrass in tropical and subtropical regions and the transition zone. Most of the bermudagrass cultivars that have been used in intensively managed turfgrass systems must be established by sprigs or sod, but over the last decade, turfgrass breeders have developed seeded bermudagrass cultivars that provide a high-quality surface for use on golf courses and other sports venues (6).

Late-spring or early-summer plantings have been recommended for bermudagrass established from seed because the environmental conditions most closely match the needs for bermudagrass germination and growth (4). Early planting dates are also considered advantageous because several researchers have demonstrated that late-summer seeding dates can lead to greater freeze injury in the winter after seeding (7,8,11).

Dormant seeding refers to planting seed when soil temperatures are outside the normal range for germination (9). Although work has been done on dormant seeding of cool-season turfgrasses (2,9,12), limited information is available on the effects of dormant seeding warm-season grasses such as bermudagrass. In the only published study conducted to date (2), bermudagrass was found unsuitable for dormant winter seeding, and poor stands were observed the summer after establishment. However, there have been no other documented attempts at using dormant seeding to establish bermudagrass. The objectives of our study were to determine the effects of seeding date (dormant vs. spring), seeding rate and cultivar on the establishment of bermudagrass in the transition zone in the United States.

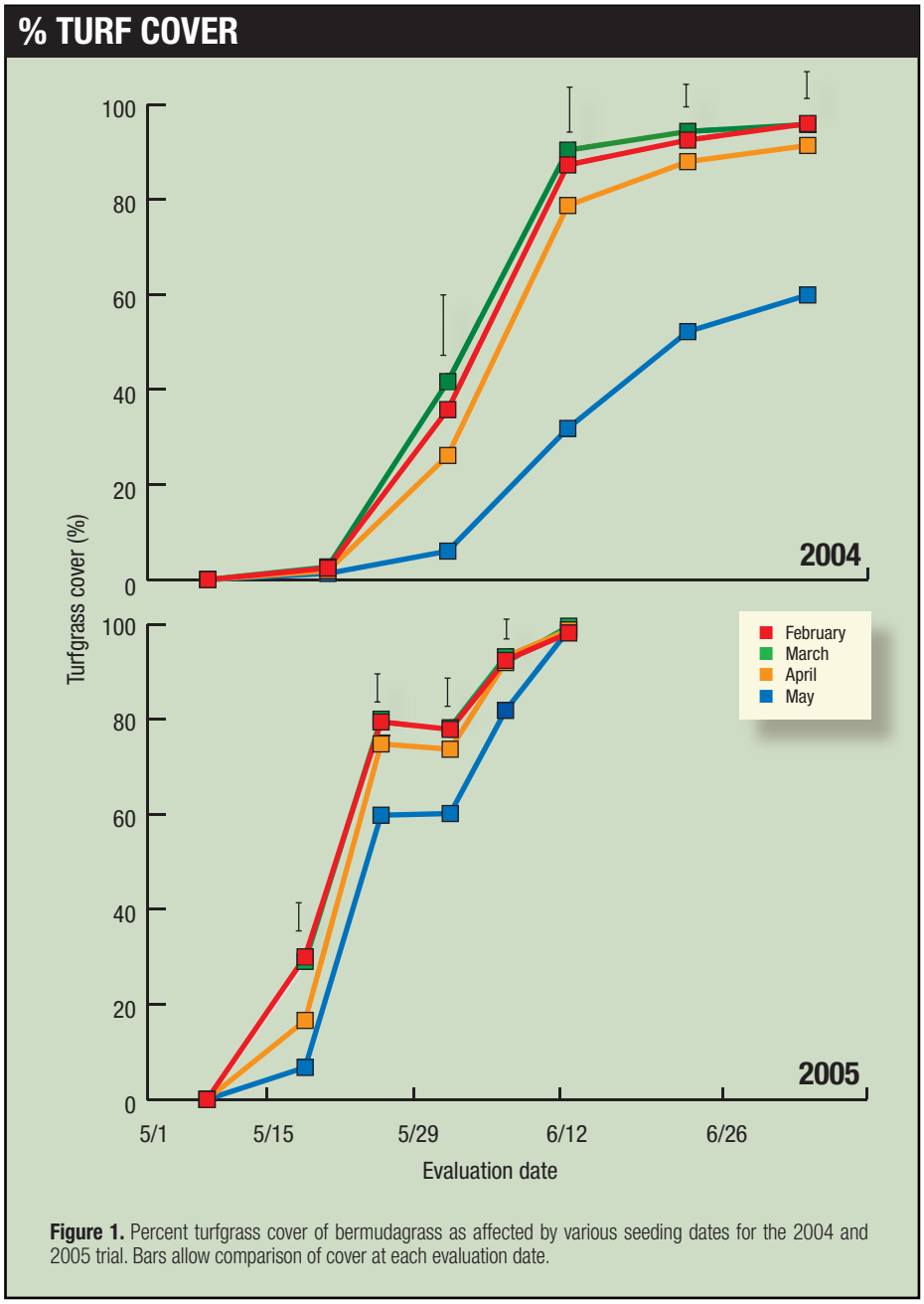

Figure 1. Percent turfgrass cover of bermudagrass as affected by various seeding dates for the 2004 and 2005 trial. Bars allow comparison of cover at each evaluation date.

Research methods

A field study was conducted in 2004 and

2005 at the University of Arkansas Agricultural Experiment Station in Fayetteville to test the effects of dormant seeding on the establishment of two seeded bermudagrass cultivars. We used two sequential applications of glyphosate (3.0 pounds a.i./acre [0.3 gram/square meter]) in the early fall of 2003 and 2004 to remove turf from the areas used for the 2004 and 2005 studies, respectively. This provided an experimental area that was similar to a dormant grass but allowed data collection on seedling germination and growth and establishment to occur in the absence of turfgrass recovery the following spring.

Princess 77 and Riviera bermudagrass were seeded at 1.0 and 2.0 pounds pure live seed/1,000 square feet (4.88 and 9.76 grams/square meter). All cultivars and seeding rates were planted near the 15th of each month in February and March (dormant planting dates) and April and May (traditional spring planting dates) in 2004 and 2005.

Before seeding, each plot was scarified using a vertical mower to a depth of 0.5 inch (1.27 centimeters). Seed was applied using a drop spreader, and the plots were topdressed with 0.25 inch (0.64 centimeter) of dry sand. Weeds were removed by hand during the germination period, but MSMA was applied at 1.0 pound a.i./acre (0.11 gram/square meter), as needed, once seedlings were at least two weeks old (5).

Soil-temperature data loggers were placed in the plot area at the beginning of the study to record soil temperatures at a depth of 1.0 inch (2.5 centimeters). Date of first germination was recorded for each plot and compared to soil temperature at germination.

At two weeks after germination within each plot, seedlings were counted to assess establishment vigor of the various treatments. Beginning two weeks after initial germination, digital images were collected weekly from all plots and analyzed to determine turfgrass coverage (10).

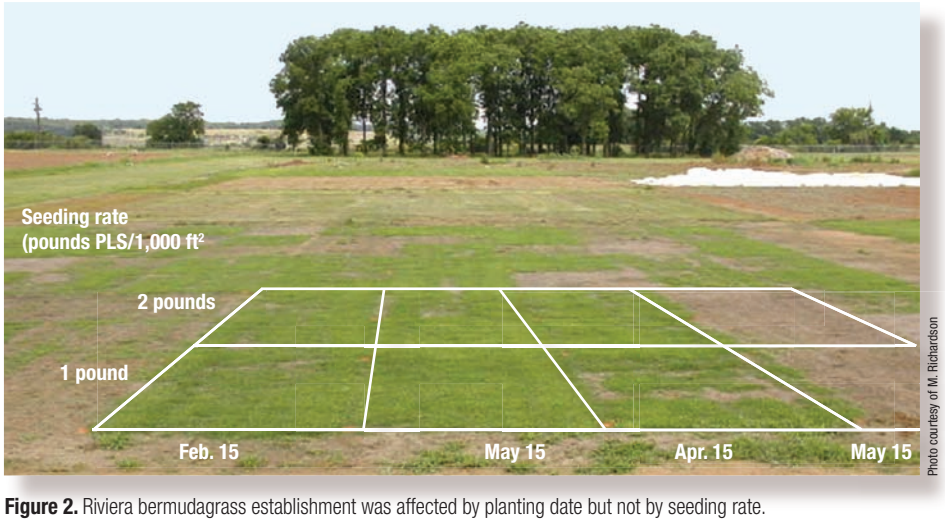

Figure 2. Riviera bermudagrass establishment was affected by planting date but not by seeding rate.

The experimental design was a randomized complete block with four replications of each treatment and a plot size of 6.0 × 9.0 feet (1.8 meters × 2.7 meters).

Turfgrass establishment

Seeding date

Seeding date had a significant effect on turfgrass coverage in both the 2004 and 2005 trials (Figures 1,2). In both years, the February and March (dormant) seeding dates produced similar turfgrass coverage on all evaluation dates (Figure 1). April treatments produced less cover than February and March treatments on all evaluation dates except the last evaluation in 2004 and the first evaluation in 2005 (Figure 1). The May seeding date treatment had less turfgrass coverage on all evaluation dates in 2004 and 2005 except for the final evaluation in 2005, when all plots were near 100% (Figure 1).

Seeding rate

Seeding rate only had a significant effect on turfgrass coverage for one evaluation date in 2004 and one in 2005 (data not shown). It was originally thought that higher seeding rates might be beneficial in a dormant seeding because conditions might decrease seed viability. However, similar results were obtained at seeding rates of 1.0 and 2.0 pounds/1,000 square feet (4.9 and 9.8 grams/square meter) (data not shown). Other research has also demonstrated that bermudagrass establishment did not increase with seeding rates higher than 1.0 pound/1,000 square feet (4.9 grams/square meter) (8).

Soil temperature effects on germination

In 2004 and 2005, the date of germination was affected by both cultivar and seeding date (Table 1). For February and March seeding

GERMINATION DATE

	2004		2005	
Seeding date	**Princess 77**	**Riviera**	**Princess 77**	**Riviera**
	Date of first germination (soil temp at 1-inch depth)			
February	April 16 (61 F)	April 23 (63 F)	April 11 (59 F)	April 18 (61 F)
March	April 16 (61 F)	April 23 (63 F)	April 11 (59 F)	April 18 (61 F)
April	May 4 (66 F)	May 4 (66 F)	April 21 (62 F)	April 21 (62 F)
May	May 24 (72 F)	May 24 (72 F)	ND*	ND*

*ND, not determined.

Table 1. Date of first germination and soil temperature (at 1-inch depth) at first germination of Princess 77 and Riviera seeded on four seeding dates.

dates in both years, Princess 77 germinated approximately seven days earlier than Riviera (Table 1). Riviera was seeded as a coated, hulled seed and Princess 77 was seeded as a noncoated, hulled seed, and this difference may have affected the germination dates. Other researchers have reported a slight delay in seedling emergence of hulled bermudagrass seed treated with a seed coating (3).

In 2004, Princess 77 seeded in February and March germinated on April 16, when average soil temperature at the 1.0-inch depth was 61 F, but plots seeded with Riviera displayed germination on April 23, when soil temperature was 63 F (Table 1). In 2005, dormant-seeded plots of Princess 77 first germinated on April 11, when soil temperatures were 59 F (15 C), and plots seeded with Riviera germinated on April 18, when soil temperatures had reached 61 F (16.1 C) (Table 1). It has been previously suggested that soil temperatures from 68 F (20 C) to 86 F (20 C) were required for germination of bermudagrass and other warm-season turfgrasses (5).

In this study, soil temperatures at germination for dormant seeding dates were below previously suggested soil temperature requirements for bermudagrass. These results demonstrate that bermudagrass can germinate at lower soil temperatures than previously described. These findings more closely resemble a report for emergence of crabgrass, another warm-season grass species (1). In that study, crabgrass emergence was observed when soil temperatures were as low as 51 F (10.6 C). However, in that study, a major emergence period also occurred when soil temperatures ranged from 67 F (19.4 C) to 77 F (25 C), which would more closely match previous recommendations for warm-season grasses. In our study, only the date of first germination was recorded, and germination was not recorded over time as with the crabgrass study (1). Although we saw bermudagrass germination at soil temperatures as low as 59 F (15 C) (Table 1), more work is needed to determine the minimal and optimal germination temperature range for seeded bermudagrass.

Seedling vigor

Seeding date had a significant effect on seedling density in both 2004 and 2005, although the data were not consistent between years (data not shown). The March 2004 seeding date had higher seedling density compared to other seeding dates. However, plots seeded in February 2005 had the highest seedling density of all treatments. Although the reason for these differences is currently unclear, it is apparent that dormant seeding had no negative effect on seed viability and seedling stand counts. In fact, the dormant-seeded plots had the highest seedling stand counts in both 2004 and 2005.

THE RESEARCH says . . .

- ***Dormant seeding* refers** to planting seed when soil temperatures are outside the normal range for germination.
- **In the transition zone,** Princess 77 and Riviera were successfully established by dormant seeding, and plots that were dormant-seeded reached full coverage as fast as or faster than plots planted in spring.
- **Similar density results** were obtained for both cultivars at seeding rates of 1.0 and 2.0 pounds/1,000 square feet (4.88 and 9.76 grams/square meter).
- **Planting seeded bermudagrass** in February or March at soil temperatures as low as 59 F is a viable strategy for superintendents in the transition zone.

Summary

Dormant seeding of bermudagrass proved to be a successful means of establishing both Princess 77 and Riviera bermudagrass. Germination of bermudagrass was seen at soil temperatures as low as 59 F (15 C), indicating that bermudagrass germination can occur at temperatures lower than previously reported. Furthermore, dormant-seeded plots displayed full turfgrass coverage as fast as or faster than plots seeded on traditional seeding dates (April and May) for both years of the study.

Collectively, these studies demonstrate that improved seeded bermudagrass cultivars can be successfully established by seeding in late winter in transition-zone environments. This could be beneficial for superintendents, as February and March workloads are often lighter. Seeding during this time of the year would give superintendents a larger window for repair or establishment projects. Further research is needed to determine exactly how early in the year bermudagrass could be seeded and still provide acceptable results.

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