

# Cultural Practices to Improve the Performance of Overseeded Meadow Fescue and Tetraploid Ryegrass

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Photo by Josh Summerford

Overseeding trials at the University of Arkansas in Fayetteville

**Summary.** Overseeding is a common practice used by turf managers in the transition zone to provide actively growing, green turf surfaces during the winter dormancy of warm-season grasses such as bermudagrass. The most commonly used turf species for overseeding is perennial ryegrass due to its excellent turf characteristics and rapid establishment. Continued improvements in heat and disease tolerance of perennial ryegrasses have resulted in cultivars that persist into the summer and interfere with the spring green-up of bermudagrass. Two new turf species, meadow fescue and tetraploid perennial ryegrass, have demonstrated good turf characteristics when overseeded as well as easier spring transition to bermudagrass.

Little is known about the mowing and nitrogen (N) fertilization practices that will optimize turf quality for these species. The objective of this study was to determine the effects of mowing height and N fertility rate on turf quality and coverage of these overseeding species. A range of mowing heights and N fertility treatments was applied to plots of diploid perennial ryegrass, tetraploid perennial ryegrass, and meadow fescue. In addition, simulated traffic was applied across each combination of species, mowing height, and N rate. Increased N fertility and mowing height improved the overall quality and traffic tolerance of both tetraploid perennial ryegrass and meadow fescue in this study.

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The demand for year-round, high quality sports turf surfaces has resulted in the practice of overseeding becoming more common at all levels of turf management. The most common turf species used in overseeding is perennial ryegrass (*Lolium perenne*). In the transition zone overseeding is commonly done in the fall when bermudagrass (*Cynodon dactylon*, *C. dactylon* x *C. transvaalensis*) enters dormancy, and ideally the overseeded species will naturally die out in the spring when temperatures increase and bermudagrass breaks dormancy. In such cases, perennial ryegrass acts as an annual species; however, improvements in the heat and disease tolerance of perennial ryegrass cultivars have increased the tendency of this species to behave as a perennial and persist late into the summer and interfere with bermudagrass spring green-up (Horgan and Yelverton, 2001).

Currently, there are two solutions for the problem of overseeded perennial ryegrass persisting into the summer. An overseeding species with less heat tolerance, such as annual ryegrass (*L. multiflorum*) or intermediate ryegrass (*L. perenne* x *L. multiflorum*), could be used but they both have inferior turf quality compared to perennial ryegrass (Richardson, 2004). Alternatively, a spring application of herbicide to remove perennial ryegrass from the bermudagrass is a more expensive solution for species transition.

Recent breeding efforts have resulted in two species new to the turf industry that have turf quality characteristics similar to perennial ryegrass, but with a much earlier spring transition (Richardson et al., 2007). Both tetraploid perennial ryegrass (*Lolium perenne*,  $2n=4x=28$ ) and meadow fescue (*Festuca pratensis*) have shown promise for use as overseeding species due to good turf quality and early spring transition (Richardson et al., 2007). Little is known about the cultural practices necessary to maximize turf quality for these two species. Best management practices must be developed as a reference for turf managers considering the use of these species as overseeding turfgrasses. The objective of this research was to determine the effects of mowing

height and nitrogen (N) fertility rate on the quality and coverage of overseeded meadow fescue and tetraploid perennial ryegrass under trafficked and non-trafficked conditions.

### Materials and Methods

This study was conducted at the University of Arkansas Research and Extension Center, Fayetteville, Ark., and replicated on two sites: a native Captina silt loam soil, and a silt loam with a 5-inch sand-cap. On 20 September 2006, perennial ryegrass (cv. Integra), tetraploid perennial ryegrass (cv. T3), and meadow fescue (Expt. AMF29) were each seeded into 9 x 24 ft. plots at a rate of 3150 pure live seeds per ft<sup>2</sup> (12.4, 23.4, and 13 lbs. PLS / 1000ft<sup>2</sup> for diploid ryegrass, tetraploid ryegrass, and meadow fescue, respectively). Three common athletic field mowing heights were applied to each species in this study, including a low (0.25 inch), medium (0.5 inch), and high (0.75 inch) height. In addition, three N fertility rates were also applied, including a low, medium, and high rate of 0.5, 1.0, and 1.5 lbs N / 1000ft<sup>2</sup> / month, respectively. Each combination of species, mowing height, and N rate was replicated in four plots. Visual turf quality and coverage ratings were taken bi-weekly beginning two weeks after planting. Traffic was applied weekly to half of each plot at a rate of three passes per week, beginning 21 March 2007, using a Cady Traffic Simulator to simulate the forces of a football game on the turf surface (Henderson et al., 2005). Traffic tolerance was assessed using digital image analysis of the amount of green turfgrass present in the plots one week after each traffic application (Richardson et al., 2001). The main objective of the fall evaluations was to look at how the management variables affected visual turf quality, on a scale of 1-9 (1= completely dead turfgrass, 9= optimum turf quality, 6= minimum acceptable turf quality), during establishment. Following the establishment of the overseeded species in the fall and winter, the main objective of the spring evaluations was to determine how each of the variables in this study affected traffic tolerance, as measured by green turf coverage.

## Results and Discussion

**Turf quality.** Tetraploid ryegrass was the earliest of these species to germinate and produced the highest quality at the first evaluation date in early November (Fig. 1). However, by six weeks after planting, all three species produced similar turf quality. As the temperature decreased in December and January, meadow fescue proved to be the least cold-tolerant species with quality ratings falling significantly lower than the other two species (Fig. 1).

In general, as mowing heights increased, turf quality increased, especially for tetraploid perennial ryegrass and meadow fescue (Fig. 2). Meadow fescue produced the lowest turf quality at all mowing heights, and tetraploid perennial ryegrass produced similar quality to diploid perennial ryegrass at the medium and high mowing heights, while producing slightly lower quality at the low mowing height compared to diploid perennial ryegrass (Fig. 2). When using either tetraploid perennial ryegrass or meadow fescue as an overseeding species, mowing heights should be maintained at or above 0.5 inch to optimize turf quality.

**Turf cover.** There was a significant 4-way interaction of species, N rate, mowing height, and evaluation date on turfgrass coverage (Fig. 3). All three species produced green turf cover near 100% throughout the study at the high mowing height, regardless of N fertility rates. At the medium mowing height, diploid and tetraploid perennial ryegrasses produced turf quality near 100%; however, meadow fescue showed a significant decrease in turf cover during April when temperatures fell below 20°F for several days (Fig. 3). At the low mowing height, N fertility played a more important role in increasing turf cover. Meadow fescue produced the least turf cover throughout most of the study, but coverage was significantly increased at both the medium and high N rates compared to the low rate. Coverage of tetraploid perennial ryegrass decreased during the cold period in April, though higher N rates increased turf cover throughout this period. Diploid perennial ryegrass demonstrated the greatest tolerance to the low mowing height at all N rates.

There was also a significant 4-way interaction of species, mowing height, traffic, and evaluation date on turfgrass coverage (Fig. 4). Mowing height significantly affected traffic tolerance, especially for meadow fescue and tetraploid perennial ryegrass. At the low mowing height all species showed significant reductions in turf coverage on trafficked plots. In early April, the most significant decrease of turf coverage, as affected by traffic, was 8% less coverage for diploid perennial ryegrass, 17% less coverage for tetraploid perennial ryegrass, and 50% less coverage for meadow fescue on trafficked plots. At the medium and high mowing heights, fewer differences were noted in turf coverage for both the diploid and tetraploid perennial ryegrasses; however, meadow fescue turf coverage was significantly reduced at all mowing heights on trafficked plots (Fig. 4).

Tetraploid perennial ryegrass performed similarly to diploid perennial ryegrass throughout most of the study, with the exception of treatments under the low mowing height. Therefore, the use of tetraploid ryegrass as a substitution for perennial ryegrass might be a possibility; however, under decreased mowing heights, increased N fertility may be needed to obtain similar turf coverage. Meadow fescue is the least tolerant of the three species to traffic and should not be used in overseeding situations where excessive traffic is expected. However, meadow fescue could be a good alternative overseeding species in higher-cut areas with little traffic, such as lawns, in the southern US transition zone.

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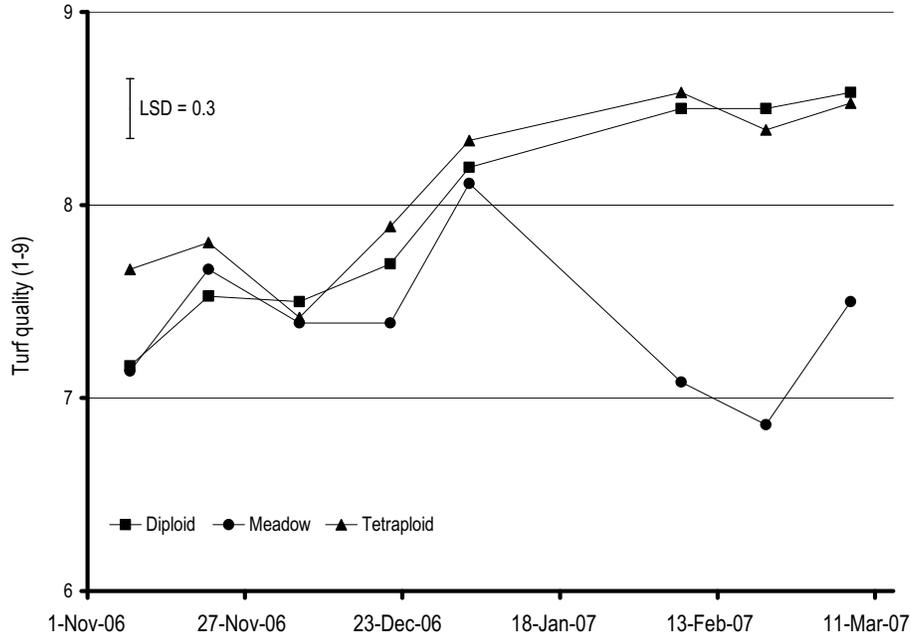


Fig. 1. Turf quality of overseeding species as affected by evaluation date. Error bar represents Fisher's least significant difference value, within dates ( $\alpha = 0.05$ ).

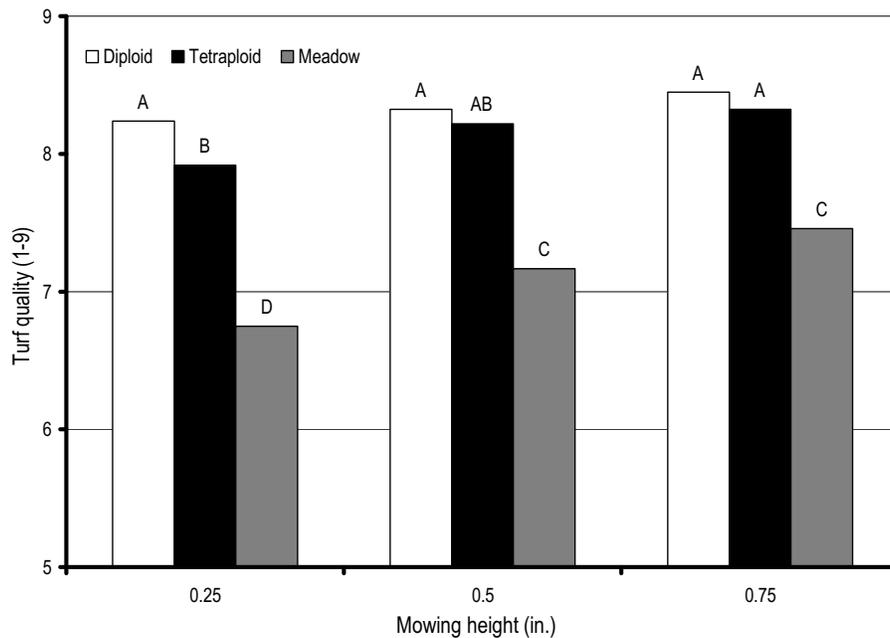
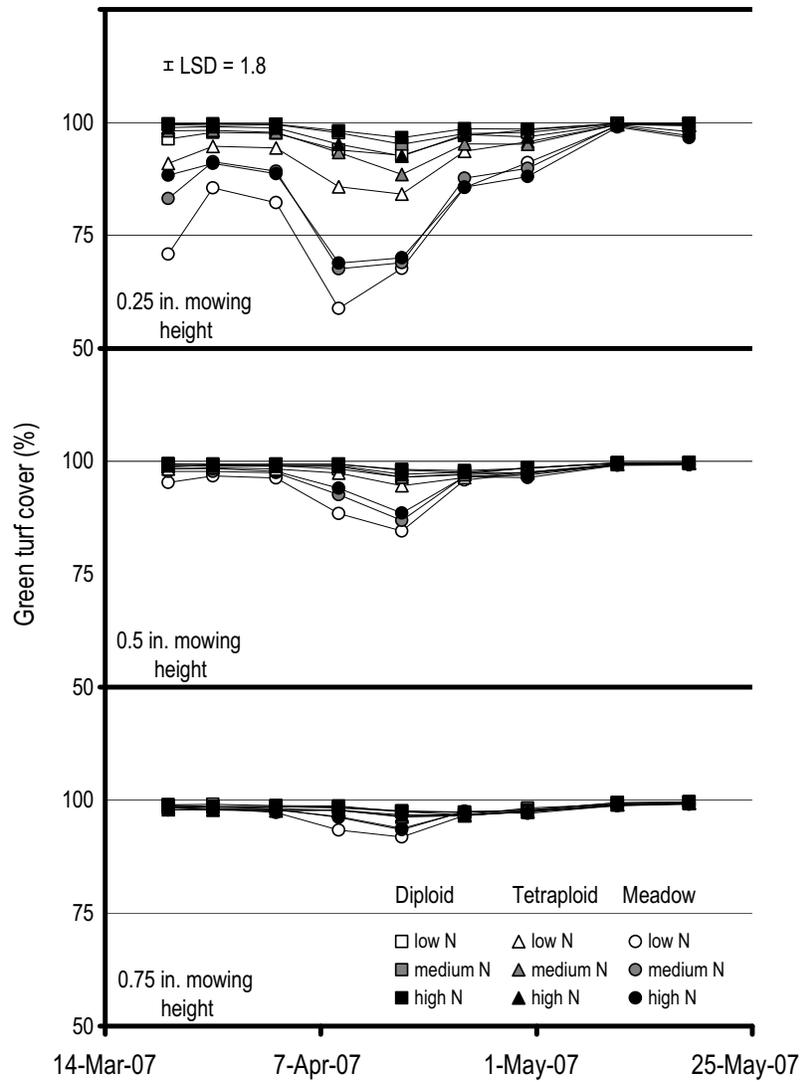
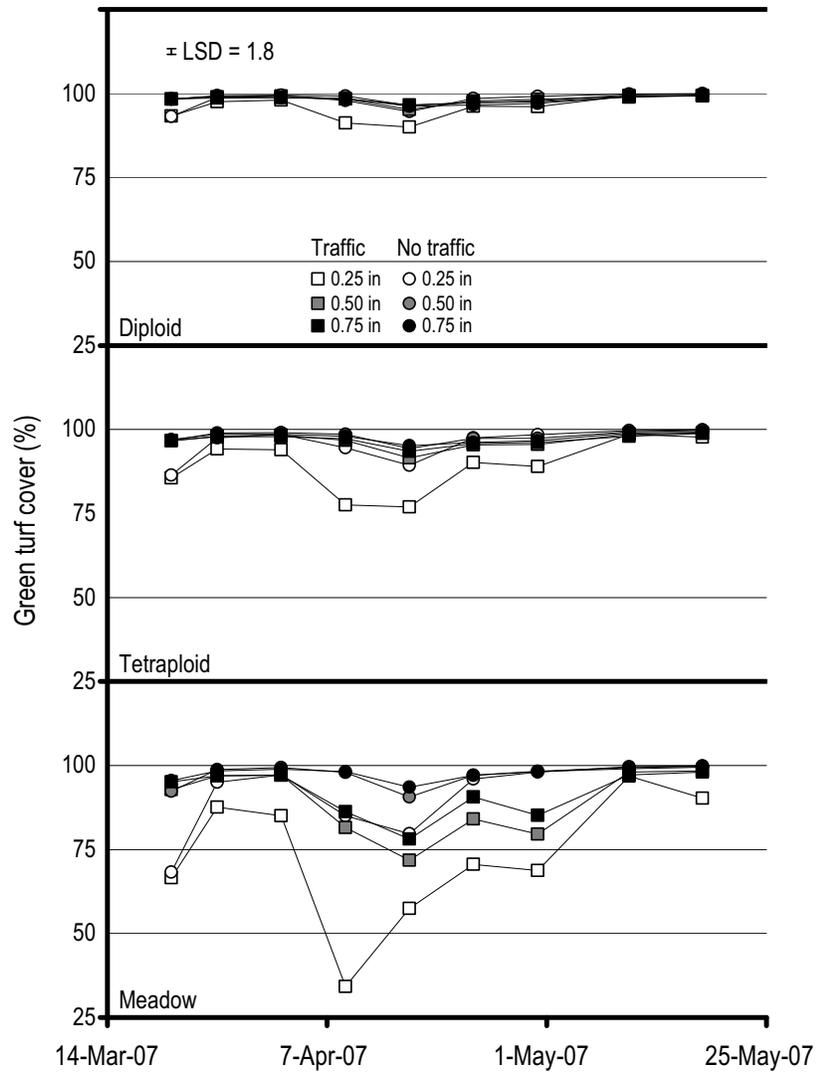


Fig. 2. Turfgrass quality of species as affected by mowing height. Bars not sharing a letter are significantly different according to Fisher's least significant difference test ( $\alpha = 0.05$ ).



**Fig. 3. Turf cover of overseeded species as affected by N rate and mowing height. Error bar represents Fisher's least significant difference value, within dates ( $\alpha = 0.05$ ).**



**Fig. 4. Turf cover of overseeded species as affected by traffic and mowing height. Error bar represents Fisher's least significant difference value, within dates ( $\alpha = 0.05$ ).**