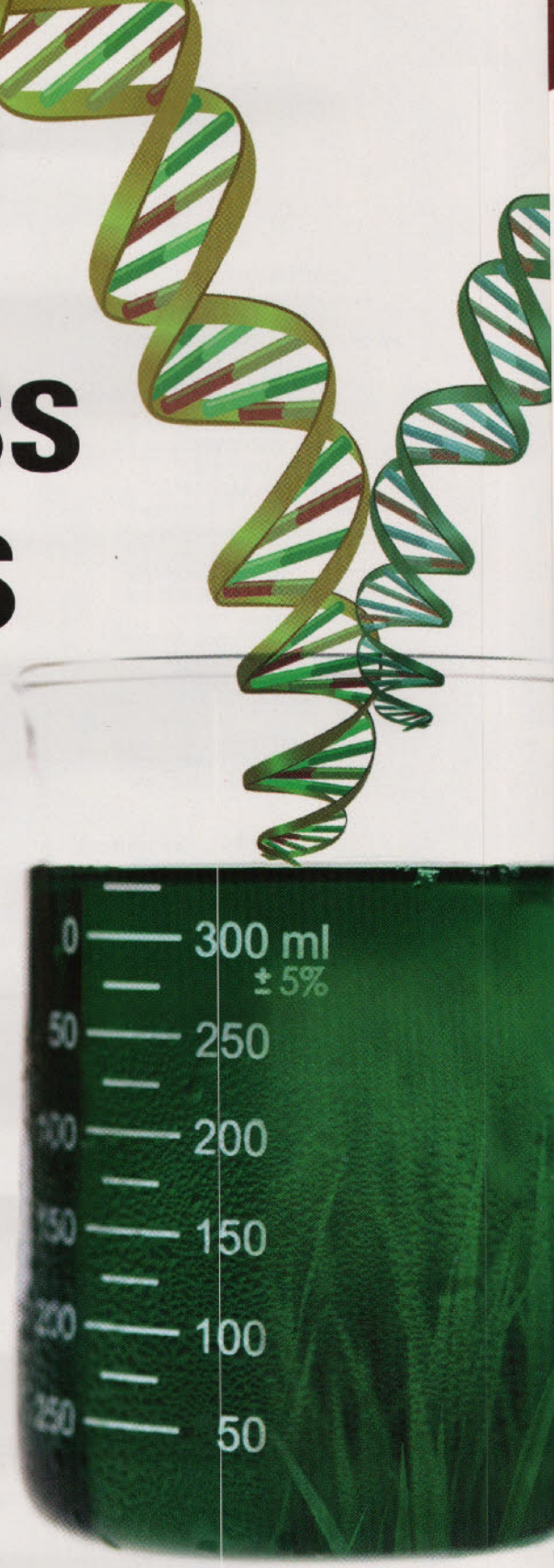
Options for overseeding bermudagrass sports fields



By Mike Richardson, Ph.D., Doug Karcher, Ph.D, Ryan Rolfe, and Josh Summerford

Bermudagrass continues to be the most important turfgrass for sports fields in the southern and transition zone areas of the United States. With its rapid growth rate, good traffic tolerance, fast recuperative ability, good pest tolerance, and excellent quality, bermudagrass performs extremely well in both low- and high-maintenance sports facilities.

One of the only downsides to bermudagrass as a sports turf is that it experiences a long winter dormancy period, especially in the upper regions of its use. During the dormancy period, the turf is not aesthetically pleasing and is much more prone to wear injury during heavy use. For many years, sports field managers have used overseeding with a cool season grass as a means to provide an actively growing turf that is both attractive and can withstand traffic during this dormancy period. This has been especially popular at facilities where early spring sports such as baseball and soccer are being played.

One of the most important decisions in an overseeding program is the selection of an appropriate cool season grass for a specific application. Many grasses have been successfully used for overseeding, including annual (Italian) ryegrass, perennial ryegrass, intermediate ryegrass, creeping bentgrass, rough bluegrass, and fine fescue. Most overseeding programs on sports fields have used either annual or perennial ryegrass, although some facilities have used the new hybrid, intermediate ryegrasses. Recently, turfgrass breeders have improved characteristics of both meadow fescue and tetraploid perennial ryegrass grasses, which have been used in forage systems around the world but have received minimal interest as turfgrasses. The following is a brief description of the major overseeding species, including their strengths and weaknesses for overseeding sports fields.

Annual ryegrass

Annual ryegrass was one of the first species used for overseeding because it germinates quickly (3-5 days), establishes rapidly under a range of conditions, and is relatively inexpensive to seed. Annual ryegrass can produce an acceptable overseeded turf and can be used in a range of sports field applications. However, compared to perennial ryegrass, annual ryegrass has poor shoot density, coarse leaf texture, and a light green genetic color and is less hardy under extreme low and high temperatures. Because of its rapid growth rate, it also requires more frequent mowing than a good turf-type perennial ryegrass and this added cost should be considered if selecting annual ryegrass.

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Perennial ryegrass

Perennial ryegrass is the most widely used species for overseeding dormant bermudagrass sports fields. Perennial ryegrass produces a high-quality playing surface and is also has excellent establishment vigor and traffic tolerance. Turfgrass breeders have made significant improvements in color, texture, density, and mowing quality of perennial ryegrass over the past 40 years. However, increased heat tolerance, drought tolerance and disease resistance of improved perennial ryegrass cultivars have made it a persistent weed following overseeding because it does not always behave as an annual in southern climates. This persistence can be managed with the new sulfonylurea herbicides, but these herbicides add significant cost to an overseeding program. The persistence of perennial ryegrass has been the primary factor in the development of alternative overseeding species such as intermediate ryegrass.

Intermediate ryegrass

Intermediate ryegrass is a hybrid turfgrass species produced by crossing annual and perennial ryegrass. Several cultivars of intermediate ryegrass have appeared in the seed trade over the past 15 years and these varieties were primarily developed to offer improved transition characteristics. Although intermediate ryegrass does have better transition characteristics than perennial ryegrass, its quality is inferior and it also has a higher mowing requirement than perennial ryegrass. Similar to its parents, intermediate ryegrass possesses excellent germination and establishment vigor and is easy to establish in many overseeding situations.

Meadow fescue

Meadow fescue has not been widely tested as a turfgrass. Early trials in the United Kingdom suggested it has limited potential, producing a thin, open turf that competed poorly with weedy grasses such as annual bluegrass (Poa annua). In the mid-1990s, NexGen Research (Albany, OR) initiated a breeding program to examine the turf potential of meadow fescue in Europe and the United States. Several forage varieties and plant collections were screened in turf plots and seed production fields for desirable characteristics such as dark color, fine leaf texture, and disease resistance. After several years of screening and backcrossing of desirable plants, an experimental cultivar (AMF 107) was developed for advanced testing. Based on previous work with this species in forage systems, it was speculated that meadow fescue may have potential for overseeding because of its poor heat tolerance and inability to survive in difficult environments.

Tetraploid ryegrass

All major turfgrass cultivars of perennial ryegrass are natural diploids, meaning they have two sets of chromosomes, one from the mother plant and one from the father plant. In forage breeding programs, techniques have been used to double the number of chromosomes and create a tetraploid line of perennial ryegrass with four chromosome sets. These tetraploid lines are generally more vigorous and have increased yield and improved forage quality. Because of their overly vigorous growth characteristics, tetraploid cultivars of perennial ryegrass have not been developed or tested in turfgrass systems. However, tetraploid perennial ryegrass has been noted as having poor heat and drought tolerance, characteristics that could make them useful in overseeding systems.

An experimental cultivar of a turf-type tetraploid perennial ryegrass was developed by exposing elite, turf-type perennial ryegrass seeds to a chemical called colchicine. This chemical doubles the chromosome number and has been widely used by plant breeders to create plants with multiple chromosome sets. After chromosome doubling, several years of screening in turfgrass systems led to the development of an experimental line (T3) of tetraploid perennial ryegrass.

With the recent development of these alternative overseeding grasses, we have been interested in evaluating their performance in a range of overseeding situations, including applications to bermudagrass sports fields. The remainder of this article will highlight some of the studies we have conducted to date.

New overseeding species study

Five overseeding species were tested in the 2004-05 seasons at three locations, including the desert southwest (Maricopa, AZ), the southeast (Auburn, AL), and the transition zone (Fayetteville, AR). A full report from these trials was published earlier *Crop Science* 47:83-90.). The entries included 'Integra' diploid perennial ryegrass, 'T3' tetraploid perennial ryegrass (Pennington Seed), 50% Transit and 50% Transeze intermediate ryegrasses (Pickseed), 'AMF 107' meadow fescue (NexGen Research),

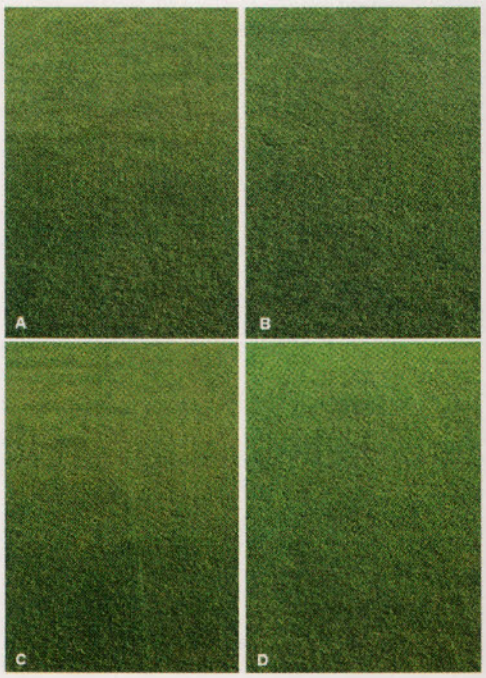

Photo 1: Integra diploid perennial ryegrass produced the highest turfgrass quality at all locations.

Photo 2: The tetraploid perennial ryegrass had the lowest survival of all species tested.

and a nonseeded control. Seeding rates for the individual species were adjusted to deliver 16 pure live seeds (PLS)/square inch, which correlates to 460 lb./acre for diploid perennial ryegrass. Overseeding grasses were maintained under fairway/sports field conditions, with a mowing height of 0.75 inch. Each site adopted management practices that were typical in their region for overseeding turf, but all plots were fertilized with nitrogen at a rate of 1.0 pound nitrogen/1,000 square feet per month of active growth.

Establishment of overseeded grasses was measured as either seedling vigor (on a 1-9 scale, where 1 = no germination and 9 = full germination) at 14 days after planting or visual estimates of percent stand of the overseeded grass at six weeks after planting. Turfgrass quality (on a scale of 1-9, where 9 = optimal turfgrass quality) was visually assessed each month during the overseeding season (November-June) and data were averaged to yield a seasonal turfgrass quality score.

Transition from the overseeded cool season grass to the bermudagrass was visually rated every other week beginning with bermudagrass green-up in the unseeded control. Transition was recorded as a percentage of the bermudagrass in the plot. Transition to bermudagrass was not aided with chemical or cultural practices. At the Arkansas and Alabama site, a significant amount of the overseeded, cool season grass persisted through the summer and was evaluated in the plots the following winter.

Study results

All species tested in this trial germinated within seven days of planting at all locations, but the ryegrass entries generally had the greatest seedling vigor and establishment rates and were not different from each other. Seedling vigor and establishment rate for meadow fescue was slower than the ryegrasses, with germination occurring 2-3 days after the ryegrasses. At 6 weeks after planting, the meadow fescue generally had about 75% of the total stand observed with the ryegrasses. A sports field manager could expect the tetraploid ryegrass to establish as fast as other grasses currently used in overseeding programs, but the meadow fescue will be a little slower to establish than the ryegrasses.

The Integra diploid perennial ryegrass produced the highest turfgrass quality at all locations, but it was not statistically different from the intermediate or tetraploid perennial ryegrass at Alabama (Photo 1). The tetraploid perennial ryegrass also performed favorably and was equal or superior to all other overseeding species except the Integra diploid perennial ryegrass at Arkansas and Arizona.

Meadow fescue produced turfgrass quality similar to that of intermediate ryegrass and tetraploid perennial ryegrass in Arkansas, but it had lower turf quality scores in Alabama and Arizona. These results suggest that meadow fescue may have more potential as an overseeding grass in transition zone climates where cooler temperatures persist.

Transition

The transition of an overseeded perennial ryegrass back to bermudagrass can be very challenging and will often require a herbicide. In Arizona, the meadow fescue began to transition sooner than other species during the early and mid-transition period, and the Integra diploid perennial ryegrass was the slowest to transition at this site. The tetraploid perennial ryegrass was intermediate to other species at all rating dates and was similar to the intermediate ryegrass at the early and late transition dates. At the Arkansas site, intermediate ryegrass, tetraploid perennial ryegrass and meadow fescue all had better transition back to bermudagrass than Integra diploid perennial ryegrass. At the Alabama site, all species transitioned in a similar fashion.

A final component of transition is the persistence of the overseeding grass in the autumn following the summer transition period, which can lead to weed problems if overseeding is not continued the next season. At the Arkansas site, which is an upper transition zone location, significant survival was observed with all species. The tetraploid perennial ryegrass had the lowest survival of all species tested, indicating the most complete transition back to the bermudagrass (Photo 2).

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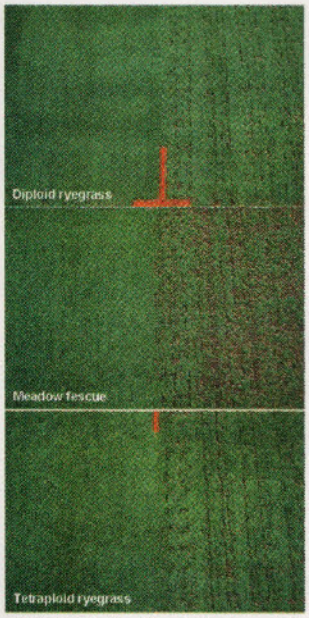

Photo 3: Traffic tolerance of the tetraploid ryegrass appears to be very similar to diploid ryegrasses.

Future outlook

The development of overseeding grasses with improved transition characteristics could have a significant effect on future overseeding management programs and could reduce the need to use herbicides to transition overseeded turf back to bermudagrass. These initial trials clearly demonstrate the potential of two new species, meadow fescue and tetraploid perennial ryegrass, for overseeding dormant bermudagrass turf. As these are the first experimental lines developed for this purpose, it is assumed that further advances can be made by breeders to enhance desirable characteristics in these species. At present, the most notable characteristics displayed by these species include good germination and seedling vigor, good turfgrass color and quality and improved transition characteristics compared to diploid perennial ryegrass.

New studies with these grasses are currently underway to determine specific management requirements for these species such as optimal seeding rates, fertility requirements, mowing requirements and pest management issues. Studies are also underway to investigate the use of chemical and non-chemical methods to transition these grasses back to bermudagrass. In addition, these grasses are being exposed to traffic in many of these studies to determine how management practices affect their ability to perform under traffic. Preliminary results suggest that these grasses can be maintained under a range of mowing heights, from 0.25 inch up to 0.75 inch. In addition, traffic tolerance of the tetraploid ryegrass appears to be very similar to diploid ryegrasses (Photo 3), which suggest that this species can be used in those sports turf situations where perennial ryegrass has been traditionally used. Initial indications are that meadow fescue is less tolerant of traffic than the ryegrasses, especially at low heights of cut (< 0.5 inch).

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John Mascaro's Photo Quiz

Can you identify this sports turf problem?

Problem: Irregular brown arrow shaped area on field

Turfgrass Area: Multi-use park field

Location: Burlington, IA

Grass Variety: Mixture of cool season grasses

Answer to John Mascaro's Photo Quiz on Page 51

John Mascaro is President of Turf-Tec International