

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),

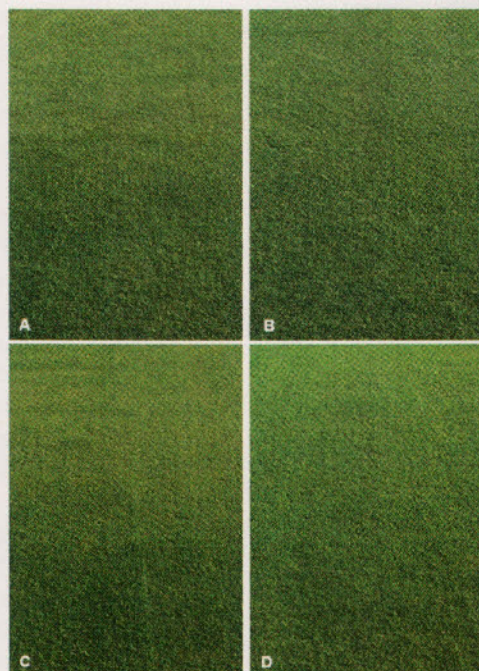


Photo 1: Integra diploid perennial ryegrass produced the highest turfgrass quality at all locations.



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 per-



centage 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).

Continued on page 14


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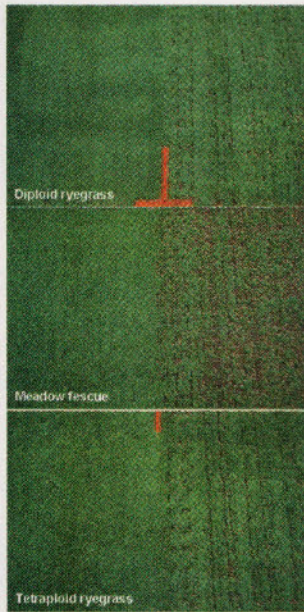


Photo 3: Traffic tolerance of the tetraploid ryegrass appears to be very similar to diploid ryegrasses.

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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Mike Richardson (mricha@uark.edu) and Doug Karcher are professors and Ryan Rolfe and Josh Summerford are graduate students in the turfgrass management program at the University of Arkansas, Fayetteville.

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
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Billbugs

By Nate Royalty, Ph.D.



What does it look like? Billbugs are a type of a weevil, more commonly known as “snout beetles.” Adults are typically 1/4 to 1/2 inches long and are dark gray or bluish-black in color. Often, the insects appear brownish-red due to the coating of soil covering them. Their bodies consist of a long, beak-like snout, head and thorax. Billbug larvae are legless and white with brown heads.

Host material and range

There are approximately 50 recognized billbug species found in the United States and Canada, although in any given region, only one or two species typically cause significant turf damage. Billbug species can be divided into two general groups: species that overwinter as adults and/or larvae and usually attack warm-season or transition turf, and species that overwinter as adults and attack cool-season turf.

Most published information on billbugs is based on the bluegrass billbug (*Sphenophorus parvulus*). This species, the most common billbug turf pest found in North America, predominantly infests cool-season Kentucky bluegrass, perennial ryegrass and fine or tall fescues. The bluegrass billbug is most commonly a pest in the northern United States, but it can also be found in cool-season turf in the southern states.

Adult female bluegrass billbugs chew a hole in the stems of turf plants and deposit their eggs inside. The young larvae feed by tunneling inside of the host plant's stem. Large-instar larvae emerge from the stem and feed on the crown and roots of the plant.

Billbug damage is sometimes difficult to identify, since symptoms often appear similar

to those of dollar spot and summer drought. Damaged turf wilts in response to billbug feeding, and billbug damage often forms small, circular whitish spots on heavily infested turf. Severe injury is most common in new lawns, especially those established with sod. Most damage occurs near shrubbery and sheltered areas within the lawn.

Current threat

Symptoms of billbug damage are usually detected in mid-June through July, when the turf is under heat or drought stress. Billbug larvae can destroy large areas of turf, and sometimes entire lawns, if not contained or killed. Unlike white grub or mole cricket damage, billbug-infested soil usually remains firm even when plant roots are destroyed.

Plants damaged by billbug feeding can easily be pulled out of the soil. This “tug test” is a good indicator of billbug infestation.

Prevention tips

Good cultural control practices, including aeration, irrigation and proper fertilization, will help prevent billbug infestation. It is important to remove thatch build-up regularly, as the insects often live and burrow in areas of thick thatch.

Treatment tips

Adult billbugs have a hard, armor-like exterior that does not easily absorb insecticides. Larvae are also difficult to kill because they spend the majority of their lives inside of the plant stems. As a result, effective billbug control requires a precise understanding of the insect's biology and proper application technique.

Early applications of surface or thatch-targeted insecticides are effective in controlling adults before they oviposit. Studies at Ohio State University have found that products such as Merit insecticide are effective in controlling young larvae in the plants when applied in late April to late May.

Less is known about the many species of billbugs that attack turf in the southern and western United States. Although some insecticides are effective against these billbugs if applied at the appropriate timing, additional research is necessary to determine the most effective and cost-effective methods of managing these difficult billbug species.

Current research at North Carolina State University on the billbug biology species complex, supported by Bayer Environmental Science, is being conducted to better enable lawn care operators to manage these different pest species.

What can you do?

Diagnosing billbug infestation is very simple. Use the “tug test”- by pulling on several affected stems and tug them from the soil. Turf damaged by billbugs will easily break off, revealing piles of sawdust-like material, which is produced during billbug feeding.

Another simple way to identify the billbug culprits is to be observant. Billbugs will often appear on sidewalks or turf towards the late afternoon. If several insects are sighted, begin checking surrounding turf for potential damage. ■

Dr. Nate Royalty is product development manager-insecticides, Bayer Environmental Science.



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Cool season turfgrass variety roundup

Here are some of the latest cool season turfgrasses currently available from suppliers nationwide:

Overseeding ryegrass

Breeder: Kenneth Hignight from Advanta Seeds Pacific has bred T3 (experimental designation: APR1802), a ryegrass that transitions easily and permanently, says Pennington Seed. T3 does not return the following year as most ryegrasses do and transitions naturally without the added expense of chemical applications. The dark green color and fine textured leaf offers turf managers just what is needed to plant early in the fall and transition gradually in the spring.

T3 does not tolerate the spring heat providing a chemical free transition; transitions completely not to return the following year; and has a natural dark green color to look

good when fertilizer levels run low.

Recommended for use in Climatic Zones 7, 8, 9, 10 (may not be adaptable to all areas within each climatic zone). Under ideal conditions, germination begins in 3-6 days. When overseeding, care must be taken to ensure adequate seed to soil contact. Subject to germination rate, first mowing may begin within 14 days after sowing. Recommended mowing heights range from 1/8 to 1 1/2 inch. T3 responds to 1/2 lb. Nitrogen per application. Repeat applications only as grass shows need due to fading color.

Suggested overseeding rate for athletic fields is 10-20 lbs./1000 sq. f

New gray leaf spot-resistant perennial ryegrasses

Gray Leaf Spot is a devastating disease caused by *Pyricularia grisea* that quickly attacks highly maintained turf areas containing older susceptible ryegrass varieties. The

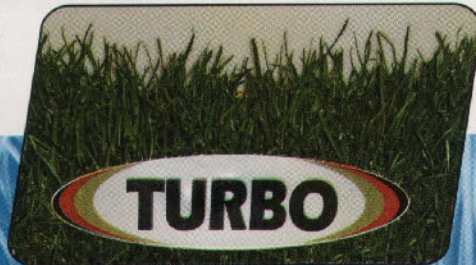
disease was originally identified on perennial ryegrass in New England and the Mid-Atlantic States in the early 90's and its incidence has been spreading quickly across the country.

Available now, these three varieties – Secretariat, Exacta, and Charismatic – were developed in conjunction with Rutgers University. They all scored very high in the new NTEP data that was published by Rutgers this summer, with Exacta II GLSR the #1 ranked variety for Gray Leaf Spot Resistance.

They are available in the ultimate disease resistant 3-way ryegrass blend called Trifecta.

New perennial ryegrass and more

Buena Vista is a new release from Burlingham Seeds that it says has excellent gray leaf spot resistance. It was developed for enhanced salt tolerance from dry soil types. A beautiful dark green color and fine leaf texture enhance its turf performance, says Burlingham.



The Ultimate Perennial Ryegrass Blend

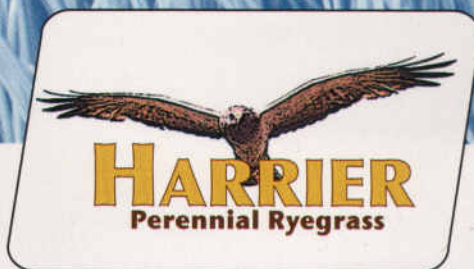


Secretariat^{II GLSR}, Exacta^{II GLSR} and Charismatic^{II GLSR} were developed for overall turf quality and resistance to Gray Leaf Spot. All three varieties scored very high in the new NTEP data that was published in the 2005 Rutgers University turfgrass proceedings in August 2006. Exacta^{II GLSR} ranked #1 for Gray Leaf Spot Resistance. Now available as the ultimate disease resistant 3-way ryegrass blend called Trifecta^{II GLSR}. Contact your LebanonTurf distributor early for best availability. Visit www.LebanonTurf.com/promotions and enter coupon code ST9087 for a **FREE** Agronomy Manual.



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High endophyte levels add to drought and stress tolerance for sports turf.

A tall fescue called Turbo recently finished its 5-year NTEP study as a high performer. Turbo has high endophyte that enhances disease and drought tolerance; it is an all around excellent performer, top in California trials and on the Maryland/Virginia recommended list for tall fescue varieties.

Dynamo Kentucky bluegrass is a cross of Blacksburg and Unique Kentucky bluegrass varieties originally bred by Pure Seed Testing. Dynamo mixes well with other elite varieties. It has a strong sod knit and is a great fit in shorter cut sport fields, says Burlingham. Dynamo has a rich green color and has excellent powdery mildew resistance. Because of the mildew resistance, it has top-rated shade tolerance for a Kentucky bluegrass variety in most recent NTEP trials.

Firebird Tall Fescue is ranked as one of the darkest tall fescues in recent NTEP trials. Firebird is a top performer in many locations across the country in NTEP trials. It has medium high endophyte levels that help in drought tolerance, insect and other stresses in the transition zone.

SRO's latest cool season selections

Seed Research of Oregon's Leah Brilman supplied this information:

Spitfire Texas X Kentucky hybrid bluegrass is a progeny of a cross between the hybrid designated BDF X Midnight. It was selected for a very dark green color and superior germination and establishment compared to many other hybrid bluegrasses.

- Heat and drought tolerant
- Very dark green color
- Extensive rhizomes
- High wear tolerance

SR 8650 tall fescue was developed for dark color, fine leaf texture and the ability to form

rhizomes under mown turf conditions.

- Very high density
- Very dark green color
- Rhizome expression under mown turf conditions
- High brown patch resistance

Harrier perennial ryegrass has extremely high gray leaf spot resistance with very dark green color and high turf quality.

- Fine leaf texture
- High tillering
- Winter-active growth
- High stress resistance

SR 4600 perennial ryegrass was one of the highest rated for gray leaf spot resistance in the 2004 Perennial ryegrass NTEP in addition to having very high turf quality even where this disease is not a problem.

- Spreading type growth habit for better wear resistance
- Very dark green, high turf quality
- Winter-active growth
- High stress resistance

Penguin 2 perennial ryegrass was developed for superior rapid germination with salts in the soil or irrigation water combined with dark green color and superior turf quality.

- High seedling salt tolerance
- Dark green color
- High red thread resistance
- Superior performance for overseeding
- Winter-active growth

Zoom (LCK) perennial ryegrass has the highest overall turf quality in the 2004 NTEP trials combined with high gray leaf spot resistance.

- Excellent turf quality under all maintenance regimes
- Very high brown patch, red thread and Pythium resistance

- Very high gray leaf spot resistance
- Winter-active growth
- Dark green color

Calypso 3 perennial ryegrass was developed to have a very dark green color combined with early spring green-up and winter-active growth.

- Very dark green color
- Excellent pink snow mold resistance
- High red thread resistance
- Tolerant of a wide range of soil pH

New varieties from Barenbrug USA

The Kentucky bluegrass research program of Barenbrug USA has a unique characteristic: Every variety sold by Barenbrug must pass our wear simulation program. This program is not used by any other breeder in the U.S. and it assures that every variety produced by Barenbrug has excellent wear tolerance.

Baroness is a new variety performing very well in different locations across the U.S. It has outstanding drought tolerance; in fact, it tops the NTEP list for drought tolerance. Baroness also has very high turf quality and is very dark green. It is a small seeded variety, which means it has twice the seed as other bluegrasses. Barenbrug offers a new coating for this variety called Zeba, a non-toxic, biodegradable, starch-based, super-absorbent coating that forms a hydro-gel to provide moisture on demand to increase efficiency of germination and establishment.

The new variety from Barnique performs very well in NTEP trials. Barnique has excellent wear tolerance and is lighter green than Baroness. Barnique also has very small seeds and is available with Zeba coating.

Barimpala is one of the fastest establishing bluegrasses you can find on the market. Barimpala was originally bred in Europe and performs very well as a straight and in mix-