



Turfgrass and Environmental Research Online

...Using Science to Benefit Golf



From 1999 through 2001, the National Turfgrass Evaluation Program (NTEP), the USGA, and GCSAA co-funded a bermudagrass fairway overseeding project involving ten locations across the southern U.S. The project compared the use of perennial ryegrass cultivars and blends, rough bluegrass, intermediate ryegrass, annual ryegrass, and various mixtures for their performance in overseeding bermudagrass fairways. Overseeding trials were placed on golf courses where the plots could receive the traffic and play needed to test their performance as shown in the above image taken at Tucson Country Club.

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PURPOSE

The purpose of *USGA Turfgrass and Environmental Research Online* is to effectively communicate the results of research projects funded under USGA's Turfgrass and Environmental Research Program to all who can benefit from such knowledge. Since 1983, the USGA has funded more than 290 projects at a cost of \$25 million. The private, non-profit research program provides funding opportunities to university faculty interested in working on environmental and turf management problems affecting golf courses. The outstanding playing conditions of today's golf courses are a direct result of ***using science to benefit golf***.

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Grasses for Overseeding Bermudagrass Fairways

Kevin N. Morris

SUMMARY

A research project was developed and jointly sponsored by the United States Golf Association (USGA) Green Section, the Golf Course Superintendents Association of America (GCSAA), and the National Turfgrass Evaluation Program (NTEP) to evaluate cultivars, blends, and mixtures for use in overseeding bermudagrass fairways. Ten golf courses were chosen to host the On-site Overseeding Trials

- Many perennial ryegrasses perform well in overseeding and often there is no statistical difference among the entries.

- *Poa trivialis* may be useful in overseeding fairways though its performance may be inconsistent. It is slower to establish than perennial ryegrass and it seems that when *Poa trivialis* is weakened due to heat or disease, it disappears quickly.

- Perennial ryegrass and *Poa trivialis* mixtures generally do not perform equal to perennial ryegrass or *Poa trivialis* cultivars. The mixture may hasten transition somewhat but overall quality will most likely suffer.

- Transition from the overseeding grass to bermudagrass in spring is rarely smooth. Weather patterns are important in determining the ease of transition from one species to another. In the cooler, northern sites, grasses that are strong going into winter may not have as much bermudagrass returning in spring. When the overseeding grass dies, there may not be sufficient bermudagrass to provide adequate cover and quality.

- There seems to be a balance between quality and cover of each species in fall and spring. The higher the quality of the overseeding early in fall, the more overseeding present in spring, along with reduced bermudagrass cover. The result is a more difficult spring transition. The lower the quality of overseeding in fall, the less overseeding present in spring, often leading to a better spring transition. Use of a weaker cultivar or species, may make for a better spring transition.

It's true, Americans love green grass - especially when playing golf! Lush, uniform green grass to a golf course superintendent, manager, or owner is akin to a perfectly round, red, luscious summer tomato to a farmer - the product sells itself. However, producing that perfect grass

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surface or summer tomato is far from easy and not always attainable.

For much of the southern half of the United States, overseeding bermudagrass fairways is a common practice used by golf courses to produce that beautiful green product that so many golfers desire, especially those escaping the winter blues of northern climates. It's not surprising then that green grass on greens, tees, and fairways adds to a course's bottom line by increasing rounds in winter. And overseeding does more for a golf course than beautify as actively growing turf in winter is more tolerant of cart traffic, divoting, and weed invasion than brown, dormant bermudagrass.

For these reasons, millions of pounds of seed are bought and sown each autumn on golf courses in this region. Golf course owners, managers and superintendents seek grasses that establish quickly, exhibit exceptional playability, are aesthetically pleasing, and require less input. Consequently, a research project was developed and jointly sponsored by the United States Golf Association (USGA) Green Section, the Golf Course Superintendents Association of America (GCSAA), and the National Turfgrass Evaluation



Dr. Al Dudeck, retired professor, University of Florida, collects data from overseeding trials at Grand Cypress resort in Orlando.

<u>Location</u>	<u>Golf Course</u>	<u>Superintendent</u>	<u>Cooperator</u>	<u>University</u>
Tucson, AZ (99-00) Green Valley, AZ (00-01)	Tucson Country Club C. C. of Green Valley	Marty Wells	Dr. David Kopec	Arizona
Palm Desert, CA	Mountain Vista G.C.	Nancy Dickens	Dr. Robert Green	California-Riverside
Orlando, FL	Grand Cypress Golf Club	Tom Alex	Dr. Al Dudeck	Florida
Duluth (Atlanta), GA	Atlanta Athletic Club	Ken Mangum	Dr. Gil Landry	Georgia
Starkville, MS	Mississippi State Univ. G.C.	Pat Sneed	Dr. Jeff Krans	Mississippi State
Crescent (St. Louis), MO	Players Club at St. Louis	Todd Marquette	Dr. Erik Ervin	Missouri
Myrtle Beach, SC	Blackmoor	Bob Zuercher	Dr. Bruce Martin	Clemson
Garland (Dallas), TX	Fire Wheel Golf Park	Gary Chambers	Dr. Milt Engelke	Texas A&M-Dallas
The Woodlands, TX (Houston)	The Woodlands C. C.	Scott Hamilton, Gant Austin	Dr. Richard White	Texas A&M- College Station
Charlottesville, VA	Glenmore C.C.	Tim Thomas	Dr. David Chalmers	Virginia Tech

Table 1. Locations of individual trials of the On-Site Bermudagrass Overseeding Test sponsored by the National Turfgrass Evaluation Program, USGA, and GCSAA.

Program (NTEP) to evaluate cultivars, blends, and mixtures for use in overseeding bermudagrass fairways.

How the Trials Were Carried Out

(Table 1). Because overseeding grasses provide a temporary playing surface for fall, winter, and spring and are reseeded each year, cultivars were seeded in two consecutive years (fall, 1999 and fall, 2000). Since speed, ease and uniformity of transition from the bermudagrass to the overseeded grass in fall and back to the bermudagrass in spring is one the biggest concerns when overseeding, entries were seeded in exactly the same location on each course for each of the two years. This allowed researchers to identify entries that persisted over time.

NTEP solicited entries for the trial from sponsoring companies. Trials were conducted with named cultivars and commercially available blends or mixtures. In addition, experimental entries that were to be commercialized in the

immediate future (i.e. before the end of the testing cycle) were also permitted. Various species used in overseeding, such as perennial ryegrass and *Poa trivialis* (rough bluegrass) were allowed. This led to the submission of many perennial ryegrass entries, as single cultivars or blends, but also single cultivars of *Poa trivialis* as well as mixtures of perennial ryegrass and *Poa trivialis*. In addition, two cultivars of intermediate ryegrass and one annual ryegrass cultivar were included in the trial.

Annual ryegrass offers the advantage of less heat tolerance than perennial ryegrass and thus a quicker transition in spring back to bermudagrass. However, annual ryegrass does not have the darker green color and finer leaf texture of perennial ryegrass. Intermediate ryegrasses are developed by crossing annual and perennial ryegrass, then selecting plants that have the best traits of both species. Companies have worked to develop intermediate ryegrasses that provide a smooth spring transition back to bermudagrass,

Grass Type	Location Seeding Rate (lbs/acre)									
	Starkville MS	Duluth GA	Charlottesville VA	Orlando FL	Tucson AZ	Myrtle Beach SC	Palm Desert CA	St. Louis MO	Dallas TX	The Woodlands TX
Perennial Rye (single cultivars or blends)	300	450	300	450	600	300	600	300	300	450
<i>Poa trivialis</i> (single cultivars)	100	100	100	100	100	200	200	100	100	200
Mixtures (Perennial rye or Intermediate rye and <i>Poa trivialis</i>)	250	400	250	400	400	250	400	250	250	400

Table 2. Seeding rate of cultivars and blends of perennial ryegrass, cultivars of *Poa trivialis*, and mixtures of perennial ryegrass or intermediate ryegrass and *Poa trivialis* for the ten locations of the Bermudagrass Overseeding Trial

but also with a finer leaf texture and darker green color.

Trials were established on active play sites where golfers hit fairway golf shots and/or drove golf carts. Plots were carefully seeded either by hand or using a drop spreader. Since seeding rates vary widely from one region to another, each location was consulted concerning typical overseeding rates in their area. Consequently, three seeding rates for the ryegrasses (300, 450 and 600 lbs per acre), two rates for *Poa trivialis* (100 and 200 lbs per acre) and two rates for mixtures (250 and 400 lbs per acre) were developed. The most appropriate rate for each grass type was then assigned to the locations (Table 2).

The experimental plot size was large, 5' x 20', replicated three times. A large plot size allowed for a greater distribution of traffic and divoting. Host clubs provided the daily maintenance of the fairway site. An advisory committee consisting of representatives from GCSAA, USGA, NTEP, universities and the turfgrass seed industry recommended establishment and maintenance procedures.

The researcher at the cooperating university was responsible for data collection. The following data was collected from each trial site:

- Percent establishment rate (4-6 weeks after seeding)

- Turfgrass quality (monthly during winter, 2 - 4 times per month during spring and fall transition period)
- Plot color, genetic color (twice - late fall/early winter and spring)
- Rate or speed of transition from bermudagrass to overseeded grass in fall (2 - 4 times per month during fall)
- Rate or speed of transition from overseeded grass to bermudagrass in spring (2 - 4 times per month during spring)
- Environmental stress, traffic and divoting damage, disease and insect damage and other data deemed appropriate and feasible by the research cooperator.

Results of the Trial

Fall 1999 - Spring 2000 Data Collection

The 42 entries in this trial (Table 3) were seeded in September or October at the ten golf course sites. Establishment was good; no problems were seen with any entries. Data collected from fall 1999 - spring 2000 was compiled, statistically analyzed and reported. This data can be found in NTEP Report No. 00-13 and on the NTEP web site (www.ntep.org/onsite/ost.htm).

Following are general observations concerning the trials in fall 1999 - spring 2000:

Entry No.	Name	Species or composition	Sponsoring company
1	Allsport	perennial ryegrass	LESCO, Inc.
2	LS-DE1	perennial ryegrass	LESCO, Inc.
3	Proam	<i>Poa trivialis</i>	LESCO, Inc.
4	Barlennium	perennial ryegrass	Barenbrug USA
5	Pirouette	perennial ryegrass	Barenbrug USA
6	Bariviera	<i>Poa trivialis</i>	Barenbrug USA
7	Professional's Select	40% Windstar, 35% Sonata, 25% Jet perennial ryegrass blend	Pennington Seed, Inc.
8	Transist	intermediate ryegrass	Pickseed West, Inc.
9	Pick HR A-97	intermediate ryegrass	Pickseed West, Inc.
10	First Cut	85% Paragon perennial rye and 15% Stardust <i>Poa trivialis</i>	Turf Merchants, Inc.
11	Brightstar II	perennial ryegrass	Turf-Seed, Inc.
12	Charger II	perennial ryegrass	Turf-Seed, Inc.
13	Citation III	perennial ryegrass	Turf-Seed, Inc.
14	Brightstar II + Winterplay	85% Brightstar II perennial ryegrass and 15% Winterplay <i>Poa trivialis</i>	Turf-Seed, Inc.
15	Charger	perennial ryegrass	Standard Entry
16	Citation III + Winterstar	85% Citation III perennial ryegrass and 15% Winterstar <i>Poa trivialis</i>	Turf-Seed, Inc.
17	Winterplay	<i>Poa trivialis</i>	Standard Entry
18	Axcella (ABT-99-3.268)	annual ryegrass	DLF International Seeds
19	Paragon	perennial ryegrass	Turf Merchants, Inc.
20	PST-3BK-99	perennial ryegrass	Pure-Seed Testing, Inc.
21	Fiesta 3	perennial ryegrass	Pickseed West, Inc.
22	Futura 2500	33% Cutter p. rye, 33% Sunshine p. rye, 33% Transist intermediate ryegrass	Pickseed West, Inc.
23	MED-007	25% JR-151, 25% JR-142, 25% JR-128, 25% JR-265 perennial ryegrass blend	Simplot Turf & Hort.
24	Capri	perennial ryegrass	DLF International Seeds
25	Leaderboard	34% Pennant II, 33% Panther, 33% Seville II perennial ryegrass blend	ProSeeds Marketing
26	Seville II	perennial ryegrass	ProSeeds Marketing
27	Snowbird	<i>Poa trivialis</i>	ProSeeds Marketing
28	MP58	perennial ryegrass	Jenks Seed Connection
29	Prime	33% Elfkin, 33% MP58, 33% MP88 perennial ryegrass blend	Jenks Seed Connection
30	Elfkin	perennial ryegrass	Jenks Seed Connection
31	MP111	perennial ryegrass	Cascade Int'l Seed Co.
32	Mountain View Seed Blend 1	40% Pearl, 30% Pageant II, 30% EP57 perennial ryegrass blend	Mountain View Seed Co.
33	Mountain View Seed Blend 2	40% EP56, 30% Pearl, 30% Academy perennial ryegrass blend	Mountain View Seed Co.
34	Mountain View Seed Blend 3	40% EP57, 30% EP56, 30% Flash perennial ryegrass blend	Mountain View Seed Co.
35	Essence	perennial ryegrass	DLF International Seeds
36	Top Hat	perennial ryegrass	Standard Entry
37	Cebeco Blend 1	33% Top Hat, 33% R2, 33% Gator II perennial ryegrass blend	DLF International Seeds
38	Sabre	<i>Poa trivialis</i>	Standard Entry
39	Tourstar	34% Imagine, 33% Ice, 33% Lynx perennial ryegrass blend	AgriBioTech, Inc.
40	Marvelgreen + Laser	40% Palmer III, 20% Prelude III, 20% Phantom p. rye, 15% Laser <i>Poa trivialis</i>	AgriBioTech, Inc.
41	Phantom	perennial ryegrass	ProSeeds Marketing
42	Marvelgreen Supreme	50% Palmer III, 25% Prelude III, 25% Phantom perennial ryegrass blend	AgriBioTech, Inc.

Table 3. Names of cultivars, blends, and mixes of entries and their sponsoring companies participating in the On-Site Bermudagrass Overseeding Trial



Individual trials at golf courses were placed in fairway locations where golfers hit fairway golf shots and/or drove golf carts.

- The *Poa trivialis* varieties were generally slower to establish and develop into a dense stand than the perennial ryegrasses. They also exhibit a lighter green color than the perennial ryegrasses. The slow establishment may prohibit the use of straight *Poa trivialis* for overseeding of fairways.

The Charlottesville, VA site did little to thin the bermudagrass on the fairways before overseeding. Overall, this resulted in a poor stand of the trial. Overseeding procedures at the other courses did not seem to affect trial establishment.

Overall, placement of the tests (physical location on the course) was very good with most being placed between the tee and the first landing area. Traffic distribution and divoting appeared uniform at the sites visited. The Orlando, FL test is planted at their golf academy (teaching facility) and receives very little cart or foot traffic.

- Transition from overseeding grass to bermudagrass started early in most sites as winter was mild and early spring was warm in many locations. However, a cool, wet April in the eastern portion of the U.S. slowed the transition by aiding the

overseeding grasses.

- Generally, entries were consistent in their performance from one location to another. Several of the perennial ryegrasses were excellent in fall and winter through early spring. Transition back to the bermudagrass varied by location. We believe this was mainly due to differing weather patterns between locations.

- In general, the perennial ryegrasses provided the highest quality turf. The exception was the high performance of the *Poa trivialis* varieties and perennial ryegrass/*Poa trivialis* mixtures at the Florida and Virginia locations. The Florida site had a severe annual bluegrass (*Poa annua*) invasion which may have been less noticeable in the *Poa trivialis* plots. With the minimal pre-plant preparation at the Virginia site, the *Poa trivialis*, being smaller seeded, had an easier time falling through the bermudagrass canopy and thus germinated better.

- At most locations, there was no statistical difference in overall turfgrass quality between the top 25-30 entries (out of a total of 42 in the trial).



Plots overseeded with annual ryegrass were much lighter green than the dark green plots of perennial ryegrass.

We have seen this happen in past overseeding trials. This may reflect the unusual nature of overseeding. If an entry is very strong in the beginning and receives high quality ratings, it may receive low ratings during spring transition as it has competed too heavily with the bermudagrass, thus "holding back" the bermudagrass. Grasses that start slowly and receive low ratings initially, often become stronger later and receive higher ratings during transition.

A major concern of overseeding is having a smooth transition from the overseeding grass back to bermudagrass in spring. In this first year data from most locations, the annual ryegrass and intermediate ryegrass entries transitioned quicker (going from 75 to 25% plot coverage in 3-4 weeks) than the perennial ryegrasses. At the Arizona and Mississippi locations, *Poa trivialis* entries and perennial ryegrass/*Poa trivialis* mixtures transitioned faster than perennial ryegrass. However, at the California and Florida sites, the opposite was true. And in South Carolina and Texas sites, *Poa trivialis*, intermediate ryegrass, and perennial ryegrasses transitioned in a similar fashion. Again, we feel these differences are weather and environment-related.

Fall 2000 - Spring 2001 Data Collection

The 42 entries seeded in fall, 1999 were seeded again in September or October, 2000 at the ten golf course sites. The same physical location

on the golf course was used with the following two exceptions. Tucson Country Club decided to cease overseeding its fairways, so another test location was needed. The cooperator decided on the Country Club of Green Valley, site of the on-site bentgrass and bermudagrass trials, for the second year's overseeding trial. Another fairway at the Atlanta Athletic Club was used in 2000 due to lack of irrigation uniformity at the previous site.

A progress report containing 2000-2001 data and management information on this project was compiled and distributed in November, 2001. This report can also be found on the NTEP web site at <http://www.ntep.org/onsite/ost.htm>. Data collected by cooperators on fall and spring transition, percent ground cover of each species, color and turfgrass quality varied considerably from location to location, as it did during fall 1999 - spring 2000. Following are some observations concerning the second year of this trial:

- At five locations, the perennial ryegrass entries or blends of perennial ryegrasses were the best performers. Often, there was little or no statistical difference among the perennial ryegrasses for overall quality, fall and spring transition. Following are the locations where a large number of perennial ryegrass entries finished in the top statistical grouping for overall turfgrass quality:

- Palm Desert, CA (26 entries)

- Duluth, GA (28 entries)

- Starkville, MS (19 entries)

- Crescent, MO (33 entries)

- Green Valley, AZ (15 entries)

- At the Myrtle Beach, SC and Garland, TX locations, there was no statistical difference among any of the 42 entries for overall turfgrass quality.

Poa trivialis entries as a group finished at the bottom of the trials listed in item 1 and at the top of the trials in Orlando, FL, Houston, TX and Charlottesville, VA. Mixtures of perennial ryegrass and *Poa trivialis* performed close to the top in the above locations and close to the bottom at all other locations.

- At almost all locations, *Poa trivialis* entries established significantly slower than the perennial ryegrasses, taking until 30-40 days after seeding to establish the same percentage ground cover as

the perennial ryegrasses. At some locations (i.e. Green Valley, AZ, Duluth, GA, Starkville, MS), *Poa trivialis* disappeared very quickly in spring leaving a plot with only 30-40% green bermudagrass. Conversely, at the Houston, TX, and Orlando, FL sites, *Poa trivialis* entries transitioned slower and smoother than the perennial ryegrasses.

- The intermediate ryegrass entries generally had lower quality ratings than the perennial ryegrasses and they transitioned quicker. The two entries, 'Transist' and 'Pick HR A-97' differ in their appearance and performance. 'Transist' appears to have more annual ryegrass characteristics which gives it a lighter green color and causes it to transition quicker. 'Pick HR A-97' is darker green and behaves more like perennial ryegrass than annual ryegrass. The one annual ryegrass entry, 'Axcella', finished in the bottom third of all entries at most locations.

Summary

Since seeding rates and maintenance levels differed from one location to the next, data was not summarized and averaged across all locations. However, we can make the following general conclusions concerning this trial:

- Many perennial ryegrasses perform well in overseeding and often there is no statistical difference among the entries. We have seen this same trend in other overseeding trials.

- *Poa trivialis* may be useful in overseeding fairways though its performance may be inconsistent. It is slower to establish than perennial ryegrass and it seems that when *Poa trivialis* is weakened due to heat or disease, it disappears quickly. This leaves insufficient green bermudagrass for acceptable quality. However, if the goal is little or no physical disturbance of the bermudagrass prior to overseeding, the small seed size of *Poa trivialis* allows it to sift through the bermudagrass canopy to make soil contact. The result is a better stand of *Poa trivialis* compared to perennial ryegrass.

- Perennial ryegrass and *Poa trivialis* mixtures generally do not perform equal to perennial ryegrass or *Poa trivialis* cultivars. The addition of

Poa trivialis generally results in lower quality ratings, except where the *Poa trivialis* entries perform exceptionally well. The mixture may hasten transition somewhat but overall quality will most likely suffer.

- Since the performance of individual entries varied so much from location to location, management practices must play a big role in establishment and transition. At the Orlando, FL site, the superintendent used chemical applications (simazine) at light rates to hasten transition. This seemed to affect the perennial ryegrass more than the *Poa trivialis*. At the Charlottesville, VA site, the superintendent did not physically damage the bermudagrass before overseeding, resulting in better establishment and quality of the *Poa trivialis* entries. Other locations, like Green Valley, AZ and Palm Desert, CA, intensively scalped and verticut their bermudagrass prior to overseeding. This is a standard practice in the Desert Southwest and is probably more beneficial to the perennial ryegrasses.

- Intermediate ryegrasses may be useful in fairway overseeding if the goal is an earlier transition. However, this will also depend on whether the grass is more close to being a perennial than an annual.

- Transition from the overseeding grass to bermudagrass in spring is rarely smooth. Weather patterns are important in determining the ease of transition from one species to another. In the cooler, northern sites, grasses that are strong going into winter may not have as much bermudagrass returning in spring. When the overseeding grass dies, there may not be sufficient bermudagrass to provide adequate cover and quality.

- There seems to be a balance between quality and cover of each species in fall and spring. The higher the quality of the overseeding early in fall, the more overseeding present in spring, along with reduced bermudagrass cover. The result is a more difficult spring transition. The lower the quality of overseeding in fall, the less overseeding present in spring, often leading to a better spring transition. Use of a weaker cultivar or species, may make for a better spring transition. However, if heat and humidity come early, these weaker grass-

es may leave sooner than expected.

Overseeding bermudagrass fairways has definite benefits but also associated risks. An overseeding grass that is too strong through the winter may lead to slower bermudagrass recovery in spring. Also, weather patterns can be quite variable from one season to the next, so overseeding results can be dramatically different over time. Management practices including pre-plant preparation, maintenance practices during the winter season and management of spring transition can significantly affect the quality of overseeding. Therefore, golf courses that overseed fairways need to have clear goals and objectives for the practice as well as realistic expectations of the outcome. This is because, in the author's opinion, successful overseeding is still as much art as science.