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Volume 6, Number 9
May 1, 2007

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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Ryegrasses as Companion Species to Speed Establishment of Kentucky Bluegrass Fairways

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SUMMARY

Researchers at Virginia Technic and State University initiated research to determine whether 'Transist' intermediate ryegrass or 'Phantom' perennial ryegrass, when planted as a companion species with Kentucky bluegrass, would allow for the rapid establishment of a fairway playing surface, while not unduly inhibiting Kentucky bluegrass development in the Appalachian Highlands of the transition zone. The study's findings include:

- The four compact-type Kentucky bluegrasses ('America', 'Apollo', 'Unique', and 'Rambo') in this trial were able to persist at a 0.75-inch fairway height.
- Kentucky bluegrasses were not competitive with perennial ryegrass or intermediate ryegrass and were invaded easily by *Poa annua*.
- Future attempts at hastening establishment of Kentucky bluegrass fairways in the Appalachian Highlands of the mid-Atlantic should include 5 to 15% perennial ryegrass or intermediate ryegrass (by seed count) rather than 30%.

Throughout the Appalachian Highlands of the transition zone perennial ryegrass is a predominant species used on golf course fairways. Its rapid establishment rate, dark green color, medium-fine texture and density, ease of striping, good wear tolerance and persistence at mowing heights down to 0.5 inch make it a desirable fairway choice. In areas of high *Poa annua* pressure such as the Appalachian Highlands, perennial ryegrass's high level of tolerance to ethofumesate (Prograss) has also favored its use. However, epidemics of gray leaf spot (*Pyricularia grisea*) in the summer of 1998 destroyed many perennial ryegrass fairways across the Mid-Atlantic and Midwest.

Kentucky bluegrass is not affected by gray leaf spot and has many of the same turfgrass qualities as perennial ryegrass. So why has it not been used more extensively for fairways in the upper transition zone? Until the mid-1990's no cultivars were available that performed adequately at present-day fairway heights of 0.5 to 0.75 inches. Additionally, Kentucky bluegrass is sensitive to ethofumesate injury and is slow to germinate and establish. While spring-seeded perennial ryegrass fairways may be ready to open by June, Kentucky bluegrass may not be ready until August.

Recent advances in the breeding of compact-type Kentucky bluegrasses have resulted in the release of five to ten cultivars that university research has shown will persist and function as a high-quality fairway at mowing heights down to 0.5 inches. Although there are now promising fairway cultivars available, the superintendent is always pushed to renovate and re-open as fast as

Kentucky bluegrasses, like the 'Rambo' cultivar shown above, are slow to germinate and establish from seed. This study was conducted to test whether the addition of intermediate or perennial ryegrass to Kentucky bluegrass seed would shorten the establishment time and still result in acceptable quality Kentucky bluegrass fairway turf.

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USGA Turfgrass and Environmental Research Online 6(9):1-4.
TGIF Record Number: 124492

Treatment	5-31-01		7-24-01		Tillers/cup 7-31-02		3-25-02		Percent KB present or removed herbicidally by 10-1-02	
	Quality	Cover	Quality	Cover	KB	IR/PR	Quality	Cover	KB	other
	(1-9)	(%)	(1-9)	(%)			(1-9)	(%)	(%)	(%)
America KB	2.8	24	4.4	73	60	0	5.9	94	37	63 Poa
Apollo KB	2.8	26	4.5	69	58	0	6.3	96	46	54 Poa
Rambo KB	3.0	21	4.6	68	69	0	5.8	97	61	39 Poa
Unique KB	2.5	26	5.0	65	72	0	5.9	93	66	34 Poa
America+PR	5.3	55	5.5	89	1	81	7.0	99	8	92 PR
America+IR	6.0	73	5.5	88	1	51	5.8	97	13	87 IR/Poa
Apollo+PR	6.0	70	5.6	91	1	56	6.8	99	7	93 PR
Apollo+IR	6.0	75	5.5	94	1	54	6.0	97	20	80 IR/Poa
Rambo+PR	5.5	69	5.9	89	1	75	7.3	99	12	88 PR
Rambo+IR	5.5	88	5.3	85	2	67	5.5	96	13	87 IR/Poa
Unique+PR	4.5	64	5.3	79	1	64	6.8	99	12	88 PR
Unique+IR	5.8	70	5.5	93	2	52	5.6	95	29	71 IR/Poa
LSD (0.05)	1.3	18	0.9	19	17	26	0.5	4	16	NA

Table 1. Visual quality (1-9), estimated percent cover (%), and tiller density of Kentucky bluegrass monostands (KB) or Kentucky bluegrass mixes with intermediate ryegrass (IR) or perennial ryegrass (PR).

possible, and, on this point, the slow germinating bluegrasses are a handicap.

Our objective was to determine whether 'Transist' intermediate ryegrass or 'Phantom' perennial ryegrass, when planted as a companion species with Kentucky bluegrass, would allow for the rapid establishment of a fairway playing surface, while not unduly inhibiting Kentucky bluegrass development in the Appalachian Highlands of the transition zone. Intermediate ryegrass is a cross between perennial ryegrass (*Lolium perenne*) and annual ryegrass (*L. multiflorum*). They were developed as bermudagrass fairway overseeding alternatives to perennial ryegrass.

Intermediate ryegrass is similar in texture and color to perennial ryegrass, but has relatively poor heat tolerance which allows a smoother spring transition back to a bermudagrass playing surface in overseeded bermudagrass turfs. In short, we were hoping to take advantage of the characteristics of both species: fast germination of the ryegrass followed by summer decline to leave behind the Kentucky bluegrass as the permanent playing surface.

This trial was conducted on a portion of the 8th fairway at the Virginia Tech golf course. Glyphosate (Roundup Pro) was applied twice in April 2001, the area was verticut aggressively, dead vegetation removed, and lime was applied to raise the soil pH to 6.5. On May 1, four compact-type Kentucky bluegrass cultivars ('America', 'Apollo', 'Unique', and 'Rambo') were either planted alone at 2 lbs./1000 ft^2 or in mixes with 'Transist' intermediate ryegrass or 'Phantom' perennial ryegrass at 4.5 lbs./1000 ft^2. Seeding at these rates meant that 70% of the seeds applied to each mixed plot were Kentucky bluegrass, while 30% was either perennial ryegrass or intermediate ryegrass. Also applied at seeding was a 10-10-10 fertilizer (at 1 lb. N/1000 ft^2) and Tupersan (siduron) for preemergence crabgrass control.

Mowing began on May 29 at a one-inch height, twice per week. Chlorothalonil was applied in May and June for dollar spot control and 20-20-20 was applied at 0.5 lb. N/1000 ft^2 on May 15 and May 29. On June 11, the area was

This trial involving the use of 'Transist' intermediate ryegrass and 'Phantom' perennial ryegrass as companion species to four compact-type Kentucky bluegrass cultivars was conducted on a portion of the 8th fairway at the Virginia Tech golf course.

turned over to the superintendent to receive regular course maintenance including mowing three times weekly at 0.75 inches. No fungicides were applied after early June 2001 in an attempt to disfavor the ryegrasses.

Results

On May 31, four weeks after seeding (WAS), most of the perennial ryegrass plus Kentucky bluegrass and intermediate ryegrass plus Kentucky bluegrass mixtures had attained 70 to 80% plot coverage and a quality level of 5 to 6 (on a 1-9 scale), indicating that these plots were "ready to open" (Table 1). At this point, the Kentukcy bluegrass-only plots had attained only about 25% cover. Sufficient cover for opening was not reached on Kentucky bluegrass-only plots until about July 24, almost two months later than the mixtures containing either perennial or intermediate ryegrass. None of the Kentucky bluegrass cultivars developed faster than the others.

Direct counts of the species present in each plot by July 31 indicated that almost no Kentucky bluegrass had established in perennial or intermediate ryegrass mixtures (Table 1). It is clear that the ryegrasses germinated and developed so quickly that the slow-germinating Kentucky bluegrass, even though it made up 70% of the seed planted, was not able to effectively compete for resources (space, light, nutrients, water) and become established. Conditions during the 2001 summer were cooler than normal providing extended dollar spot disease pressure, without any substantial periods where more devastating ryegrass diseases such as gray leaf spot, Rhizoctonia blight, or Pythium blight could develop. Basically, it was a very good growing season for both bluegrasses and ryegrasses. By the next spring all plots had obtained nearly 100% cover. However, removal of all species but Kentucky bluegrass in each plot with selective herbicides in the fall of 2002 revealed that much of this cover was due to *Poa annua* invasion (Table 1). Our results indicated that 'Rambo' and 'Unique' were the most competitive with *Poa* and the ryegrasses.

This study revealed that the four compact-type Kentucky bluegrasses ('America', 'Apollo', 'Unique', and 'Rambo') in this trial were able to persist at a 0.75-inch fairway height, but were not competitive with perennial ryegrass or intermediate ryegrass and were invaded easily by *Poa annua*. Future attempts at hastening establishment of Kentucky bluegrass fairways in the Appalachian Highlands of the mid-Atlantic should include 5 to 15% perennial ryegrass or intermediate ryegrass (by seed count) rather than

30% used in this study.

Acknowledgements

Additional contributors to this research were Lee Smith, Virginia Tech Golf Course Superintendent and Charlie McCoy and Dickie Shepherd, Virginia Tech Turfgrass Research Technicians. Primary funding was provided by a United State Golf Association Grant-in-Aid grant. Additional support was provided by the Virginia Agricultural Experiment Station.

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