‘Alpha’ and ‘T-1’ Creeping Bentgrass, New Cultivars for Golf

A. Douglas Brede

Research Department, Jacklin Seed by Simplot, 5300 West Riverbend Avenue, Post Falls, ID 83854

Additional index words. turfgrass breeding, golf course, putting green, *Agrostis stolonifera*, *Poa annua*, interseeding, competition

‘Alpha’ and ‘T-1’ are two novel cultivars of creeping bentgrass (*Agrostis stolonifera* L.) released in Oct. 2004 by Jacklin Seed by Simplot. Creeping bentgrass is a low-growing, stoloniferous monocot used almost exclusively on golf course putting greens, tee boxes, and fairways in the temperate regions of the world (Skogley, 1987).

Annual bluegrass (*Poa annua* L.) is a common weed in bentgrass turf, volunteering from seed and establishing itself even under close mowing (Henry et al., 2005). In regions with a mild climate, annual bluegrass can dominate stands of ‘Pennncross’ and other bentgrass cultivars (Harivandi et al., 2005). By some estimates, a majority of the golf playing surface in certain regions is volunteer annual bluegrass (Hagley et al., 2002).

The purpose of this article is to introduce the development, characteristics, and uses of ‘Alpha’ and ‘T-1’ creeping bentgrass. One objective in breeding these cultivars was to compete more effectively with annual bluegrass under golf conditions. To that end, a 1-ha annual bluegrass green was established as a breeding-proving ground for competitive bentgrass germplasm. As a result of using this technique, ‘Alpha’ and ‘T-1’ have shown improved competitiveness against annual bluegrass encroachment (Morris, 2005, 2006). Moreover, the cultivars have shown the potential to establish more readily by seed into mature annual bluegrass than an older cultivar in a trial described subsequently.

Origin

The origins of ‘Alpha’ and ‘T-1’ trace to two sources:

1. Selections of segregated patches from old putting greens in Massachusetts, Rhode Island, Connecticut, North Carolina, and South Carolina. These golf courses were 30 to 100 years old and were likely sown to ‘South German Bentgrass’ or ‘Pennncross’.
2. Selections of low growing plants from a herbicide-damaged Foundation field

of ‘Putter’ creeping bentgrass (Brauen et al., 1993) in Oregon’s Willamette Valley. In June 1994, a seed production field had been damaged by herbicide overapplication. For unknown reasons, the herbicide killed the taller-growing strains, leaving a population of compact, understory plants.

Clones from these two sources were grown to 3 cm in a glass house and transplanted on a grid pattern into a 1-ha mature annual bluegrass test putting green in Post Falls, ID, in 1994, mowed at 4-mm height (Fig. 1). Clones were evaluated monthly over 4 years. Those that effectively competed with annual bluegrass and grew into a sizable patch with visually attractive, dense turf and minimal thatch were selected. Selected clones were established in one of several Oregon polycross blocks based on similar phenotype; the progeny of these clones were established in a repeated clonal turf planting in 1996 and in a seeded turf trial in 1998. Breeder blocks of ‘Alpha’ and ‘T-1,’ established near Post Falls in May 1999, were comprised of top-performing lines from these two trials.

The ‘Alpha’ breeder block consisted of 2000 plants selected from the 15 top-performing entries in the 1998 seeded turf trial. Plants in this breeder block originated from seed, and as such, each was genetically unique. Approximately 8% of plants were removed before anthesis as a result of nonuniformity. Three of the 15 lines in ‘Alpha’ trace to line 98-0018 from Oregon polycross 94-8283 originating from a clone from a Massachusetts golf course. Ten pollen parents in that Oregon polycross originated from Massachusetts and South Carolina putting greens and selections from the cultivar, ‘Putter’. Three of the 15 lines in ‘Alpha’ trace to 98-0248 from Oregon polycross 94-8282 from a North Carolina golf green. Twenty-two pollen parents in that Oregon polycross originated from Connecticut, Massachusetts, North Carolina, and South Carolina golf greens and from ‘Putter’. The remaining lines trace to ‘Putter’ Foundation field selections.

The ‘T-1’ breeder block was established from 1000 plants of 11 clonal lines selected from the top competitors in the annual bluegrass putting green trial. The breeder block was planted in randomized, replicated clonal rows. One clone, 98-0172, traced to a selection from the cultivar ‘Providence’ (Skogley, 1987). One clone, 98-0167, traced to a plant selected from a South Carolina putting green, pollinated in Oregon polycross 94-8283, described previously. One clone, 98-0157, traced to a ‘Putter’ selection pollinated in Oregon polycross 94-8282. Three clones, 98-0160, 98-0163, and 98-0168, traced to Oregon polycross 94-8283 and originated from two Massachusetts golf greens. The remaining clones trace to Oregon polycross 94-8283 and ‘Putter’.

In summary, both ‘Alpha’ and ‘T-1’ were composed of ≈50% low-growing selections

Fig. 1. Annual bluegrass test putting green used to determine the competitive ability of bentgrass clones during the breeding of ‘Alpha’ and ‘T-1’. Photograph was taken after 3 years when some clones measured 60 cm across.

Received for publication 10 Jan. 2007. Accepted for publication 7 Mar. 2007.

For correspondence and reprint requests e-mail doug.brede@simplot.com

from 'Putter'. The remaining background originated from selections from old New England and Carolina golf courses. 'T-1' also contains 10% germplasm from 'Providence'.

Description

Plant breeding over the past 50 years has improved the performance of golf course grasses. Harivandi et al. (2005) observed differences between modern bentgrass cultivars and older types in quality, color, leaf texture, and resistance to annual bluegrass invasion.

In plots in Post Falls maintained under simulated putting green conditions (4-mm mowing height), a Noer soil profile sampler was used to quantify shoot density. 'Alpha' had a summer density of 25 shoots per cm², 'T-1' 18 shoots per cm², and 'Penncross' 8 shoots per cm² (a statistical analysis was not performed). These shoot counts were comparable to visual density ratings taken across nine U.S. states and one Canadian province by university researchers (Morris, 2006). 'Alpha' and 'T-1' share several characteristics in common, including a moderate to high shoot density but differ in color. 'T-1' is distinctly blue-green in color, darker than any other cultivar (Morris 2005, 2006). 'Alpha' is medium dark green in color.

In North American university trials, 'Alpha' and 'T-1' performed well across various geographies and management regimes and showed improved resistance to annual bluegrass encroachment under tee or fairway mowing heights (1 to 2 cm), particularly in Indiana and Wisconsin (Morris, 2005, 2006).

Competing against annual bluegrass is challenging for any creeping bentgrass cultivar (Harivandi et al., 2005). However, interseeding bentgrass into a mature annual bluegrass putting green is a far more difficult assignment. In interseeding, bentgrass seeds must germinate and compete against full-grown annual bluegrass plants while the putting green is under daily golf play and maintenance.

Bigelow and Chalmers (1995) studied interseeding into mature annual bluegrass using a 1980s creeping bentgrass cultivar, 'Southshore' (Hurley et al., 1994). They found that spring sowing resulted in the greatest increase in creeping bentgrass populations for all treatments. Henry et al. (2005) found that a combination of early summer planting and improved cultivars were the

most successful for establishing bentgrass into annual bluegrass.

To demonstrate the interseeding ability of 'Alpha' and 'T-1', a trial was established 15 Apr. 2005 on the same annual bluegrass test green described. 'Alpha', 'T-1', and 'Southshore' were established in 3.8-m² plots at a 5, 10, or 20 g-m⁻² seeding rate in a factorial arrangement with four replications along with an unseeded control. Cultivars were seeded and topdressed with 1 mm of sand and raked to incorporate; no core aeration or vertical mowing was used. On 15 Sept. 2005, two of the four replications were seeded again to the same seeding rates and cultivars forming a set of combination spring-fall treatments with two replicates each. The plot area was mowed three times per week with clippings returned and irrigated once daily to prevent stress. The area was fertilized with 15 g-m⁻²/year nitrogen. Bentgrass surface area estimates were taken by visual estimates. All plots started the trial at 0% bentgrass. Note that a proportion of bentgrass observed in the control and probably the 'Southshore' plots came from 'Alpha' or 'T-1' stolons or seed migrating into the plot (Table 1).

Data analysis (analysis and least significant difference_{0.05}) revealed only cultivar to be the significant factor. Therefore, cultivar means were averaged across seeding date and rate treatments. Results showed that 'Alpha' and 'T-1' were able to establish by seed more readily than an earlier cultivar. By the end of 1.3 years in this trial, a majority of the surface area had transitioned from annual bluegrass to creeping bentgrass. More research is needed to verify whether results of this single-site experiment can apply to a variety of golf course conditions.

Availability

Seed of 'Alpha' and 'T-1' is produced and Breeder seed is maintained by Simplot. Seed propagation is limited to four cycles of increase Breeder, Foundation, Registered, and Certified. 'Alpha' and 'T-1' and all germplasm derived therefrom are protected under pending U.S. utility patents 10/872,695 and 10/872,697, respectively. Unauthorized breeding from the cultivars is prohibited. Seed samples are available from the author for research and testing purposes.

Table 1. Establishment of three bentgrass cultivars in mature annual bluegrass mowed at 4 mm.^z

Treatment	N	Percent bentgrass area	
		16 Aug. 2005	21 Aug. 2006
Alpha	12	30 a ^y	81 a
Southshore	12	8 b	47 b
T-1	12	35 a	75 a
Unseeded control	3	2 b	30 b

^zData are pooled across three seeding rates and two planting dates.

^yMeans followed by the same letter are not statistically different according to least significant difference_{0.05}.

Literature Cited

- Bigelow, C.A. and D.R. Chalmers. 1995. Interseeding establishment of creeping bentgrass [*Agrostis stolonifera* var. *palustris* 'Southshore' (Huds.) Faw.] into an annual bluegrass (*Poa annua* L.) turfgrass system, p. 1-5. In: Va. Tech Turfgrass and Hort. Field Days and Va. Turf and Landscape Conf. and Trade Show Proc. Va. Polytechnic Inst. and State Univ. and Va. Turfgrass Council, Blacksburg, VA.
- Braun, S.E., R.L. Goss, and A.D. Brede. 1993. Registration of 'Putter' creeping bentgrass. *Crop Sci.* 33:1100.
- Hagley, K.J., A.R. Miller, and A.C. Gange. 2002. Variation in life history characteristics of *Poa annua* L. in golf putting greens. *J. Turfgrass Sports Surface Sci.* 78:16-24.
- Harivandi, M.A., W.B. Hagan, and K.N. Morris. 2005. Evaluating bentgrasses for quality, speed, thatch development and annual bluegrass invasion. *Int. Turfgrass Soc. Proc.*, p. 60-61.
- Henry, G.M., S.E. Hart, and J.A. Murphy. 2005. Overseeding bentgrass species into existing stands of annual bluegrass. *HortScience* 40:468-470.
- Hurley, R.H., V.G. Lehman, J.A. Murphy, and C.R. Funk. 1994. Registration of 'Southshore' creeping bentgrass. *Crop Sci.* 34:1124-1125.
- Morris, K.N. 2005. Fairway/tee bentgrass test 2003. Progress Report NTEP No. 05-1, National Turfgrass Evaluation Program, USDA ARS, Beltsville, MD.
- Morris, K.N. 2006. Fairway/tee bentgrass test 2003. Progress Report NTEP No. 06-2, National Turfgrass Evaluation Program, USDA ARS, Beltsville, MD.
- Skogley, R. 1987. Selection and breeding of superior bentgrasses. *Turfgrass Environ. Res. Summary*, US Golf Assoc. Green Sec., p. 24.