

**B**entgrasses have been utilized in American turf since the late Nineteenth Century. Native to Eurasia, the bentgrasses were widely distributed by European colonists and first commercialized by English seed companies. Early use was for "wetlands" pastures, followed by golf courses and lawns.

The genus *Agrostis*, according to Hitchcock's Manual of Grasses, consists of approximately 200 species plus many subspecies.

Although each is quite heterogeneous (mixed morphological types from seed propagation) there are four commonly accepted as turfgrass types:

- 1 *Agrostis Palustris* — creeping bent grass
- 2 *A. canina* — velvet bent
- 3 *A. tenuis* — colonial bent
- 4 *A. alba* — Redtop bent.

## Origin and types

**Creeping Bent:** A mixed species type known as South German Bent was first available for sowing of putting greens in the late 1800's. It was harvested from moist soil pastures in present day Austria and Hungary, and later from other areas of Europe.

South German consisted of varying proportions of the four above mentioned species and probably their natural hybrids. Resulting greens turf quickly segregated into predominating patches of individual creeping bents and velvet bent to a lesser extent in more favorable temperate climates.

In the absence of pesticides and turfgrass technology, or until the 1930's, much attention was devoted to the more vigorous and better appearing patches. Vegetative selection and propagation began in the 1920's with the initiation of the USGA Green Section

research program at the Arlington Turf Gardens. Similar efforts were practiced by early greenkeepers in their then-secretive methods to practice their trade by themselves.

**The C Series**—Although many hundreds of segregates were selected and propagated for turf, including over 200 in the "C" series of the USGA, only a handful managed to pass the ravages of nature and man. Among the best were Toronto (C-15) which proved best adapted in the midwest, Cohansey (C-7) with better heat tolerance, Washington (C-50) east of the Great Lakes, Arlington (C-1) and Congressional (C-19) in the mid-Atlantic region, and Old Orchard (C-52) for the upper Midwest. Many others were propagated and used to a lesser extent.

The evolution and use of vegetative bents as single genetic types has  
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# The Bent Grasses

by J.M. Duich, Ph.D., Pennsylvania State University, State College, PA



Segregation into patches happens quickly with South German Bent.

August blotches on *Poa annua*/bentgrass fairway under level management.

## BENT GRASS from page 72

proven such narrow genotypes cannot long survive in pure form as most recently evidenced by the devastating "bacterial decline" of Toronto bent. Apomictic bluegrasses (genetically uniform) since the advent of Merion bluegrass in 1950 show a similar relapse over time and area to those who monitor the turf scene.

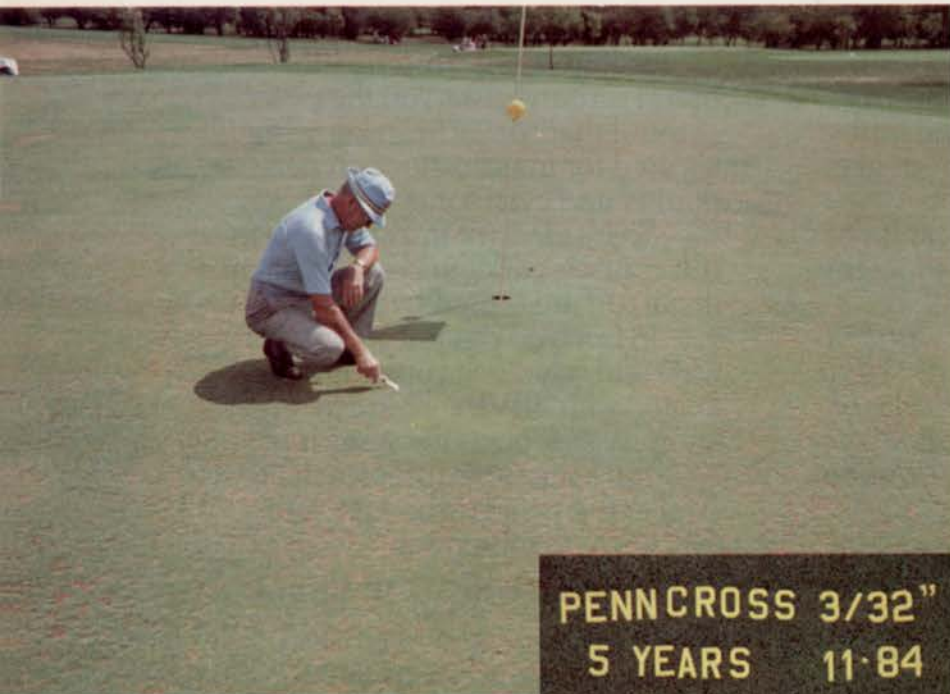
with *Poa annua*. Secondly, expanded use demonstrated its adaptation to be the widest of any cool-season grass variety. Finally, in conjunction with improved soil modification techniques, the development of fungicides for *Pythium*, and overall improved management technology, Penncross use extended further and further into the South.

Southern use increased due to a

each, from Washington and Seaside bents. Penneagle was bred for putting-green-quality upright growth, and vigor to compete with *Poa annua*, although curtailed compared to Penncross. Its use is increasing, particularly in northern areas for fairways.

**Emerald and Prominent**—Emerald (Smaragd) from Sweden and Prominent from Holland have been commercially available in limited quantities in recent years. Their performance at today's close heights of cut (approximately 1/8-inch) have yet to be proven. Ten year tests at Penn State show both to segregate and unable to compete with *Poa annua*.

Compared to other species, experimental work with creeping bentgrasses is quite limited. Bent improvement for fairways is underway at Rutgers, as well as improved winter-hardy types in Canada. At Penn State, PSU-126 has been distributed to over 100 golf courses in 30



**Bacterial decline** of Toronto bent (C-15) except for patch of Cohansey at base of pin.

**Seaside**—The discovery and seed harvest of creeping bent growing in tidal flatlands pastures near Coos Bay, Oregon, in the late 1920's resulted in the first domestic source of creeping bent. Known originally as Coos or Cooos bent, Seaside has since been commercially available, but many locations and generations removed from the original.

Seaside use increased with the need for a seeded type to repair deteriorated or damaged vegetative greens. Except for a "synthetic" S. German composed of mixing domestic species of bent, Seaside was the only seeded creeping bent available for over three decades.

**Penncross**—The first seeded creeping bent bred specifically for turf, Penncross, became commercially available in 1956. Its availability coincided with the major northern golf course construction boom which lasted until the early 1970's. During this period, Penncross was used on over 90% of newly constructed courses.

Penncross use increased due to its ability to compete most favorably

PENNCROSS 3/32"  
5 YEARS 11-84

PENNCROSS 6/32"  
5 YEARS 11-84

**Algae infestation** on Penncross cut at 3/32-inch is not found on same grass cut at 6/32-inch.

cycle of winterkill of hybrid bermudass and a desire to eliminate the need for winter overseeding. Recent Penncross greens established in the deep south, especially Florida, shall warrant close attention relating to species adaptation and turf management skills.

**Penneagle**—Penneagle creeping bent (1978) was developed from four advanced generation selections, two

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**The greatest single threat facing putting green bent is the season-long practice of excessive close mowing to maintain fast putting speeds.**

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states, Canada and S. Africa. Pending continuing favorable performance, this upright growing creeping bent may become commercially available in 1986.

**Velvet Bent:** Since its introduction as a component of South German bent, velvet bent attracted attention due to its very dense and fine-textured foliage. Adaptation has been found as best suited to maritime climates, such as upper New England.

Velvet bents are tolerant of acid soils and shade. Upon establishment they must be sparsely fertilized with nitrogen to avoid thatching and sponginess. Former types such as Piper, Raritan Kernwood and various local types are no longer commercially available. Limited seed quantities of Kingstown, a University of Rhode Island release, are being produced.

**Colonial Bent:** Allegedly bunch types, colonial bents are tolerant of mowing under one-inch. Diverse growth habit types include those with short stolons and/or rhizomes. Upon

being introduced from Europe, the colonial bents have always been identified as ecotypes based on their areas of initial naturalization.

New Zealand Browntop, Prince Edward Island and Rhode Island Colonial were among the earliest "varieties" commercialized. Since the mid-1930's, the Oregon production of Highland and Astoria bents has prevailed. Highland production exceeds all other bentgrasses tenfold!

Colonial bents were a common mixture component with Kentucky bluegrass and fine leaved fescues for many years prior to the advent of improved varieties. Their general use for this purpose rapidly declined as turf use expanded and the colonials dominated turf stands.

Musser and Duich evaluated the growth habit of 54 colonial bents in 1954. We found 44 of 45 domestic seed lots to contain from 3 to 51 percent stoloniferous types. One domestic and nine New Zealand types contained no stolons.

The main turf use of colonial bents in the U.S. has been for golf fairways beginning with the introduction of irrigation in the 1930's. Use increased in the late 40's as shorter heights of cut

plus irrigation eliminated bluegrasses and fescues.

During this period, colonial bents were found to be susceptible to many diseases, i.e. brownpatch, pythium, snowmolds, dollarspot, leafspots and others. Disease problems led to initial fungicide spraying of fairways in the early 1950's. By necessity, fungicide applications became a near weekly

### Triplex mowing, especially with clipping removal, is becoming the most innovative management approach in years.

practice for some. However, foremost among problems with the culture of colonial bents has been the dominance of invading *Poa annua*.

Varietal improvement has been limited to the non-creeping Exeter, Holflor, and Bardot cultivars. The dominance of lower cost Highland has

curtailed consumer interest in these varieties. An extensive program to develop rhizomatous colonial bents is under way at Penn State.

**Redtop Bent:** Quick germination and seedling growth were virtues for early use of Redtop in turf seed mixtures. However, the overuse of this small seeded grass led to its dominance of new turf stands. As a short-lived perennial, stands quickly deteriorated except for longer lasting rhizome types which are considered weeds. The introduction of turf-type perennial ryegrasses has practically eliminated Redtop as a turfgrass.

### Management trends

A major fallacy concerning bentgrasses, particularly the creeping, is that they require high levels of nitrogen, in particular, and water.

For years, texts, articles, and advertisements have stated bent greens need 1 to 1½ pounds N per month of growing season, tees higher yet, and fairways of approximately half these rates. Those utilizing such programs have had to cope with nothing but excesses: mowing, clipping, thatch, puffiness, scalping, grain, aeration, verticutting, spraying,

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## BENT GRASS from page 78

*Poa annua*, watering, and stress.

At one-fourth to one-third of the above rates, bentgrasses can be among the most hardy of manicured grasses.

The basic rule in successful long-term management of turf is to maintain the foliar canopy as close to the ground surface as possible. This is especially true of creeping bent for all purposes.

Practices leading to excessive thatching should be avoided as thatch is the greatest single limiting factor in successful turf culture. Those adhering to modest fertility programs and thatch prevention have discovered that water needs can be reduced by up to 75%!

The single limitation of low fertility programs on bent is the prevalence of dollarspot diseases. Fungicides for this problem are much more economical than the alternatives. The author advocates the precise use of herbicides for weeds rather than the over-stated maxim that "the best weed control is a dense turf".

The greatest single threat facing putting green bent is the increasing season-long practice of excessive close mowing to maintain fast putting

green speeds. Varieties have yet to be developed that can perpetuate themselves at constant mowing heights of approximately  $\frac{1}{8}$ -inch. This is particularly true of greens with inadequate soils, play in excess of 20,000 rounds, and the ravages of open or icy winters.

The use of water to provide optimum resiliency serves to compound all problems, especially *Poa annua* invasion. The author has seen more algae and moss on greens in the last two years than in the previous 20 years combined.

Conversely, most greens can tolerate a gradual height reduction for a short period. Our research has shown that firm greens surfaces, lower overall fertility, double mowings, and even rolling can serve as adequate substitutes to lower mowing.

*Poa annua* dominance of close-cut, irrigated fairways has been a major problem faced by golf superintendents. The rationale of using colonial bents has generally been unsuccessful. Triplex mowing of approaches, especially with clipping removal, has long been observed to result in bentgrass dominance. Most dramatic improvements are now being achieved on fairways with the

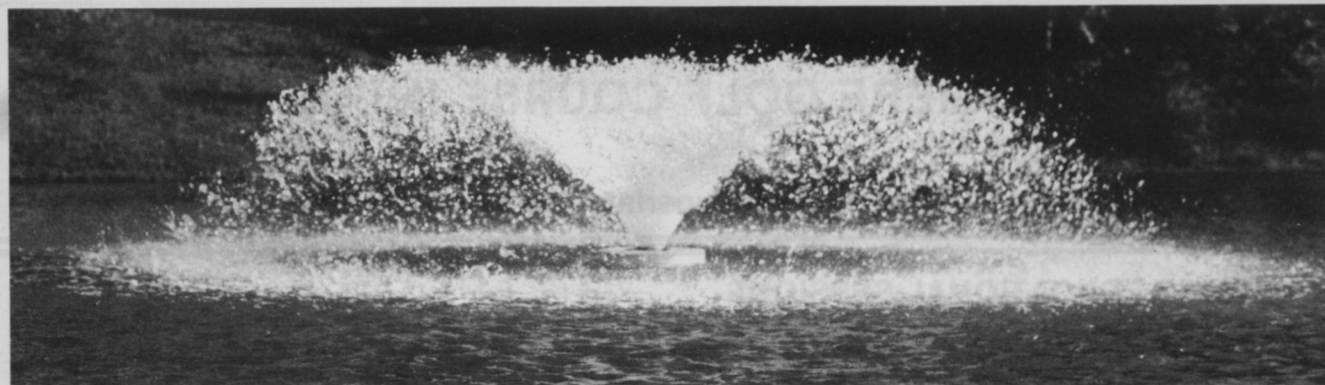
presence or reseeding of creeping bents.

Triplex mowing without the explanatory benefit of prior research is becoming the most innovative management approach in years. Modest fertility and irrigation, effective aerification and use of creeping bent are keys to the rapid demise of *Poa annua*.

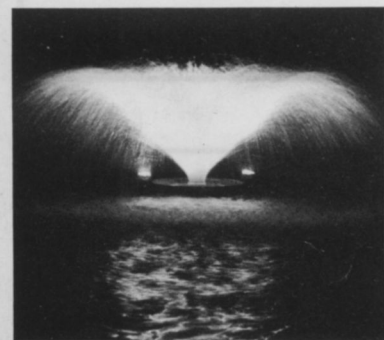
Reseeding effectiveness requires a timing of approximately one month prior to the cool weather germination of *Poa* in the fall. Timing is most important regardless of whether chemicals such as Roundup are used.

Sulfur for acidification, new growth regulators and retardants, and preemergence and postemergence chemicals for *Poa* are proving effective. Above all else, drainage is basic, and remains the first step in species conversion and culture.

In summary, one must recognize that of all the major grass species, we have had the fewest number of varietal improvements with the bents. Proper use and management of what we have is proving creeping bent to be the most effective grass available for close-cut turf culture. The *T Poa annua* era shows signs of diminishing. **WT&T**



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