

New bluegrass species for turf

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Commonly known as bluegrasses in North America and as meadowgrasses in Europe, the grass genus *Poa* contains many economically important grass species that are components of pastures, meadows and turf in both northern and southern temperate climates.

The grass genus *Poa* is a diverse collection of widely adapted, cool-season grasses containing 300 species. Many species of *Poa* have worldwide distribution, ranging from

tropical mountainous regions to the most northern limit tolerated by any plant species.

Kentucky bluegrass (*Poa pratensis* L.), which produces some of the finest quality turf in the Green Industry, is the representative species of *Poa*, both agronomically and botanically.

This article's objective is to introduce several economically-important species of bluegrass that are not normally thought of as amenity turfgrasses, but nonetheless possess qualities that make them interesting and potentially useful as turf.

Identifying and distinguishing species within *Poa* is difficult because morphological variation often overlaps, and many species have an inherent ability to adapt to a range of environmental conditions. Furthermore, the retention of pollen recognition systems between species enables a variety of interspecific hybridization to occur in nature. Interspecific hybridization results in many species being introgressed with each other to such an extent that species classification is also often difficult.

Poa contains a variety of breeding systems

including apomixis and dioecy (Table 1). Species may be annual or perennial, with simple culms, and have narrow, flat leaf blades with a pair of bulliform cell lines along either side of the midrib and a boat-shaped tip.

The retention of pollen recognition systems and the asexual nature of apomixis present many possibilities for interspecific hybridization within *Poa*.

The potential of integrating wider adaptation and transferring valuable agronomic traits through interspecific hybridization is attractive. The long-term commitment of such breeding objectives, however, has generally resulted in lack of substantial progress. Examples of interspecific hybridization include *P. pratensis* x *P. compressa*; *P. pratensis* x *P. alpina*; *P. ampla* x *P. pratensis*; *P. scabrella* x *P. pratensis*; *P. longifolia* x *P. pratensis*; *P. arachnifera* x *P. pratensis*; and *P. caespitosa* x *P. arachnifera*.

Annual bluegrass

Annual bluegrass (*P. annua* L.) is described as being an annual cosmopolitan bunchgrass with light-green foliage and sometimes rooting from lower nodes.

It is often considered a serious weed problem for fine-sports turf. However, annual bluegrass exhibits a range of variability in traits like color, shoot density and life history. As such, there are annual bluegrasses that exist as long-lived perennials [*P. annua* f. *repentans* (Hausskn) Timm] with dark forest-green color and a shoot density that is higher than any other recorded turfgrass.

The process of this transformation from a annual weedy type to a high shoot density perennial-type is an interesting one. Initially, golf greens planted to creeping bentgrass eventually become infested with the wild

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and weedy annual types of annual bluegrass. Because of the ability of annual bluegrass to flower and set seed under close mowing heights, those annual bluegrass plants that become established on the green sire progeny that are more adapted to the green's environment than the original colonizers.

Over time, each generation becomes more tolerant of the close mowing heights by investing more of their photosynthesis energy into vegetative growth and less into seed production. Over decades, the annual bluegrass types that exist on golf greens have evolved stoloniferous-like shoots, a short-stature and a high shoot density.

These perennial forms of annual bluegrass have become an important turfgrass for the golf industry in regions like the Pacific Northwest and coast and the U.S. Northeast. Because such greens-type annual bluegrasses evolve on-site and cannot survive in environments other than golf greens, they are considered cultivars. Presently, no commercial sources of such cultivars are available. Therefore, prospects for developing improved cultivars are good.

One commercially available cultivar source of perennial annual bluegrass, known as Peterson's Creeping bluegrass, has had some limited success in the semi-arid regions of California as turf. However, there still are no commercially available cultivars for use on golf greens.

Canada bluegrass

Canada bluegrass (*P. compressa* L.) is a rhizomatous perennial with a distinctive bluish-green color of its leaves. Its flowering culms are stiff and flattened and the lemma of its seed has only two nerves and either lacks or has sparse basal webbing.

Canada bluegrass resembles Kentucky bluegrass but is distinguishable by its flatter culms, its obscure lemma nerves, and typically does not have as high a shoot density.

TABLE 1.

AGRONOMICALLY IMPORTANT POA SPECIES AND SOME SELECTED CHARACTERISTICS

Common name	Scientific name	Chromosome number	Method of Reproduction
Canada bluegrass	<i>P. compressa</i> L.	35-36, 42, 56	Apospory apomixis
Bulbous bluegrass	<i>P. bulbosa</i> L.	14, 21, 28, 35, 42, 45	Bulbiferous apospory
Annual bluegrass	<i>P. annua</i> L.	14 (sterile), 28	Self-compatible, gynomonecy
Texas bluegrass	<i>P. arachnifera</i> Torr.	56	Dioecious

Despite its name, Canada bluegrass is native to Europe and southwest Asia and was introduced and naturalized throughout much of North America. It's primarily used for pastures and for erosion control on nutrient-poor or thin soils in parts of Ontario, Canada, and in humid northern United States.

It is best adapted to open, poor, dry soils and under these conditions may be better than Kentucky bluegrass for lawns. Some strains of Canada bluegrass show greater shoot density than others suggesting that variability exists within the species for turfgrass quality characteristics. Thus, Canada bluegrass shows potential for use as a low maintenance turfgrass.

Future prospects for developing improved cultivars are good. Current cultivars include: Canon, released in 1944 by the Ontario Agricultural College, University of Guelph, Guelph, Ontario. (Canadian Seed Growers' Association, P.O. Box 8455, Ottawa, Ontario, K1G 3T1). Another cultivar is Reubens developed and marketed by Jacklin Seed Company (W. 5300 Riverbend Ave., Post Falls, ID 83854, 208-773-7581). The intended use of Reubens is for low-maintenance turf and erosion control cover in areas of low fertility, irregular moisture supply and where mowing is difficult.

Bulbous bluegrass

Bulbous bluegrass (*P. bulbosa* L.) is a dense, perennial bunchgrass that possesses swollen, fleshy basal sheaths at the bases of its tillers and culms that resemble bulbs. In addition, its flowers do not produce seed but contain vegetative bulblets having purple bases and slender bracts 5 to 15 mm long.

Bulbous bluegrass growth usually begins about October 1 and ceases early to mid-May.

Bulbous bluegrass is a native of southern Asia, Europe, and North Africa. Its growth usually begins October 1 and ceases early to mid-May soon after the bulblets are set in the inflorescences. This growth period of bulbous bluegrass makes it an interesting grass for use in regions where dormant warm-season grasses are normally overseeded to provide a green turf during the winter months.

Given its active winter growth and perennial nature, bulbous bluegrass offers potential as a permanent overseeding grass in areas where warm-season grasses go dormant.

Currently, bulbous bluegrass is used for pastures and erosion control in parts of the western United States, including southwestern Idaho, Oregon and northern California. It is increased from its bulblets that form in its panicles, and these bulblets are planted as though they were seed. There is extensive variation among naturally occurring strains of bulbous bluegrass, particularly for traits like shoot density, leaf texture and stature. So, our ability to select for fine textured, dense, short-statured types makes the prospects for developing improved cultivars appear good.

Currently, there are no named varieties available in the United States, however, "seed" (i.e. bulblets) is available in limited supply from Seeds Inc., Box 866, Tekoa, WA, 99033, 509-291-5411.

Texas bluegrass

Texas bluegrass (*P. arachnifera* Torr.) is a creeping, rhizomatous perennial grass that is also dioecious (the sexes are separated onto different individual plants).

The spikelets of its female plants are webbed near bases of the lemmas, resembling fuzzy balls of cotton, while the spikelets of male plants are only sparsely webbed. Texas bluegrass is native to the plains and prairies of south central U.S., and is sometimes cultivated as winter pasture and as turf in Texas.

The characteristics that make Texas bluegrass a potentially useful turfgrass species are good winter growth and good summer heat stress survival. Thus, Texas bluegrass is already a valuable species within its native habitat, however, seed production and seeding is often difficult due to the cottony-webbing of its seed. Consequently, the production and

establishment of stands for turf use is limited.

However, Texas bluegrass is known to hybridize with Kentucky bluegrass which radically improves its potential for eventual commercial seed production and turf use in areas of the hot, humid south. Thus, prospects for developing improved cultivars are good. Although no commercially available cultivars are currently available, interested parties should contact Dr. James Read, Texas A&M University, Agricultural Experiment Station, Dallas, TX.

Wood bluegrass

Wood bluegrass (*P. nemoralis* L.) was introduced from Europe and has naturalized in many areas across Canada and south into the northern tier of states.

Wood bluegrass is suitable for lawns in the shade, or low-maintenance lawns under trees. It produces good turf under low maintenance conditions and has a fine leaf texture.

Prospects for developing improved cultivars are good. Current cultivars include: Barnemo, which was developed from European material and has shown to produce a good turf under low maintenance conditions and has a fine leaf texture. For further information interested parties may contact Barenbrug USA, P.O. Box 239, Tangent, OR 97389, 503-926-5801.

Sandberg bluegrass

Sandberg bluegrass (*Poa secunda* Presl) is a native bluegrass occurring throughout the Northern Plains and Western States. It is a bunchgrass reaching to 24 in. under optimum conditions. Leaves are sparse.

The grass starts growth early in spring and matures and dries in midsummer. While green, and even after drying, the foliage is palatable, so it is a valuable range grass. Seed germination is low. Sandberg is usually seeded in combination with later growing grasses for maximum pasturage over a long season. Its potential for turf is only now being explored.

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OTHER BLUEGRASS SPECIES OF INTEREST

Not every species of bluegrass is ready for prime time. However, there are several species which are of interest to breeders and may have some impact on the genus down the road. Here is the outlook on several such species:

■ **Big bluegrass** (*Poa ampla* Merr.) is a strong-growing perennial bunchgrass native in Western United States. Plants are up to 4 ft. tall, with numerous basal leaves 8 to 16 in. long by 0.375 in. wide and a deep, fibrous root system. Stands are generally not dense.

■ **Mutton bluegrass** [*Poa fendleriana* (Steud.) Vasey] is native from the Great Lakes westward to the Cascade Mountains and south into Mexico. It is a perennial bunchgrass with erect stems up to 24 in. tall. It develops tillers at the base and rarely produces short rhizomes. Leaves are mainly basal, are rather firm and stiff. They are folded or inrolled, rarely flat. The species grows under a wide range of conditions including elevations to near the top of the Rocky Mountains. It is also found among sagebrush and in open timber stands.

Mutton bluegrass is well adapted to dry slopes and is found on clay loam as well as sandy or gravelly soils. It is drought resistant, palatable and nutritious, and starts growth very early. Even the dry growth is grazed well. These characteristics make it a valuable range grass. The name reflects the value sheepmen place on the grass for sheep feed.

■ **Alpine bluegrass** (*Poa alpina* L.) is a low-growing, non-rhizomatous, perennial bunchgrass that is erect, with culms arising from a tight crown, 10-30 cm tall, and has short leaf blades that are

2-5 mm wide. It naturally grows in mountain meadows, arctic regions of the Northern Hemisphere, extending south to Quebec, northern Michigan, and the alpine summits of Colorado, Utah, Washington, and Oregon.

Alpine bluegrass has extremely early seed maturation and superb winter-hardiness. It also forms a noticeable thatch with persistent leaves from previous year's growth. Gruening is the first named cultivar of this species. Gruening is tended for use in erosion control, reclamation, and restoration in arctic, sub-arctic, and boreal regions. It has been observed to out-compete other bluegrass cultivars on gravelly, alpine slopes. For more information contact: Stoney J. Wright, Manager, Alaska Plant Materials Center, State of Alaska, HC 02, Box 7440, Palmer, AK 99645, 907-745-4469.

■ **Plains bluegrass** (*Poa arida* Vasey) is a native bluegrass that grows in prairies, plains, and alkali meadows, up to 3,000 m elevation in Manitoba to Alberta, south to western Iowa, Texas, and New Mexico. It has erect culms, 20-60 cm tall with leaf blades that are mostly basal, firm, folded. It is mildly rhizomatous, and has ability to establish excellent stands in saline-alkaline affected soils.

Although no cultivars exist, seed for limited field testing is available from: Plant Materials Center, SCS, RR 1 Box 1189, Bridger, MT 59014, 406-662-3579.

■ **Glaucous or upland bluegrass** [*Poa glauca* Vahl ssp. *glauca* (Gauldin) Lindm.] is a perennial, loosely tufted bunchgrass that spreads by tillering; numerous compressed, fine, wiry culms,

decumbent at the base; many flat, short, well-distributed, dark green leaf blades. Seed heads numerous, lax, becoming brownish, compact, and nodding at maturity. Seeds are small, lemmas lightly pubescent, and sparsely webbed at the base.

Plants resemble Canada bluegrass but become sodbound less readily, lodge less, and produce more seed. Upland bluegrass is adapted to low-fertility soils and is used for ground cover.

It was first introduced in 1935 by Westover and Enlow from Chorsum, Turkey. A cultivar known as Draylar has been selected soil erosion control on disturbed lands with a minimum annual precipitation of 45 cm. Draylar is apomictic ($2n=50$) and has been used by the Carnegie Institution of Washington for bluegrass hybrid studies. For more information contact: Plant Materials Center, SCS, Room 104, Hulbert Agricultural Sciences Bldg., WSU, Pullman, WA 99164-6211, 509-335-7376.

The first cultivar of this species was released as Tundra with an intended use for revegetation purposes. Tundra originates from selected plant indigenous to Alaska along the Sagavanirktok River about 116 km south of the northern coast at Prudhoe Bay. It is adapted arctic regions to northern fringes of boreal forest in Alaska and neighboring areas of Canada. For more information contact: Palmer Research Center, Agricultural and Forestry Experiment Station, 533 E. Fireweed, Palmer, AK 99645, 907-745-3257.