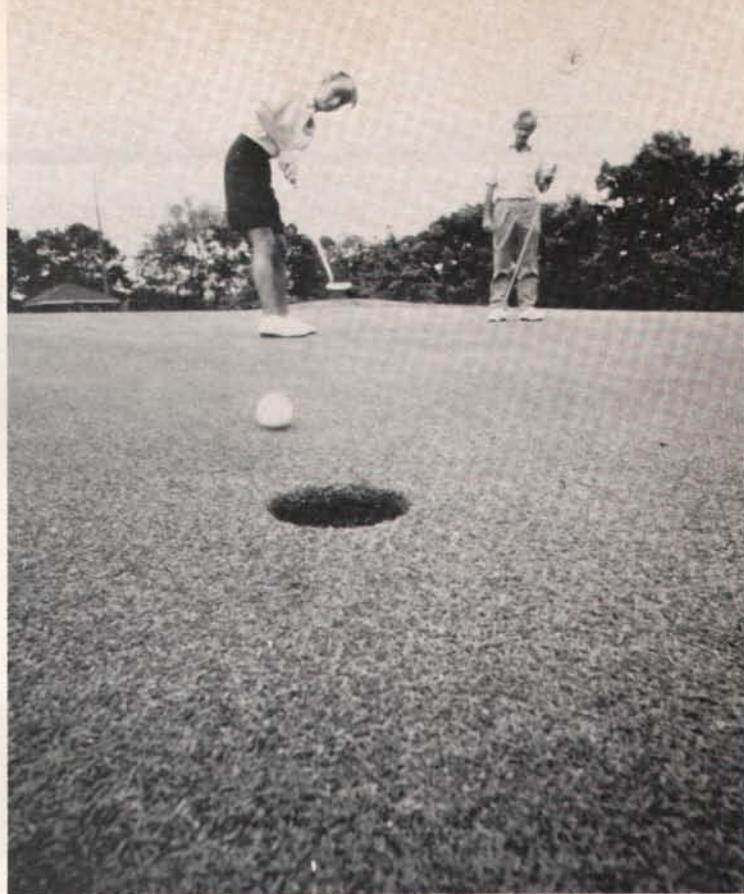


# The Search For The Perfect Creeping Bentgrass



PennLinks green at Old Hickory Country Club in Nashville, TN. Photo Copyright © Larry Kassell.

An entire generation of golf course superintendents has now worked without having to manage vegetative creeping bentgrasses. Ever since the release of Penncross in 1955, seeded creeping bentgrasses have dominated greens construction and renovation. The vegetative C-Series bents, including Arlington, Cohansey, Congressional, Toronto, and Washington, are almost never found in architects' specifications anymore.

South German and Seaside bents, the only seeded options to the C-series for years, have also been largely replaced by Penncross. No other single turfgrass variety has dominated the golf industry as long or as widely. Developed at Pennsylvania State University, Penncross has become the standard by which all bentgrasses are judged today. For more than 30 years, the university's Dr. Joseph Duich has monitored its production by the Penncross Bentgrass Growers Association of Oregon and marketing by Tee-2-Green Corporation of Hubbard, OR.

During this period, superintendents have adapted maintenance to enable Penncross to withstand varied growing conditions on golf courses across the country, green speeds of eight to ten on the Stimpmeter, and mowing heights as low as 1/8-inch. They have begun using it on fairways and tees to force out annual bluegrass and provide a dense playing surface just 1/2-inch high. The reputation of thousands of superintendents has been based on how well they maintain not just their greens, but Penncross.

So understandably the introduction of a number of new varieties of creeping bentgrass over the past few years has been received by superintendents with a certain amount of reluctance. The prospect of changing varieties is unsettling to many who have mastered the establishment and care of Penncross. Nevertheless, the process of experimentation and reevaluation has begun and will continue into the '90s.

It was Duich himself who introduced the first serious competitor to Penncross in 1978, Penneagle. Since he had helped Dr. Burton Musser develop Penncross, Duich was more familiar than anyone else with its characteristics. He spent 18 years crossing and evaluating more than 150 bents in research plots in the United States and Canada before selecting Penneagle.

One of the criticisms of Penncross was its aggressiveness. This trait was beneficial when it came to quick establishment, recovery from injury, tolerance to high and low temperatures, and competing with *Poa annua*. The downside was the rate at which it developed thatch under typical high rates of nitrogen, water, and pesticides.

From working with superintendents, Duich knew that the thatch question could be resolved through adjustments in maintenance. By lowering nitrogen levels, light verticutting, core aeration, and more precise irrigation, Penncross' aggressiveness was manageable. Furthermore, by controlling thatch, the superintendent also had better control over diseases.

In Penneagle he discovered a bent that

was slightly less aggressive yet could still compete successfully with *Poa*. He also felt that the variety's more upright growth habit was suitable for tees and fairways, in addition to greens. In 1978, Penneagle was released as a broad-use bentgrass adapted to a large portion of the country.

At the same time, Duich was evaluating another bentgrass specifically for greens. He had crossed a bent found on a green at The Country Club in Shaker Heights, OH, with nine other attractive selections in his plots at Penn State. After a second phase of selection involving 90 more parent plants, he picked out one and sent seed samples to more than 100 different golf courses and universities under the tag PSU-126.

Feedback from these sites showed that the bent was more aggressive than Penneagle but less aggressive than Penncross. It also had an upright growth habit with very fine leaves. These two traits produced a green surface with little to no grain.

Superintendents also reported that the upright growth, narrow leaves, and high density reduced the need for verticutting, was more drought tolerant, and withstood high temperatures and humidity better. After 20 years of work, limited supplies of PennLinks were available in 1987.

The demand for seeded creeping bentgrass began to exceed supply in the '80s despite production increases of 50 percent during some years. Construction of new golf courses, use of bentgrass for fairway turf, and conversion of bermudagrass greens to bent in portions of the South and West forced buyers to plan years in

advance. Superintendents in these areas became concerned, got organized, and asked their state turf research specialists to step up breeding and development work on bentgrasses.

Turf researchers at the University of Arizona in Tucson; North Carolina State University in Raleigh; the University of Rhode Island in Kingston; Rutgers University in New Brunswick, NJ; Texas A & M Research Center in Dallas; and Washington State University in Puyallup were among the universities that joined Penn State in breeding and selection of creeping bentgrasses.

Dr. Richard Skogley at the University of Rhode Island had for decades preserved and cared for some of the oldest plots of bentgrass in the country. Dr. Reed Funk at Rutgers managed a highly productive turfgrass breeding program with numerous improved perennial ryegrasses, Kentucky bluegrasses, and turf-type tall fescues to show for it. Dr. Robert Kneebone at the University of Arizona had established bentgrass maintenance trials beginning in the '70s, as had Drs. Roy Goss and Stan Brauen at Washington State University in Puyallup. All these men played a role in the development of new seeded creeping bentgrasses released in the last five years.

The insatiable demand for creeping bentgrasses in the U.S. and in developing foreign golf markets was recognized by a number of seed marketing companies. They began to sponsor bentgrass breeding research at universities in the early '80s. Among them were International Seeds, Inc. of Halsey, OR; Jacklin Seed Company of Post Falls, ID; and Seed Research of Oregon, Inc., in Corvallis, OR. While these companies were basically starting from scratch with bentgrasses, the universities they approached had been working with them for more than a decade.

International selected a dark-green, semi-erect creeping bent that had exhibited strong drought tolerance and resistance to dollar spot in the plots at Rutgers for nine years. To test its tolerance to heat and humidity further, seed was sent to North Carolina State University and the University of Georgia in 1985.

After two years of trials, the bent called Cobra was judged to have dark winter color with comparable density, speed of establishment, and texture. The first commercial quantities of Cobra were sold in 1988. International also markets Emerald, a variety of bentgrass of European origin best adapted to northern climates with low heat and humidity.

Jacklin found the bentgrass it was looking for at Washington State University. After 18 years of evaluation, Brauen selected one particular creeping bentgrass that was darker than others, had a dwarf, upright growth habit, and fine texture. It had exceptional resistance to take-all patch, a common problem in maritime climates which predisposes bents to invasion by *Poa*. The disease is difficult to cure and is a considera-

ble problem in the Pacific Northwest and a growing problem on the East Coast.

The original parental material for the new bentgrass called Putter came from golf course greens in five different New England states. Because of its dwarf growth habit, Putter covers the ground following seeding slightly slower than Penncross, according to Gayle Jacklin, but still forms a full stand within four weeks of planting. When overseeded into a putting green, she adds, it outcompetes many other bentgrass varieties, yet its vertical growth rate is relatively slow.

Seed Research also seems to have taken a regional approach to bentgrass selection. Providence, a variety developed in cooperation with the University of Rhode Island, has demonstrated resistance to dollar spot and brown patch as well as cold tolerance. Its upright growth habit and fine texture are credited with eliminating grain in greens. Wear tolerance, recuperative ability, and fast establishment are tied to Providence's aggressiveness and strong tillering.

The dark green variety is the result of a breeding program which began in 1965 with the collection of plants from old putting greens throughout the Northeast and those taken from trials at the university dating back to the 1920s. In 1982, the nine most promising selections were placed in a putting green trial. Two years later, the best five were planted in a polycross nursery. After two more selections, the first certified seed was harvested in Oregon in 1988.

Seed Research's second bentgrass, SR 1020, comes from a program at the University of Arizona designed to identify bents best adapted to Southwestern conditions. Kneebone collected material from old golf greens in Arizona, California, and South Carolina to create his plots in 1971. Five years later, the best 26 were planted and maintained under putting green conditions

without applications of herbicides, insecticides or fungicides. By 1982, five clones maintained a dense stand with good quality and color. They originated from golf courses in Phoenix and Tucson, plus one from Clemson University. The first certified seed of SR 1020 was harvested in Oregon in 1987.

Some of the characteristics of SR 1020 include dark color, fine texture, upright growth habit, better heat and drought tolerance, and improved resistance to Pythium blight and powdery mildew. It can be maintained successfully in full sun or moderate shade.

These are the major players in the seeded creeping bentgrass market today. Superintendents and golf course architects are very aware that choosing the right variety for their projects is more complicated than it was just five years ago. While all these bents have been used on golf courses, the amount of university data comparing all varieties is limited and short-term.

"Certain varieties of creeping bentgrass are better adapted to specific environmental conditions," explains Virginia Lehman, research associate for Dr. Milt Engelke at the Texas Agricultural Research Center in Dallas. Engelke has been engaged in bentgrass heat- and drought-resistance research at the center since 1985. The work was sponsored by the United States Golf Association and Bentgrass Research, Inc., a group made up of southern golf course superintendents.

"You really need three to five years of data based on a wide range of different conditions to draw any conclusions," adds Lehman. "Our work has been targeted at heat and drought resistance. There are many other conditions that need to be studied."

Texas A & M is one of 18 universities cooperating in the National Turfgrass Evalu-

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**Bentgrass plots at Pennsylvania State University in University Park, PA. Photo Copyright © Larry Kassell.**

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ation Program (NTEP) bentgrass trial managed by Kevin Morris at the USDA Research Center in Beltsville, MD. The first test plots were seeded last year at test locations across the U.S. and Canada. NTEP has carried out similar research in the past for Kentucky bluegrasses, perennial ryegrasses, and fescues. The first bentgrass data will be available in April 1991.

The trials have been divided into three categories: native soil greens, modified soil greens, and fairways and tees. Cooperators in each location will be evaluating general turf quality, color, density, disease resistance, putting speed, and drought tolerance at various times of the year.

"We've never before had a coordinated effort to compare bentgrasses," states Morris. "Participation by universities and seed companies is strictly voluntary. Each company pays an entry fee to make the program totally self-supporting." Both creeping and colonial bentgrasses are included in the three studies.

However, superintendents don't necessarily have to wait for the next three years. "I highly recommend that superintendents experiment with various bentgrasses in their nurseries," Lehman says. "In this way, they will discover which variety best fits their specific environment and maintenance program."

Superintendents may also want to try different varieties or blends for greens, tees, and fairways. "Blending different varieties to add more elasticity to turf stands is common with perennial ryegrasses, tall fescues, and Kentucky bluegrasses," reveals Dr. Leah Brillman, turf breeder for Seed Research. "Why shouldn't it work as well for bentgrasses?" Her company has done just that with Dominant, a blend of Providence and SR 1020. Tee-2-Green introduced a blend called Pennway in 1983 containing Penncross and Penneagle. This year it introduced a new blend of certified Penncross, Penneagle and PennLinks called PennTrio. Jacklin suggests Putter can be blended with other varieties.

Regardless of the variety, superintendents should be extremely careful to buy certified seed. Seed growers go through an extensive process monitored by agricultural officials to provide seed which is pure, has a specified percentage of germination, and will perform to the full capabilities of the variety. It is possible to identify a specific variety once it has been planted by a laboratory procedure called electrophoresis. Always buy seed from a reliable supplier in bags with certification tags attached. Keep the tags until you are satisfied that the bentgrass you purchased is the variety stated.

No bentgrass will perform to its potential without careful attention to soils, drainage, and maintenance. There is a considerable

difference in managing bentgrasses on soilless greens as opposed to soil greens, remarks Duich. "We have more to learn about how to manage soilless greens," he adds. "The basic problem is eyeballing sand during construction. Green specifications are based on exact principles of soil physics. If you don't match the specifications to the letter you will run into trouble." To preserve the characteristics of sand greens, superintendents must be equally concerned about topdressing materials.

"A major fallacy concerning bentgrasses is that they require high levels of nitrogen and water," Duich remarks. "For years, textbooks, articles, and advertisements have stated bent greens need 1 to 1½ pounds of nitrogen per month of growing season, tees higher yet, and fairways approximately half these rates. At 1/4 to 1/3 these rates, bentgrasses can be among the most hardy of manicured grasses. Those superintendents adhering to modest fertility programs and thatch prevention have discovered that water needs can be reduced by up to 75 percent!"

The single limitation of low fertility programs, Duich points out, is the prevalence of dollar spot diseases. The introduction of systemic fungicides, maintenance practices to control thatch, and judicious irrigation has increased the reliability of disease control. In fact, bentgrass maintenance has reached a point where some superintendents prefer it to Kentucky bluegrass on fairways. Lightweight reel mowers, clipping removal, and improved drainage are helping bentgrass crowd out annual bluegrass to provide a shorter, dense fairway surface.

There is some disagreement, however, on the use of bentgrasses in place of perennial ryegrasses for overseeding dormant bermudagrass greens. The disagreement centers around spring transition. While ryegrasses germinate faster and are less expensive, the fine-leaved bentgrasses can provide a faster putting surface during the important winter season. The aggressiveness and competitiveness of bents helps in winter Poa control, but also allows them to hang on longer into spring when the bermudas come out of dormancy.

In the transition zone, where winterkill of bermuda can be a problem, bentgrasses are an option. Furthermore, architects are specifying bentgrasses for greens as far south as Florida and Texas for their playability. Both these factors raise the question, when and where is summer management of bentgrasses worth the extra effort?

These are a few of the questions currently being evaluated by superintendents working in conjunction with university researchers and seed companies. Before the end of this decade, we will all have a clearer picture of the role and scope of bentgrasses in golf course maintenance. In the meantime, superintendents need to begin testing the growing number of bentgrass varieties in their nurseries to determine which one best fits their environment and maintenance program. ●

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