

Something Better in Grasses

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“THE BREEDING and selection of truly outstanding grass varieties is one of the greatest needs of the turfgrass industry.” This is how Dr. C. Reed Funk, well-known turfgrass breeder at Rutgers University, describes the search for something better in grasses.

Many of the important steps in the history of golf course maintenance have coincided with the introduction of improved turfgrass cultivars. The game of golf itself has been responsible, to a great degree, for the search for better grasses. The establishment of the USGA Green Section, in 1920, spurred the development of improved grass types. In conjunction with the United States Department of Agriculture, the Green Section established plots of the so-called better grasses at the Arlington Turf Gardens in 1921. Since that time, many improved cultivars have been developed, and today, the standards of playability on golf courses throughout the world have improved significantly.

If you need further convincing, consider this statement by Piper and Oakley in their book *Turf for Golf Courses*, published in 1917:

“Kentucky bluegrass is an ideal grass in the North for fairways, and not rarely putting greens are made up largely or almost wholly of this grass, especially where lime is used as a fertilizer.”

Following is a brief discussion of each of the five major turfgrasses used on golf courses today — bentgrass, Kentucky bluegrass, perennial ryegrass, bermudagrass, and zoysia. A historical perspective on each grass is included and is followed by the need for future development within each group.

Bentgrass

Historically, because of its prominent use on putting greens from the time golf was introduced into this country, bentgrass for many years received the most attention in turfgrass selection and

improvement. In the years prior to World War I, seed from southern Germany was used in the establishment of putting greens. It was called South German mixed bent and contained a small percentage of creeping bent, a certain percentage of velvet bent, with the remainder a mixture of colonial or non-creeping types. After several years, the turf which developed from seed would begin to appear mottled or patchy because of the vegetative spread of certain strains within the green. The surface of the green was not always uniform, since certain types performed well while others performed poorly.

The first step in improvement came with the selection of turf from the most vigorous and best-looking patches on the older South German bent greens. This began about 1910. Bentgrass vegetative propagation began at the old USGA-USDA Arlington, Virginia, Test Gardens, in 1921. In 1924, Dr. John Montieth published an article naming seven strains of vegetative bentgrass, including Metropolitan, Washington, Columbia, and Virginia. In 1931, a summary of performance trials indicated that Metropolitan, Washington, and Seaside were the finest bentgrasses available at that time.

Forty experimental greens were established by the Green Section in different parts of the country during 1939 and 1940. Each green had 12 different bentgrasses established in wedge-shaped areas, thereby leading to their name, “pie greens.” Each grass was given a letter and number designation to hide its identity, and superintendents and golfers were asked to putt and rate them according to their performance. In a 1944 summary of the rating on the 40 greens, four grasses were consistently near the top: C-1 (later named Arlington), C-19 (later named Congressional), C-7 (later named Cohansey), and C-15 (later named Toronto). The C-1/C-19 combination

became very popular, and it is still propagated on golf courses today, while currently the use of C-15 is being threatened by a serious and difficult-to-control disease.

Arlington (C-1) was considered by many to be the finest of them all. It was selected for its resistance to heat and drought, disease tolerance and its great wear resistance. Its tendency to be grainy was one of the reasons for mixing it with Congressional (C-19), which was characterized by a pleasing color, good texture and the ability to green up early in the spring and remain green until late fall.

In 1946, Dr. Jesse DeFrance, Dr. Fred V. Grau and Professor H. Burton Musser met and discussed the future of the development of bentgrasses for putting greens. It was agreed that an effort should be made to produce seed of creeping bents which would provide a turf superior to that available from Seaside creeping bent and the seeded colonial types. As a result, 18 of the best-performing strains from the USGA-USDA experimental plots now at Beltsville, Maryland, were sent to Professor Musser at Penn State.

In 1954, Penncross creeping bentgrass was released. The release of an improved seeded creeping bent was an important step forward. Seeded cultivars are vegetatively propagated grasses. Compared to Seaside bent, Penncross was more aggressive, more dense, had much better resistance to several diseases and was less prone to segregation into mottled patches.

In 1958 a search was again begun at Penn State for another high-quality seeded bentgrass. The main objectives now were development of a broad genetic base without gross segregation, excellent putting quality, vigor to compete favorably with *Poa annua* but curtailed compared to Penncross, favorable disease resistance, and good commercial seed yields. After 20 years

of work and evaluation, Penneagle creeping bentgrass was released by Dr. Joseph Duich, of Penn State, in 1978. In addition to meeting most of the stated objectives, tests have shown that Penneagle also provides earlier spring greenup and superior low-nitrogen performance.

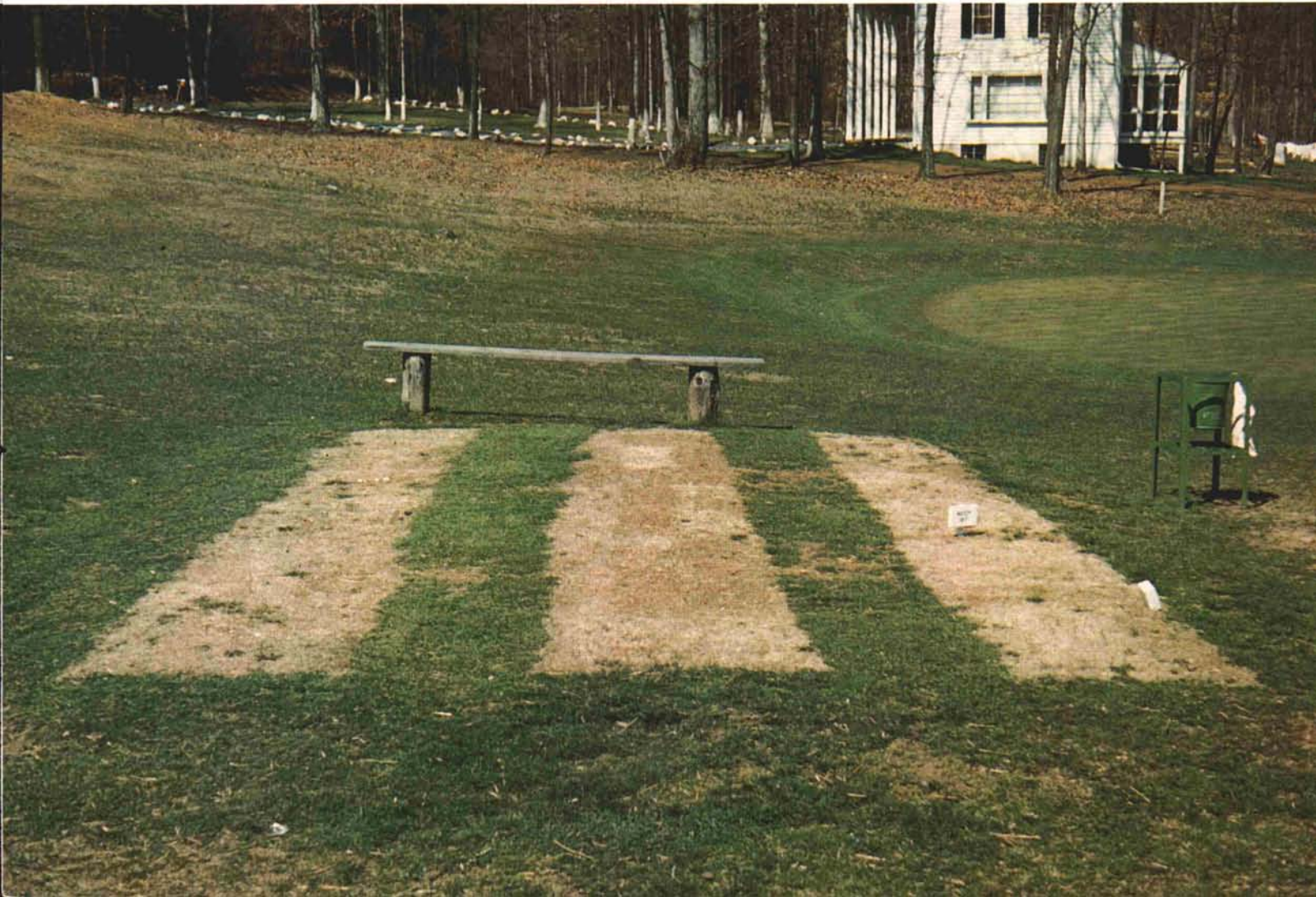
Looking to the future, one of the important needs is the development of a superior bentgrass for fairway use. Existing colonial types offer poor competition for *Poa annua*, and the creeping types tend to thatch quickly at the higher cutting height. They are also prone to scalping and drought injury. At Penn State, Dr. Duich has been selecting rhizomatous colonial bentgrasses with an eye toward fairway use. Someday such a grass might compete well with *Poa annua* while at the same

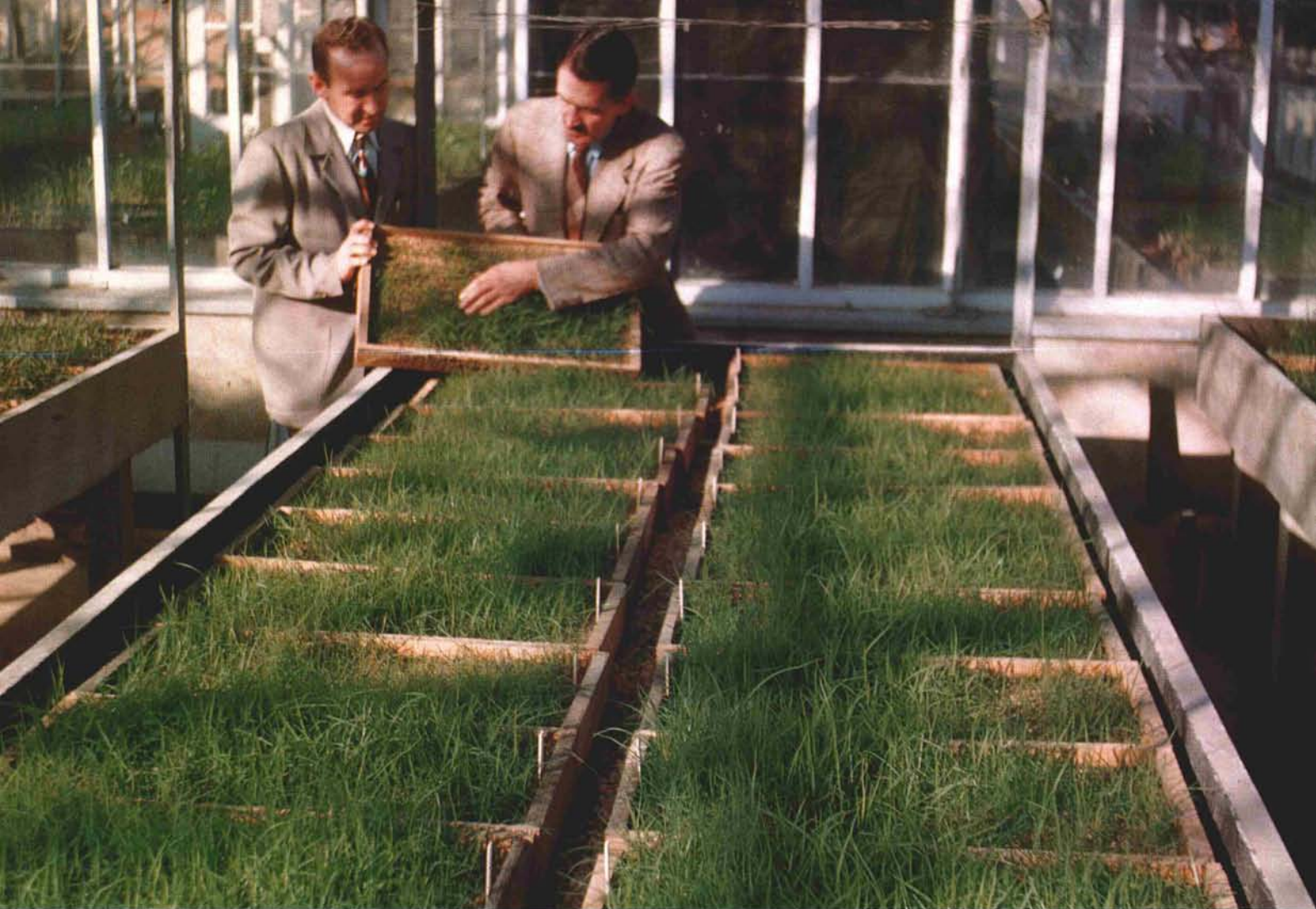
time be deeply rooted, more drought tolerant and more persistent than today's types. Still another goal will be to increase the heat tolerance and summer performance of the bentgrasses so they may be more fully utilized in the South.

Kentucky bluegrass

Kentucky bluegrasses were limited for many years by their susceptibility to disease and their poor summer performance under high-maintenance cultural regimes. The introduction of Merion Kentucky bluegrass, in 1947, was perhaps the single greatest step forward in the improvement of the bluegrasses. It provided a dense, vigorous turf which would thrive under intensive management and which was resistant to the melting-out stage of leaf spot disease.

Early bermudagrass test strips taken by Dr. John Monteith, Jr., in 1939. Left to right: U-1, U-2, U-3 bermuda.





(Above) Zoysia seedling work underway in the early 1950s.

(Right) A patchy creeping bentgrass green. Purple color is old Washington type.



Merion was the "Cadillac" of bluegrasses for many years, until a number of other improved cultivars were developed in the late 1960s and 1970s. The availability of a large number of superior Kentucky bluegrasses today is a desirable situation. Since each one is genetically different and has its own unique strong points, they can be blended to give wider adaptation and more dependable performance. And, there is some safety in just having a number of good cultivars together in one mix.

In spite of the gains made in Kentucky bluegrass improvement, it needs many more for the future. Superior cultivars are needed that will tolerate close mowing and provide better competition for *Poa annua* on tees and fairways. Bluegrasses that exhibit good resistance to diseases and insects, tolerate heat, drought and shade, and that are adapted to saline soils are now in demand. Cultivars that provide good quality turf under low-maintenance conditions must also be investigated.

Perennial ryegrass

The extensive use of perennial ryegrass on golf courses has become a recent phenomenon. As long ago as 1917, Piper and Oakley stated, "For golf purposes, perennial ryegrass has no higher value than Italian (annual) ryegrass. On fairways it is not objectionable, but there are few conditions under which other grasses are not more desirable."

More than 30 years later, Professor Musser (*Turf Management*, 1950) could do no better in his statement, "Its value in mixtures for permanent turf in the North is questionable."

It really wasn't until 1967, with the release of the cultivar Manhattan by Dr. C. Reed Funk, of Rutgers, that the potential of the perennial ryegrasses began to be realized. Since then, dozens of improved cultivars have been introduced, opening the door to greatly increased utilization on golf course fairways and for overseeding dormant bermudagrass turf in the South.

The improved turf-type perennial ryegrasses available today exhibit improved color, shade tolerance, winter hardiness, heat tolerance, disease resistance, mowing characteristics and better turf density and texture compared to common perennial ryegrass. However, turfgrass breeders can look ahead with many objectives in mind, including the

need for even greater disease resistance, winter hardiness and tolerance to close mowing. In addition, cultivars with a more diminutive growth habit must be sought so that perennial ryegrass can be used more effectively in mixtures with Kentucky bluegrass and other turf species.

Bermudagrass

Bermudagrass is believed to have been brought to this country in 1751, but it wasn't until 1918 that selections of the species were made for turf characteristics. This work was initiated by Dr. D. V. Piper, of the USDA. Though bermudagrass was used extensively on golf courses in the South at that time, Piper and Oakley (1917) stated that "Bermuda putting greens have in general not been altogether satisfactory . . . (but) hope lies in finding a variety of bermuda that is fine in texture."

The first major improved selection of bermudagrass was released in 1947 by the USGA Green Section and was called U-3. It came from Savannah, Georgia, and is known there as Halls bermuda. Its excellent low-temperature hardiness makes it popular even today in the upper South.

In 1952 the first of the famous "Tif" series of bermudagrasses was released by Dr. Glenn Burton, of the Georgia AES. Named Tiflawn, this cultivar offered vigorous growth and excellent wear tolerance, making it popular for sports fields, recreational areas and lawns.

A number of improved bermudagrass cultivars have since been released from experiment stations in Georgia, Florida, Texas, California, and elsewhere. Of special significance to golf courses is the introduction of Tifgreen, in 1956, a cultivar with fine texture, high shoot density and low growth habit. These characteristics made Tifgreen the first high-quality bermudagrass for putting greens, fulfilling the hope of Piper and Oakley. The release of this and other cultivars, including Tifdwarf, in 1965, have filled a significant gap in the development of quality playing conditions on putting greens in the South.

In looking ahead, bermudagrass breeding efforts will be focusing on such important characteristics as cold hardiness, pest resistance, earlier spring greenup, reduced thatching tendency, tolerance to salt and pesticides, and ability to withstand the application of

brackish water or sewage effluent for irrigation purposes.

Zoysiagrass

It has been said that the story of zoysiagrass improvement is the story of Meyer zoysia. Released jointly by the USGA Green Section and the USDA, in 1951, as a finer textured strain of *Zoysia japonica*, Meyer zoysia remains today one of the best available cultivars in its range of adaptation. It was selected at the Arlington Test Gardens in 1941 and was further evaluated at Arlington and later at the Beltsville Turf Gardens until its release. Meyer zoysia was named after Frank N. Meyer, a plant explorer who collected zoysia seed in Korea and brought it to the United States in 1906. Useful on home lawns, athletic fields, playgrounds, parks and cemeteries, Meyer zoysia is also the primary cultivar being used on golf course tees and fairways in the transition zone.

One of the real problems with the use of zoysiagrass on golf courses has been its very slow rate of establishment. Future breeding and selection efforts will be geared toward improving the seed production, establishment, and recuperative rate, developing better cold hardiness, pest resistance, spring greenup and fall color retention, and improving the texture and consistency of this grass.

The outlook for improving bermudagrass, zoysia and other warm-season grasses through breeding and selection looks very promising. Several prominent turfgrass researchers are planning trips to Asia and Africa to search for bermuda and zoysia strains which show promise in fulfilling some of the needs of these grasses.

In Conclusion

Many advancements have been made in the past 60 years in the development of improved turfgrass cultivars for use on golf courses and elsewhere. Although today's cultivars have many weaknesses, the potential for further improvement is greater than ever before, due to an expanding knowledge of genetics and the development of new breeding techniques. Since the cost of maintaining golf courses continues to increase, the search for something better in grasses is indeed one of the greatest needs in the turfgrass industry today.