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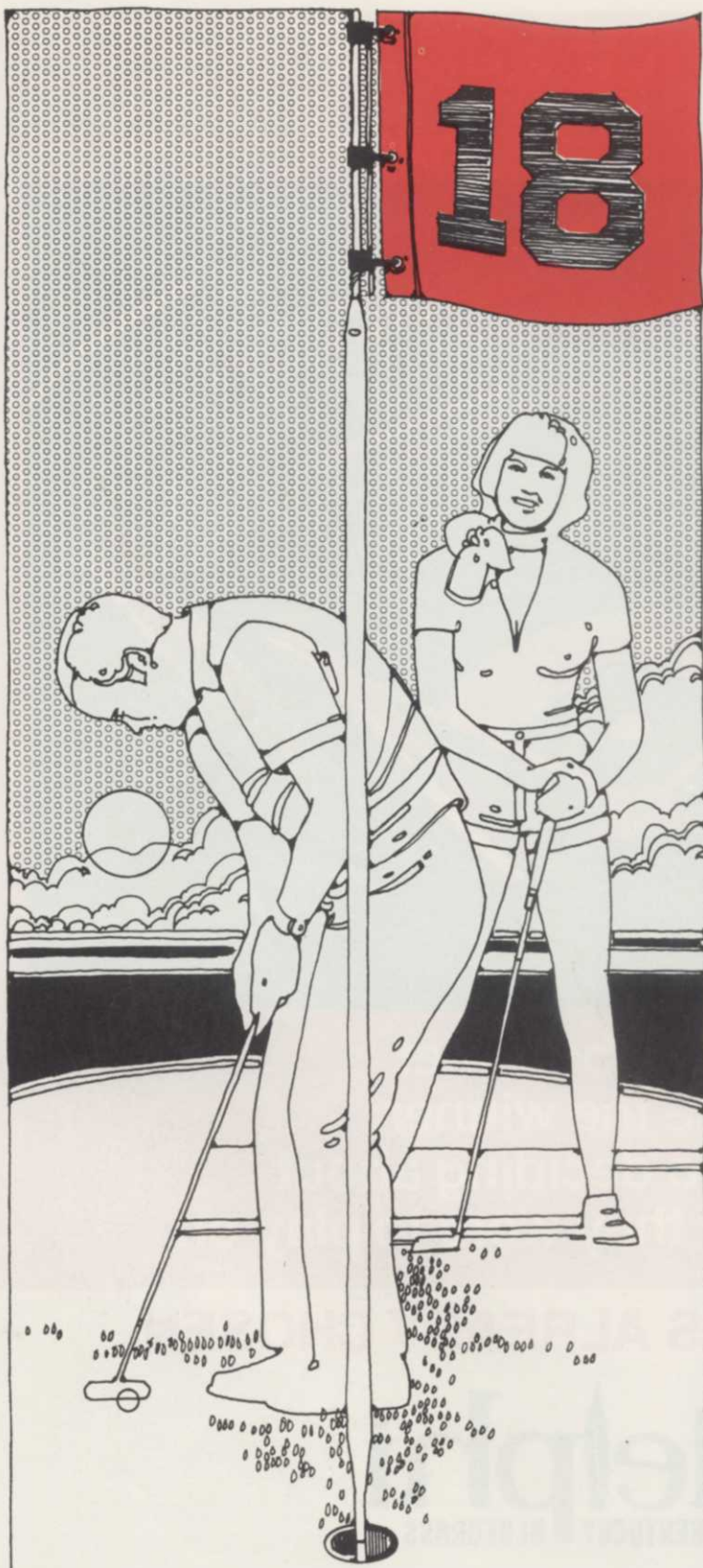
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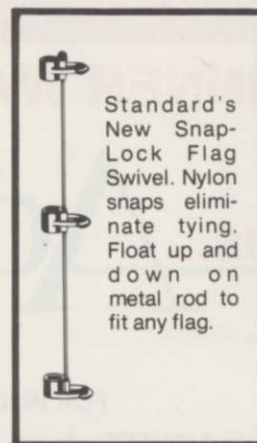
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with warm winters or with coastal influenced temperatures.

**BAYSHORE**, Gene Tift, Fla. 1945

A light green color, tends to be stemmy, rapid vertical growth rate, poor color retention in low temperature. Extensive seedheads, susceptible to pythium, some resistance to leafspot. Used on golf greens in coastal and island areas.

**EVERGLADES**, Fla. 1962

A medium dark green color, fine texture, vigorous extensive seedheads, low growth habit. Some resistance to leafspot. Used on golf greens.

**ORMAND**, Fla. 1962

A dark blue-green color, taken from a large clone in a fairway during 1946 by Roy Bair. Aggressive, prostate, medium density, minimal seedheads, susceptible to dollar spot. Used on fairways, lawns and sports fields.

**PEE DEE**, S. Carolina 1967

Mutant of Tifgreen, dark green, dense, fine-stemmed, turns purple, poor color retention at low temperatures, minimal seedheads. Used some on golf greens.

**ROYAL CAPE**, Calif. & ARS 1960

Dark green color, medium shoot density, early spring green-up, few seedheads, resistant to leafspot. Used for lawns in hot arid climates.

**SANTA ANA**, Calif. 1966

Seedling selected from Royal Cape in 1956. Deep blue-green color, high density, vigorous with good recuperative ability, free of grain,

good spring and fall color, resistant to smog, salinity and wear. Used in coastal and warmer winter areas only. Used for lawns, tees, fairways, sports. Can be used in place of Royal Cape, Pee Dee, Everglades and Bayshore.

**UGANDA**, Grau USGA 1940's

Natural selection, *C. Tranvadinses*, light green, soft leaf, tends to be puffy, turns reddish-purple in cool weather. Requires high nitrogen; heavy thatch and repeated seedhead emergence. Largely has been replaced by other varieties.

**Medium Tolerance to Low Temperatures** — This describes a large group of medium textured cultivars. These seem adaptable for the deep south, as far north as Kentucky, Tennessee, Arkansas, and Oklahoma, provided the elevations are less than 1500 feet.

Good management includes the reduction of the nitrogen supply in the fall so the starches in the rootstocks can accumulate and provide for strong initiation of buds for spring growth. Annual soil loosening and vertical cultivation, which favors deeper rootstalks, can also assist in increased survival.

**NO MOW**, Fla. 1937

Dark blue-green, short wider leaf, short internodes, slow vertical growth, extensive seedheads, susceptible to leafspot and insects. Vegetative, slow to establish. Used in lawns and requires less mowing, useful in shade.

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TEXTURE IF, Texas 1957

Light green color, medium texture, dense turf, prone to heavy thatch, good spring green-up, intermediate wear tolerance, minimal seedheads. Used for lawns and sportsfields.

TEXTURE 10, Texas 1957

Dark Green color, medium texture, low growth habit, moderate spread, minimal seedheads. Used on recreation areas.

TIFDWARF, Georgia & ARS 1965

Third in series of putting green types released at Tifton, Ga., by Glen Burton and associates. Dark green color, fine texture, excellent low temperature hardiness, tolerates close mowing, requires good management. Susceptible to smog and pesticide injury. Widely used in putting greens.

TIFFINE, Georgia & ARS, 1953

The first of three releases. Excessive seedhead formation, prone to thatching, widely used, then largely replaced as putting greens in southern U.S.

TIFGREEN, Ga. & ARS, 1956

Second of three releases, dark green, very fine texture, soft wide leaf blade, good recuperative potential. Few seedheads. Widely used then mostly replaced by Tifdwarf selection for golf but Tifgreen is preferred for bowling greens.

TIFLAWN, Ga. & ARS

First of crosses by Burton to be released. Spreads fast, medium texture, drought and wear tolerant. Requires less fertility than some. Susceptible to mite damage. Widely used as lawns and recreational turf.

TIFWAY, Ga. & ARS, 1960

Improved over Tiflawn, darker color, less seedheads, good spring green-up, prone to thatching, more disease and insect tolerant than most. Widely used on lawns, fairways, tees.

SUNTURF, Ala. Okla. 1956

Dark green, fine texture, vigorous growth, spreads rapidly, turns purple in fall, drought and salt tolerant, few seedheads. Used on lawns and sportsfields and a few greens.

**Increased Tolerance to Low Temperatures.** — This has been the subject of research in Kansas, Missouri, Oklahoma, USDA at Beltsville, and elsewhere. The widespread happenstance establishment of bermuda has been the source of most collections. Ray Keen at Kansas State University has conducted extensive research in this area, and has released to cultivars — Midiron for athletic fields, and Midway for golf fairways.

The practical upper limit for growing bermudagrass is near the capitals of Kansas, Indiana, and Ohio, and eastward as far as New York City.

MIDIRON, Kansas 1966

Medium coarse, bright green color, vigorous and fast spreading, few seedheads and good sod density. Wear resistant, exceeds Tufcote in cold tolerance. Resistant to spring dead spot (observed in ten years of tests). Resistant to rust and leafspot. This open turf favors cool season overseeding. Used in fairways, tees and sportsfields.

MIDWAY, Kansas 1965

Superior low temperature hardiness, minimum thatching, intermediate texture and density, minimal seedheads, leafspot tolerant, susceptible to billbug, used in fairways and lawns.

TUFCOTE, SCS & ARS 1962

Medium green color, stiff leaf blades, low growing, susceptible to mites, few seedheads. Used for recreational and sportsturf.

U-3, USGA Gr. Sect. & ARS, 1947

Extensive testing was done by L. D. Hall and F. V. Grau. Dark grayish green, good wear tolerance, medium density. Susceptible to spring dead spot. Earlier widely used in fairways and tees.

WESTWOOD, St. Louis

Research started in 1949. Bluegreen, vigorous, medium coarse, low temperature survival. Used for fairways and athletic areas.

Following the severe winter of 1976-77 in Virginia the Midiron cultivar exhibited the greatest cold tolerance by producing a 75% 'green-up' coverage; Tifway produced less than 50% and Arizona common showed less than 10% coverage. Tufcote was slow to green-up and exhibited extensive spring deadspot. In some other tests, however, Midiron and Tufcote greened at about the same rate as Tifgreen. In the spring of 1976, Westwood showed more spring color (46%) than Midiron (35%).

Results of Bermudagrass Spring Green-Up in Missouri.  
(Five year average).

Cultivar	%*
Midway	56
Midiron	48
Westwood	39
U-3	30
Tufcote	29

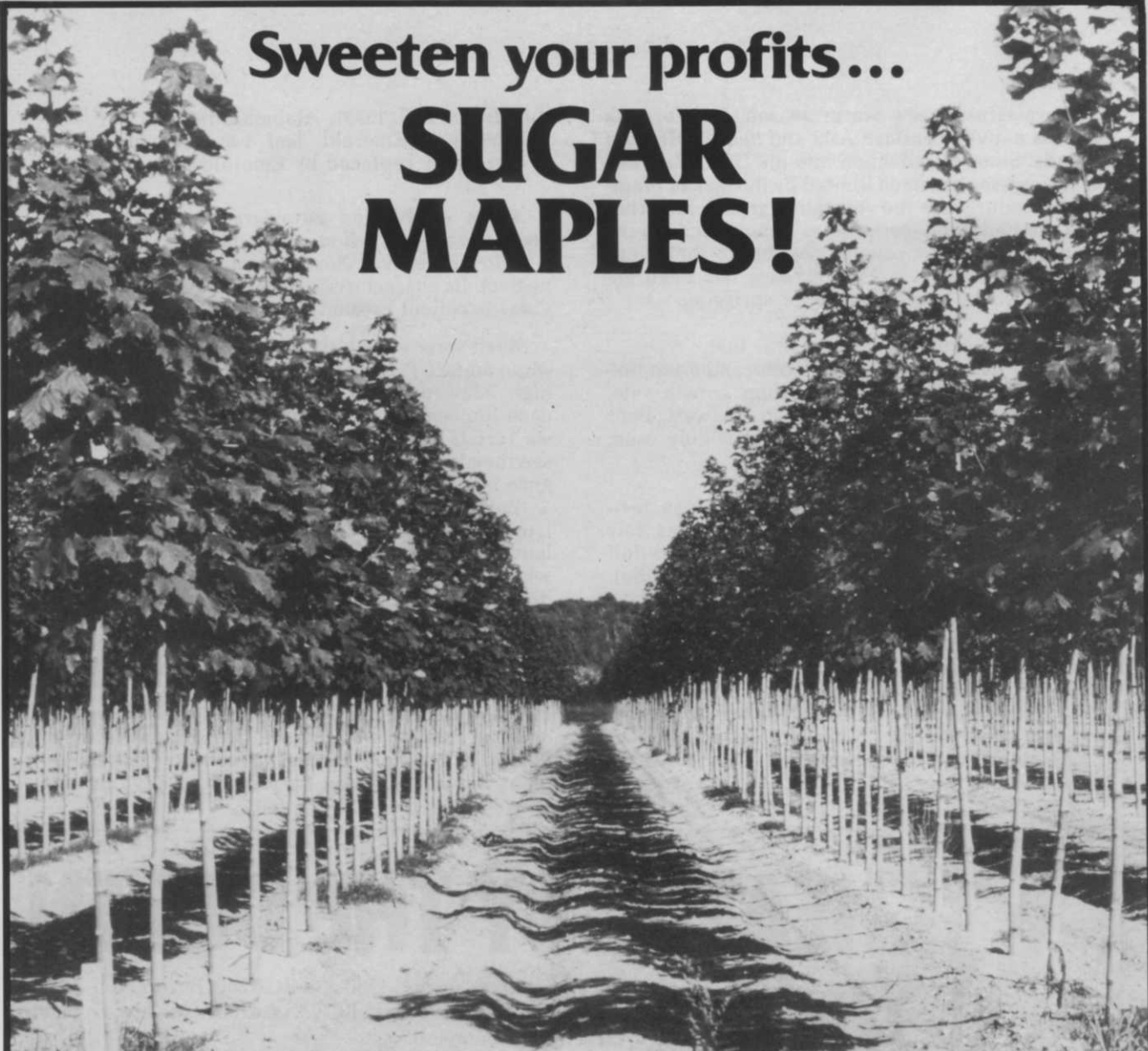
\*The best individual plot in the test was 75%, the poorest only 6%.

Bermudagrass responds readily to applied nitrogen. Approximately 6-1-3 of N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O per square foot is recommended as an adequate annual maintenance level on areas that are irrigated and have clippings removed. The increased winter survival of bermuda in areas where potassium was added indicates that uptake of K before winter is beneficial.

It appears that a combination of the comparatively open Midiron bermudagrass and one or more of the new perennial ryegrasses would be a desirable turfgrass mixture for the transition zone. In the areas where bluegrasses have a reasonable chance for survival the combination of bermuda and bluegrass planting could be managed by cultivation, fertilization and overseeding to provide satisfactory performance as a dual combination turf. The Wabash cultivar should be adapted for this. The same applies to the more open Midwest zoysiagrass. Numerous overseeding mixes are used for winter color on fairways, greens, and lawns. A mix of Derby ryegrass and Highlight red fescue is one suggestion. Check with turf specialists in your state for current recommendation.

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## Zoysia

Zoysiagrasses are warm season, sod forming grasses native to eastern Asia and nearby offshore islands. Since introduction into the USA, their use as turfgrasses has been limited by the lack of planting procedures for the vegetative growth material. The limited seed germinates slowly and young seedlings are poor competitors due to their very slow growth. Most zoysia increase has been accomplished by hand plugging or sprigging.

### MEYER-Z-japonica, USGA & ARS, 1951

Meyer has a medium green color, medium texture (leaf 2-3mm wide) medium growth rate, dense sod, tolerates winters in midwest. Poor shade tolerance, thatch build-up, widely used, highly advertised.

### MIDWEST, Z-japonica, Indiana, 1963

Coarse textured leaves, 3-5mm wide, open, faster spreading than Meyer, long internodes, low shoot density, less thatch buildup, good fall color retention (weeks longer than bermuda), not widely used.

### EMERALD, Ga. & USGA, Green Sect., 1955

*Z. matrella-tenuifolia* cross, medium green color, fine leaf (1 mm), tends to be puffy, low growth, more tolerant to shade than Meyer, susceptible to dollar spot, slower than Meyer in spread, vegetative, tends to thatch, needs vertical grooming and close mowing, distributed in southeast.

### Z-matrella, F.C. 13531, Alabama, 1930's

Similar to Emerald, leaf 1.5 mm wide, slow spreading, replaced by Emerald generally.

Once established zoysiagrass makes a very wear tolerant turf. If severely damaged, however, it is slow to recover. Zoysia has a high tolerance for neglect. Its characteristic rugged ground cover provides excellent erosion control.

Seed spikes of zoysia appear in late spring and when mature (Meyer variety) are four to six inches high. Mature zoysia seeds are smooth, slick and each fits very closely to the main stem. When zoysia turf is uncut the leaves grow up around the seedheads so they have little effect on the appearance of the unmowed turf.

Zoysia loses its color following the first heavy frost of the season; later than bermuda does. The leaves contain a series of fiber (vascular) bundles which are joined by thinwalled sections. During drouth the leaf structure allows the leaf to roll as the moisture becomes limited and reduces further water loss. During freezing the leaves shred readily so the leaves turn brown and remain so until late spring.

Meyer zoysia plugged into a bluegrass lawn on one foot centers will require two seasons to predominate. Spring is the most advantageous time to plant zoysia, but it can be plugged in any time of

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the year and still survive. Machines to plant plugs into existing turf have been developed by individuals, but are not available in quantity.

Because zoysia has a tolerance to atrazine as well as pronamide, annuals and cool season grasses can be controlled. Dollarspot, rust and leaf-spot diseases have been reported on occasion, but are not common in zoysiagrass.

In isolated cases, damage to older thatched zoysia has been caused by larvae of the billbug cutting the roots. This problem has not continued year after year.

Several entire golf course fairways are of zoysiagrass. Alvamar Country Club at Lawrence, Kansas, was planted to zoysiagrass when constructed. Old Warson Country Club, Meadowbrook Country Club, and Bellrive of St. Louis have gradually converted to zoysiagrass. Danville Country Club of Illinois and Evansville Country Club of Indiana have had zoysia tees since the early 1970's.

Topdressing and verticutting aids in keeping zoysia tees tight and firm. The stiffness of the leaf blades provides excellent ball support. Mowing at one-half inch, or 12 mm, is recommended along with regular coring for topdressing and thatch dilution.

Many landowners planted a few plugs of zoysiagrass after they saw it advertised. Approximately three years later, they discovered they had large areas where zoysia was predominating.

Zoysia becomes green comparatively early because its growing points are already established while bermudagrass must produce new growth from dormant buds. Zoysiagrass may provide two additional weeks of green color in spring and fall than does bermuda grass.

Zoysia does best with close and frequent cutting and little rather than excess nitrogen. In areas where earthworms are present, their mounds of casts are stabilized by zoysia's strength and an uneven surface results. Where there are no earthworms vertical dethatching is recommended.

Zoysia's protected terminal growing points, durability, tolerance to chemicals and relative freedom from diseases are major factors in its acceptance. Its high temperature tolerance is greater than that of bermuda. In the transition zones, zoysiagrass is best adapted to open sunny areas, south and west slopes where summer use is most important, near south and west sides of buildings, on fairways and sunny tees, around sand traps and athletic fields.

#### **St. Augustine**

St. Augustine (*Stenotaphum secundatum*) came from the West Indies. It has become widely distributed in Mexico, Africa, Australia, and southern United States (zones 8, 9 and 10). It is well adapted to moist climates and coastal sands. Also it is the most shade tolerant of the subtropical

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# FMC

grasses. It is stoloniferous and so spreads readily. St. Augustine is planted vegetatively, as little seed is produced.

St. Augustine is extremely coarse textured with leaves 5-10 mm wide. It goes dormant in cold weather. Chinch bugs can become a problem when large populations are allowed to develop. Wintertime overseeding is seldom attempted due to its heavy thatch and coarseness. Where excess thatch and old sod are problems, removal and resodding or sprigging is the most satisfactory procedure. Most sod is cut from pastures or quickly developed on sod farms.

A St. Augustine Decline Virus (SADV) disease has become severe in some localities. St. Augustine grass frequently shows iron chlorosis and responds to applications of iron sulfate. Where adapted, it is used in lawns but seldom used on playing fields or athletic areas. In Florida, 46% of the lawns are St. Augustine grass.

"Bitter Blue," a common type, is the most frequently sold. "Floratine" is a natural selection released in 1959 by Florida AES. Floratine, a new release, is fine leaved, and is blue-green color. It has short internodes, low growth habit improved low temperature color retention, resistant to SADU disease and to chinch bug damage.

#### Bahiagrass — *Paspalum notatum*

Bahiagrass is limited to warm coastal areas. It is

not as coarse as St. Augustine, but produces many coarse seedheads, so mowing includes seedhead removal. Under low level management, such as roadsides, it forms an erect open turf. It spreads by short, thick, flat stolons and shallow rhizomes.

Since bahiagrass is a prolific seed producer it is propagated by seed. Germination is slow and the process may continue over several months. Seed scarification by acid or machine can improve or speed germination. Seedlings develop slowly.

Along roadsides, on airport grounds, or in minimum maintenance areas, hydroseeding and mulching are preferred methods of planting.

The variety *Pensacola*, Florida, 1944, has narrow upright leaves and forms a dense sod. *Wilmington* has fine texture and the least seedheads of the varieties. *Argentine* and *Paraguay* are coarse and produce abundant quantities of seedheads.

#### Centipede

Centipede (*Eremachloa ophiuroides*) was introduced into the USA from south China in 1916 and has continued to do well in areas from Oklahoma to North Carolina.

The dense mat of this hardy, slow, lowgrowing grass tolerates neglect. The leaves a parallel on sides of stems and lie flat over the soil.

Centipede is sensitive to iron deficiency and gives positive response to iron sulfate sprays. Centipede is used in lawns, motel grounds, and

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