



Figure 1. Bluegrass (left); zoysia (right).

The St. Louis Solution — Zoysiagrass for Fairways!

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NO ONE HAS ever said growing grass for golf is easy — every golf course superintendent has problems.

It is equally true that in some areas of the country it is more difficult to grow consistently good, reliable golfing turf than in others. The area in and around St. Louis, Missouri, situated right in the heart of the turfgrass transition zone,*

is at the top of this list. Here, the golf course superintendent, the club official, and the everyday golfer have faced a dilemma: "What type of fairway grass will grow and succeed on my golf course?"

If cool-season grasses are chosen (mainly the improved bluegrasses and/or perennial ryegrasses), they must be cut at 1 to 1¼ inches to survive the summer heat and humidity. Fungicide

and herbicide programs should be followed to protect against disease and weed invasion. But these grasses will provide good density and growth as well as good spring and fall color. At the same time, however, many golfers dislike the high summer cut and the natural tendency for them to thin out during the summer. The ball does not sit up as well.

On the other hand, the warm-season grasses such as bermudagrass and zoysia can be cut quite low and can provide excellent summer golf turf conditions when play is usually at its peak. These grasses turn off-color in the fall, however, remain off-color through the winter, and only become green during mid-spring. While it is true that dormant zoysia and bermudagrass provide a good playing surface, there is still a

*The transition zone is that part of the country where northern (cool-season) grasses are at the limit of their southern adaptation and the southern (warm-season) grasses are at the limit of their northern adaptation. St. Louis is a perfect example of such an in-between area. Weather patterns have

wide and unpredictable swings. Some years the cool-season grasses thrive on fairways and the next, warm-season grasses are the only survivors. There never seems to be any compromise, and the course superintendent is caught between the forces of nature and the golfers of the transition zone.



Figure 2. Bermudagrass winterkill in row planting of zoysia. Algonquin Country Club, Missouri.

stigma attached to the off-color winter turf, especially when the golf course down the road (having cool-season grasses) is green, lush, and growing.

Farther south, dormant bermudagrass is routinely overseeded with ryegrass blends for winter color, but this practice has drawbacks in the transition zone. Here, fall renovation injures the existing warm-season turf just when it is going into dormancy and increases the possibility of winterkill. The overseeded ryegrass also can be so persistent the next spring and summer that it competes with the warm-season grasses, particularly if the summer is moderate. In some years, the overseeded ryes never die and, therefore, in the St. Louis area, overseeding causes more problems than it solves.

It boils down to a commitment to either warm-season or cool-season grasses, with their associated advantages and disadvantages. There is little choice in between.

Let me cite a case history. The winter and spring of 1970 were particularly severe, and a catastrophic loss of bermudagrass in general and U-3

bermuda in particular occurred. The cyclic weather pattern was again at work. A few golf courses like Bellerive Country Club, in Creve Coeur, and Old Warson Country Club, in St. Louis County, considered alternatives to the bermudagrasses then available. After some thought, these golf courses replanted and re-established their fairways to Meyer zoysiagrass. Was this to be the answer for fairway turf in the St. Louis area?

ZOYSIAGRASS HAS been around for a long time. First introduced into this country in the late 1890s, it was propagated and some work done on it by the Green Section and the USDA in the 1930s and 1940s. Work on improved turf-type zoysias resumed after World War II. Then, in 1950, Dr. William Daniel, of Purdue University, released the variety "Midwest." This was followed in 1951 by the release of Z-52, or "Meyer zoysia." Both releases were subspecies of *Zoysia japonica*. Today, by far the most used variety is Meyer.

Why zoysia? Although classified as a warm-season grass, zoysia will tolerate

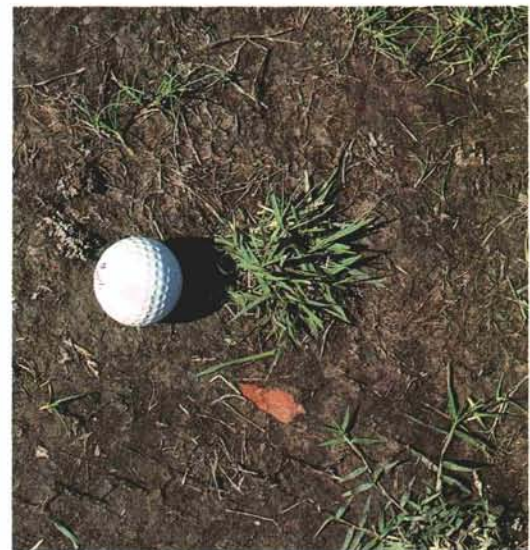


Figure 3. Zoysia plugs.

Figure 4. Strip sodding (before).

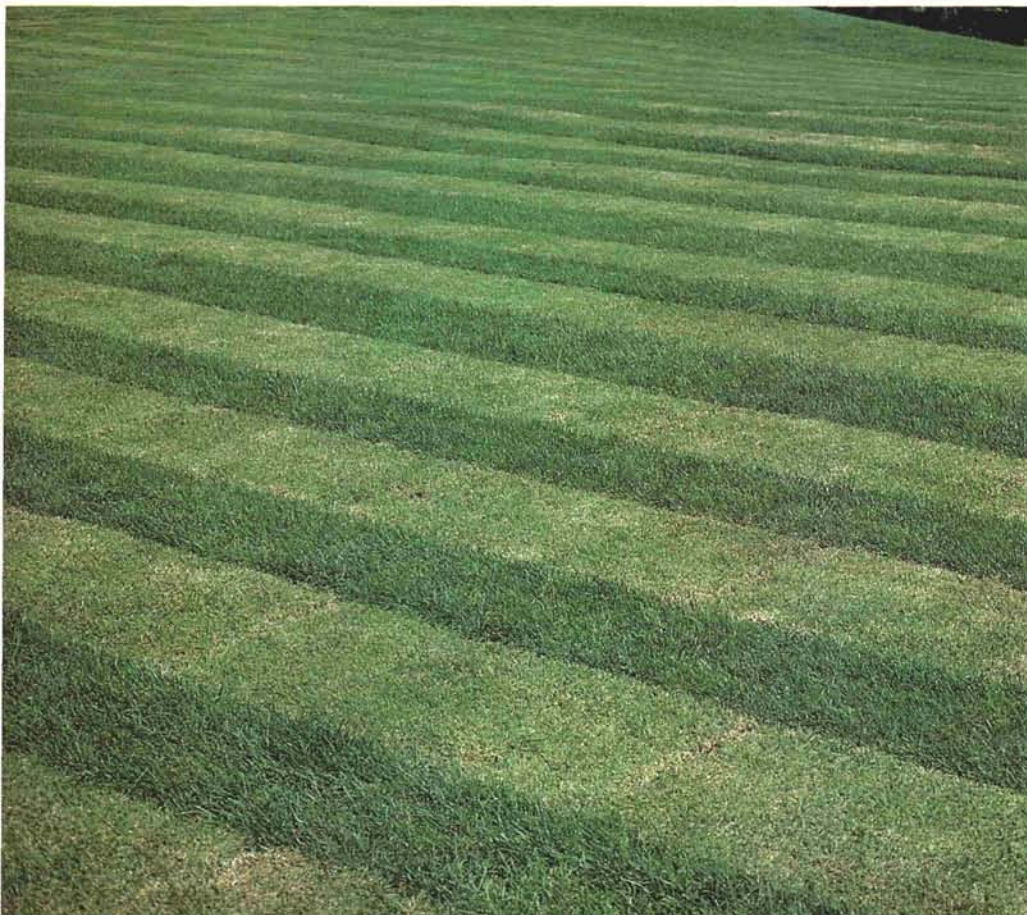


Figure 5. Strip sodding (after).

and even thrive under the extremes of weather experienced in the transition zone. It shows excellent summer performance as well as outstanding winter hardiness in most of Missouri, Kansas, and Illinois. Zoysia is now being grown in Minneapolis! Zoysia not only provides exceptional playing surfaces but, once established, it is also very economical to maintain.

During the 1970s, superintendents in the St. Louis area observed that:

A. Zoysia rarely experienced winter-kill, which is often a problem with bermudagrass in this part of the country.

B. Zoysia seemed to become green relatively early in the spring.

C. Zoysia required far fewer applications of fungicides, insecticides, and herbicides.

D. It required less water and fertilizer, compared to cool-season grasses and bermudagrass.

E. It provided outstanding playing turf during the peak of the summer golf season when cool-season grasses were at their weakest.

F. Zoysia was so dense it literally crowded out and eliminated most goosegrass and crabgrass problems without extensive pre-emergence or post-emergence herbicide programs.

G. When fall frosts came, zoysia went dormant at about the same time as play would normally decline, and, even when dormant and off-color, it still provided excellent playing surfaces with practically no fall care.

With zoysia, there was no overseeding, no fall fertilization, no widespread herbicide treatments or even mowing! It was less turf area for the golf course superintendent to worry about when it went dormant.

But there are never any absolutes or any panaceas in the turfgrass management business. Zoysiagrass has one outstanding negative trait; it is slow to establish, particularly when planted into an existing turf cover. Depending on management techniques and weather, it sometimes takes four to five years for zoysiagrass to spread and provide a good cover.

As one might expect, commercially grown zoysia sod is expensive. Because Meyer zoysia must be propagated vegetatively, row planting or strip sodding costs are high. The old law of supply and demand is at work. The supply of zoysia sod is limited and the demand and cost for zoysia remain high.

To reduce this cost, some courses have established their own sod nurseries.

While it takes time to establish a good zoysia nursery, there is a definite cost saving for the club. There is also a problem in finding ample area with irrigation and reasonably good soil for establishing such a nursery.

Zoysia does not perform well in areas contaminated with patches of bermudagrass. Generally, on a one-to-one basis, bermudagrass is more aggressive and will outcompete and tend to dominate zoysia in a mixed stand. Only when bermuda winterkill is experienced (*Figure 2*) or when a very careful and precise zoysia management program is followed, will zoysia tend to dominate in a mixed stand of bermudagrass. If extensive areas of bermudagrass do exist, perhaps the best planting program is one using the newer varieties of winter-hardy bermudagrass. Nevertheless, if zoysia still is desired, it may be necessary to apply non-selective herbicides, such as Roundup, to thoroughly eradicate bermudagrass before trying to establish the zoysia.

Golf courses with cool-season fairway grasses and little bermudagrass contamination are a natural for zoysia. However, zoysiagrass is clearly not for all golf courses in all situations. Careful consideration must be given before trying to establish zoysia.

IF A COURSE decides to establish zoysia fairways, five basic programs can be followed. The choice depends on how much money is to be spent each year, to what degree the golfers are to be inconvenienced, and how quickly the zoysia fairways are to be established. The basic programs are:

1. Plugging (see *Figure 3*). This technique is used mostly by home owners. On golf courses, it was used when fairways were first being established to zoysia, and it is still being used on a small scale today. Small areas can be effectively plugged by hand and even commercial companies will plug larger acreages on a contract basis. Plugs are usually two to four inches in diameter and are generally planted on approximately 12-inch centers.

2. Strip Sodding (see *Figures 4 and 5*). This procedure is widely used to establish zoysia as quickly as possible. It involves removing four- to 12-inch strips of existing turf and replacing it with a corresponding width of zoysia sod. The sod strips are planted on 12- to 16-inch centers. Obviously, the closer together the rows, the faster the coverage. Because of the amount of zoysia sod

required to do an area, this technique is the most expensive, but it is one of the most sure and effective methods.

Both strip sodding and plugging can be done during the active growing season. There are also reports of success using plantings of dormant zoysia strips and plugs.

3. Row Planting. While this is a relatively new technique, results have been very encouraging. Hyde Park Golf and Country Club, of Cincinnati, and Hurstbourne Country Club, of Louisville, Kentucky, have used this method. Continuous rows on 12-inch centers, four to five inches deep, are cut into the soil using a row planting machine. Then, shredded sprigs are inserted into the groove. The groove is mechanically closed by the same planting machine, and the area is ready for post-plant care.

Row planting, a technique used to establish bermudagrass, is now being adapted for zoysiagrass. As far as can be determined, this procedure, when used on large acreages, promises to become an alternative to the more traditional programs of plugging and strip sodding. This procedure may also be used on a contract basis. *Figure 6* shows rhizome spread following row planting.

4. Hydrostolonizing. Although initially used to establish zoysia on some fairways at Bellerive Country Club and Old Warson Country Club, this technique is now used mostly when planting new golf courses, establishing zoysia nurseries, or on limited areas that can be taken out of play and given time to establish. Zoysia sprigs are shredded, mixed with water (sometimes containing fertilizer), a binder, and a mulch. This combination is sprayed onto bare soil and followed by careful post-plant care, especially irrigation. By the very nature of this program, it is quite disruptive to play, and now it is used only in specific situations.

5. Seed. Through the research efforts of Dr. Herbert Portz, of Southern Illinois University, the first steps are being taken to improve germination in the otherwise difficult-to-germinate zoysiagrass seed. The treated seed is now available, but it is expensive. The zoysia variety now available is fairly coarse and slow to establish in competition with other grasses. However, germination and seeding techniques will continue to be studied and surely improved in future years. For now, seeding of zoysiagrasses seems to have limited use.

6. Sod. A complete sodding with zoysia is obviously another establishment technique, but it is extremely expensive. It is sometimes used on a small scale for important areas or in special cases where a complete sod job and the extra cost can be justified.

IN REALITY, there are really two zoysia management programs. The first is an establishment program and the other is a regular maintenance program. The two are quite different.

When zoysia is first planted, it must be kept moist (not wet) until a rooting system develops and the grass plant can sustain itself. Drying out must be avoided during this critical period. Thus, a very careful irrigation program during the initial phase of zoysia establishment is essential.

Once a good rooting system has been developed, less frequent irrigations should be scheduled. Still, when you are attempting to establish zoysia and speed its spread, drying out of the plant and soil during the active growing months should be avoided. An automatic irrigation system, although not absolutely necessary, does make for good water control and a savings in labor during the zoysia establishment phase.

In order to stimulate the spread of zoysia, fairly liberal rates of fertilizer should be applied. Experience shows, however, that there is a point of diminishing return on nitrogen fertilizer applications. During the establishment phase, nitrogen at the rate of 6 to 8 pounds actual per 1,000 square feet annual range is used most often. Some superintendents have and are using higher rates, but the norm is in the range of 1 to 1½ pounds actual per 1,000 square feet per growing month.

As to the type of fertilizer to use during establishment, the faster-release chemical types are preferred. Also, phosphorus and potassium needs should not be overlooked. For best results, use an alternate program of straight nitrogen one time followed by a complete N-P-K fertilizer the next. As with any program, a thorough set of soil tests should be taken for establishment to identify and correct any soil deficiencies.

Experience has also shown it is advisable to schedule the last application of fertilizer from middle to late August. This gives the plant an opportunity to harden off going into the fall and winter. It is interesting to note that top growth slows in the fall, but the



Figure 6. (Left) *Zoysia* spread from rhizome.

Figure 7. (Below) An exceptional fairway from *zoysia*!



all-important rhizome system continues to develop (see *Figure 6*).

Once a solid stand of *zoysia* has been established, it is essential to alter this liberal water and fertilization program radically. Experienced superintendents recommend maintenance levels of one-half to just over one pound actual nitrogen per 1,000 square feet *per year* and only enough irrigation to maintain good color. Once established, *zoysia* is truly a very low maintenance grass. Excess fertilization and irrigation only create thatch and puffiness — something you, the grass, and the golfer do not need.

Other tips on *zoysia* management include:

A. A vigorous coring or vertical mowing program to keep thatch under

control. Best timing is in July or early August, when the grass is growing at its best and recovery will be the quickest. This is also a good time to make a second application of fertilizer when a split application program is being used.

B. *Zoysia* should be cut low, in the range of 1/2- to 5/8-inch (see *Figure 7*).

C. Keep mowers sharp and use hydraulically driven reels rather than pull-type mowers.

D. Depending on conditions, follow a curative fungicide, insecticide, and herbicide program. If a problem is diagnosed, treat it. Generally, *zoysia* is a very tough grass and has few serious disease, insect, or weed problems.

E. Permit *zoysia* to grow a bit long in the fall. Stop cutting early enough to

allow for somewhat longer grass going through the fall and into the winter. The slightly longer grass reduces the potential for winter injury and helps reduce annual weed infestation.

F. While the grass is completely dormant, apply a non-selective herbicide like Paraquat in the very early spring to control winter annual weeds. Careful timing, obviously, is extremely important when using non-selective herbicides.

In summary, an ever-increasing number of golf course superintendents in the transition zone are turning to *zoysiagrass* for fairways and tees. It has proven to be a reliable, low-maintenance turf that golfers like, and, once established, is relatively trouble-free. It offers a solution to an old problem.