ZOYSIA: For The Transition Zone

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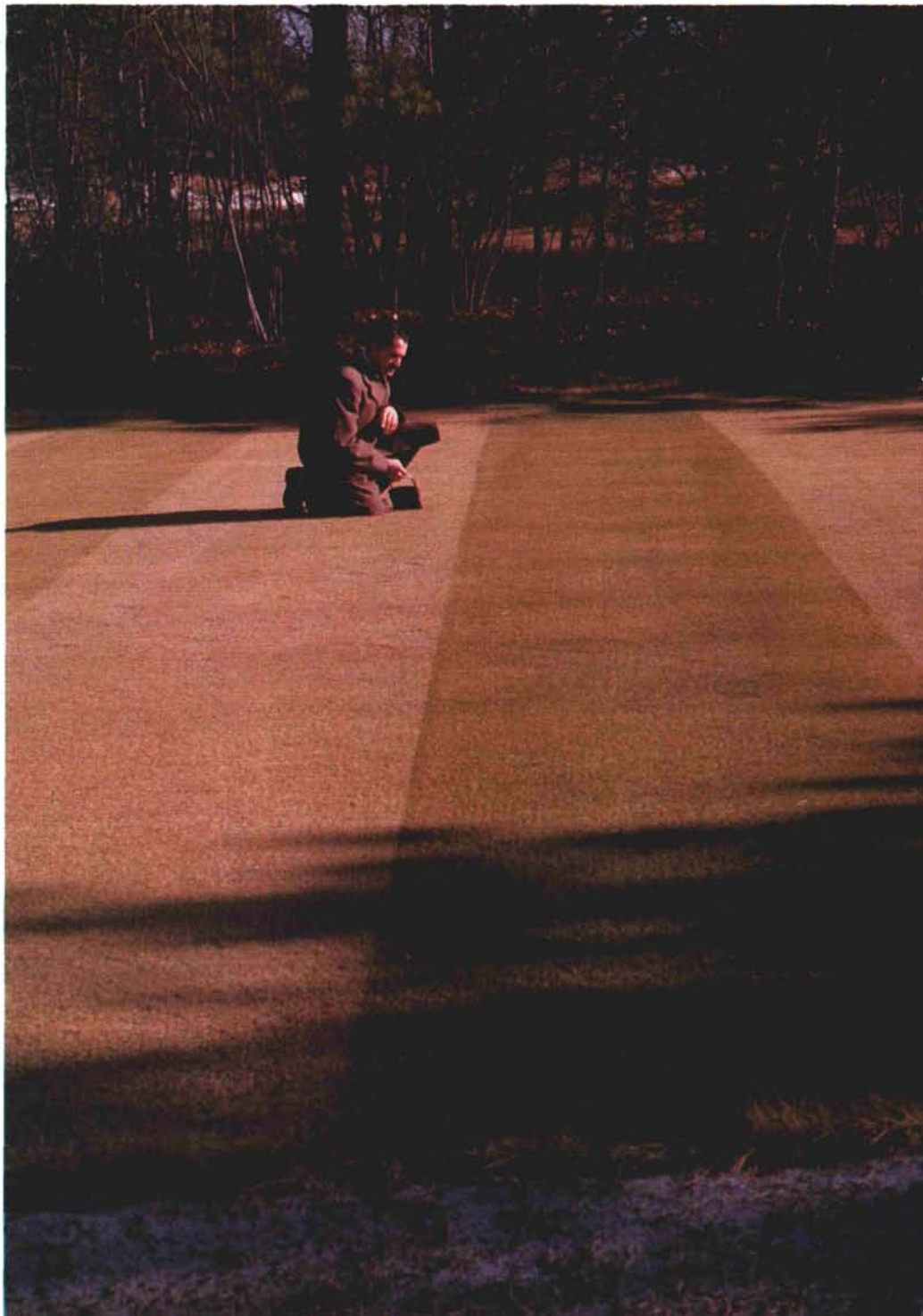
ZOYSIA, a controversial grass of the 1950s, finally seems to be finding its place in golf course management as a fairway turf species in the transition zone.

The transition zone is that region in which the cool season grasses do not stand up well under the heat and disease stresses of summer, and where bermudagrass fails because of inability to cope with occasional severe winters. The Zoysias — *Zoysia japonica, Zoysia tenuifolia* and *Zoysia matrella* are considered one species by many in the turfgrass industry based on research done by Dr. Ian Forbes, who recently retired from the Georgia Coastal Experiment Station. The zoysia mentioned in the context of this article refers primarily to *Zoysia japonica*, variety Meyer, an improved variety researched and released jointly by the Green Section of the USGA and the U.S. Department of Agriculture. Frank N. Meyer, a plant explorer for the United States Department of Agriculture, died while he was on an expedition to China. Meyer zoysia was named to honor his memory. Other zoysia varieties have been used in various turf situations. Presently, however, Meyer zoysia is the only variety being used on golf course fairways to any extent in the transition zone. Zoysia is native to Asia, and it is very widely used on Japanese golf courses for greens, tees and fairways. In Japan, several different zoysias are being used, with fine-textured *Zoysia tenuifolia* used mainly for putting greens.



Dr. Fred V. Grau examining the dye used on the zoysia nursery at Pine Valley Golf Club.

After a severely cold winter, zoysia (left) survived while bermudagrass (right) died.

Zoysia was introduced into the United States in 1905, but it was not until the 1950s that it became widely used. Unfortunately, it was used in many situations where it was not best adapted; it was not maintained as it should have been, and it fell into disfavor by the end of the 1950s, particularly on the East Coast. Zoysia is a very persistent slow-growing turf species that has survived winters well in the transition zone. Under low management regimes, when the bermudagrass or bluegrass in competition with it weakens or dies, zoysia replaces it. After observing it slowly dominate companion grasses, turf managers in the transition zone have decided that it has a use. Typically, this use has been in areas where its ability to withstand a low height of cut under a low level of maintenance makes it a very desirable turf species.

This ability to withstand low mowing with minimal maintenance makes it ideal for fairways. Putting greens established to Meyer zoysia on the Naval Ordinance Laboratory Golf Course, in White Oaks, Maryland, testify to this grass's adaptability. These putting greens, mowed at approximately ¼ inch under relatively minimal maintenance, have survived winters for 20 years. These winters are typically mild, yet some have been very severe, such as the winter of 1976-1977. Over the last 20 years, quite a lot of bermudagrass has died from winter-kill in this area. Meyer zoysia is not recommended for putting greens. I mentioned its tolerance to close mowing only to show its ability to withstand close mowing under minimal maintenance levels.

Once it is established, zoysia requires a minimal amount of nitrogen, providing a very satisfactory turf with one to two pounds of nitrogen per 1,000 square feet per growing season. Even these low rates result in a solid, excellent upright turf which provides a very good lie for wood and iron shots when the grass is close-cut. The zoysias have been known to persist for years with no fertilizer at all.

THE ZOYSIAS need far less frequent watering than the cool season grasses, and, since it is almost as drought tolerant as bermudagrass, it resists scalping because of its upright habit of growth, thus providing a uniformly smooth surface after mowing. Bermudagrass, on the other hand, with decumbent growth has a tendency to scalp if it is mowed only infrequently.

Zoysia is quite tolerant of most turf herbicides. Weed control is relatively easy during establishment and often not necessary after the grass has been established. Zoysia is very tolerant of air pollution and heat; thus, it grows well in urban areas. It is quite tolerant of most soil conditions; however, if the pH becomes more acid than 5.5 or more alkaline than 7.5, it will have problems. Zoysia's slow growth makes it a better choice than bermudagrass where encroachment into bunkers is a problem. Zoysia is also more tolerant to shade than bermudagrass.

Although Meyer zoysia is a very desirable grass for fairways in the transition zone, it is not without problems. First, it establishes and grows very slowly. Because of its slow growth rate, the vegetative material required to establish it is costly. Establishment with stolons (sprigs) has a very critical phase. It is critically important that stolons be kept moist for the first 10 to 14 days. When zoysia stolons are allowed to dry, they often fail to establish; there-

fore, plugs are frequently used. Establishment by sprigging can be successful if it is done carefully. Zoysia sprigging requires less man-hours than zoysia plugging and is therefore less costly. Another problem in establishment of zoysia by sprigs is that some leaf material must show above ground; otherwise the sprigs die. Unlike bermudagrass, zoysia will not grow from sprigs if the entire plant is buried under the soil surface.

Although slow establishment has been a primary reason why zoysia hasn't been widely accepted, it has other problems. Mowing is difficult; sharp, heavy-duty reel mowers must be used for best results. The reason for this is that zoysia has more fiber material in the leaf blade than any of the other turf species, and, therefore, it is very difficult to cut with an ordinary mower. Clippings also decompose very slowly. The height of cut must be kept low so that excessive thatch buildup of the accumulated stem and leaf material does not occur. To prevent thatch buildup, nitrogen must not be used in excess. If excessive growth is allowed to accumulate and the turf becomes thatchy, then unstable footing results. It is tiring to walk on zoysia under excessive thatchy conditions, because its surface is similar to a stiff brush where a firm footing is not possible. To avoid this problem, frequent mowing with heavy reel type mowers is desirable. It has been typically found that three mowings a week during the growing season (June, July and August) are required to provide a satisfactory playing surface.

BILLBUG AND nematode problems can't be ignored. Although nematodes don't seem to be a serious problem in most of the transition zone, they are a problem in California, Florida, and Georgia. Both pests are difficult to identify, and they usually cause quite a lot of damage if correct diagnosis is not quickly made. Excessive thatch accumulation appears to encourage billbugs, chinch bugs and other insects. More research is needed on these problems.

Many golfers dislike the tan winter color common to zoysia and bermudagrass, but even when zoysia is tan and dormant, it still provides a very desirable playing surface. However, dormant zoysia will not withstand heavy traffic, and so it should not be used for winter tees. It is more difficult to establish a good overseeding in zoysia than in bermuda. When it is sprayed green for winter color, it retains the dye as well, if not better than dormant bermuda.

Limited research has been done on the possibility of growing a combination Kentucky bluegrass and zoysia turf. Presently, only a few courses in the transition zone use this combination. More research needs to be done on the management of zoysia-bluegrass combination turf. Also, a more open-growing variety other than Meyer might prove to be a more satisfactory warm season companion.

If zoysia is going to be used for fairway turf, one must first consider what method of introduction should be used. Zoysia is basically a vegetative species, although seeds of *Zoysia japonica* can be used to establish a turf. Seeds of zoysia have a hard coat, germinate poorly and the seedlings are very slow to establish. Therefore sprigs, plugs or sod of improved zoysia varieties are preferred to establish fairways. Whether zoysia competes well with existing turf depends somewhat on management practices. Zoysia competes best with

Kentucky bluegrass or creeping bentgrass under low fertility, careful summer fertilization practices and close mowing. Zoysia established from plugs or from sod strips at spaced intervals tends to provide an uneven surface for several years until full zoysia coverage is obtained. Continuous close mowing after establishment will help reduce this problem.

Zoysia established from sprigs spread on a prepared seedbed provides the most satisfactory coverage in the quickest period of time if the sprigging rate is high enough and if properly maintained during the establishment period. Sodding is usually too expensive for most budgets. The need for constant watering of zoysia sprigs during the first two weeks cannot be overemphasized. Sprig preparation is very critical also. The sod from which the sprigs are taken must remain moist as the sprigs are prepared, and the sprigs should be used as soon as they are prepared, and they must be kept moist as they are being spread.

WEED CONTROL can be obtained by the use of methyl arsenates and 2,4-D materials as commonly done for post-emergent crabgrass and broadleaf weed control. These herbicides can be used on plugs or sod immediately after planting. With sprigs, one should wait until the initial two- to three-week period of critical watering has ended to be sure rooting has occurred before attempting any herbicide treatment.

Once complete coverage has been obtained, nitrogen applications should be dropped from the one to two pounds per 1,000 square feet recommended per month during June, July and August to one or two pounds per season, preferably applied in late May, June or July. Excessive nitrogen must be avoided because of the rapid buildup of thatch on an established stand of zoysia. Mowing should be done as follows: the height of cut should begin in the spring at somewhere between 1/3 to 1/2 inch; this should be gradually raised at approximately 1/8 to 1/16 of an inch every month from early June through the end of August. This practice of increasing the height of cut during the growing season will allow the turf to go into the winter a little long. Reducing the height of cut in the spring to a low level should be followed by sweeping to remove debris or blowing the debris off into the rough to prevent thatch accumulation. Unlike most grasses, zoysia clippings do not decompose rapidly. The early close mowing of zoysia should be conducted before greenup in late March in most of the transition zone. This early close mowing promotes faster greenup. If the practice of lowering the height of cut in the spring and removing debris does not keep thatch under control, then a dethatching program will have to be initiated. Dethatching should be carried out in the actively growing period of July and early August. Thatching late in the year is to be avoided.

In summary, zoysia's ability to handle the heat, humidity, air pollution, and close mowing with minimal weed problems and with more winter hardiness than bermuda makes Meyer zoysia and other *japonica* varieties worthy of consideration for fairway turf in the transition zone. It should be emphasized again that zoysia is slow to establish. It does have pest problems, but they do not seem to be any worse than for any other turf species. Properly maintained zoysia provides an excellent playing surface.

Adaptation of warm and cool season grasses in the United States.