METHODS OF PROPAGATING ZOYSIAGRASS FROM SPRIGS

Michael D. Richardson[1] John W. Boyd,[2] Gene P. Bordelon,[1] and Brian N. Rodgers[2]

IMPACT STATEMENT

Establishment of zoysiagrass *(Zoysia japonica)* from sprigs is often impractical for golf courses and sports fields because of the slow growth rate of the species and subsequent long establishment period. A study was conducted at Fayetteville and Little Rock to evaluate three methods of propagating zoysiagrass from vegetative cuttings and to assess the effects of postplant nitrogen (N) fertilization on establishment. A new method of establishment, named Z-NET, proved to be better than traditional sprigging at the Fayetteville site, but not at Little Rock. Topdressing the sprigs with 0.5 in. of native soil also significantly improved establishment compared with traditional sprigging. Applications of N during establishment had little or no overall effect on grow-in.

BACKGROUND

Zoysiagrasses *(Zoysia* spp.) continue to expand in popularity on golf courses, commercial sites, and home lawns throughout the tran-

[1] Department of Horticulture, Fayetteville.
[2] Pest Management Section, Southeast Research and Extension Center, Monticello.

sition zone because of their excellent wear tolerance, winter hardiness, playability, and overall turf quality. The major zoysiagrass cultivar, 'Meyer', is a vegetatively propagated, spreading grass that once established, produces a dense, thick turf that competes well with weedy plants. However, 'Meyer' has a very slow overall growth rate relative to other warm-season grasses, and is difficult to establish in most situations. Because of this slow growth, most sites that choose zoysiagrass establish the site from sod. Sod farmers also face the same problem with establishment of the species, and the long grow-in period adds substantial production costs.

The primary means of establishing 'Meyer' zoysiagrass is to broadcast vegetative sprigs at a rate of approximately 800 bushels/acre. This method is effective, but most growers anticipate a 12- to 18-mo period from planting to establishment of a harvestable zoysiagrass sod. In recent years, a new technique of planting zoysiagrass, called Z-NET, was introduced from Japan (Miyachi et al., 1993). This method consists of a biodegradable netting with zoysiagrass sprigs intertwined within the netting. This net/sprig combination is then rolled onto a site in a similar fashion to sod, topdressed with 6 to 12 mm of soil, and watered according to need. The original manuscript citing this technology (Miyachi et al., 1993) found that the Z-NET planting method could produce a complete zoysiagrass cover in 85 to 110 days from planting. However, their study was flawed in that there was no comparison to traditional sprigging techniques to demonstrate whether the method was superior to existing methods.

Postsprigging fertilization of zoysiagrass is also poorly understood. The few studies that have addressed this issue have produced inconsistent results from using N fertilizers during establishment (Carroll et al., 1996; Fry and Dernoedon, 1987). However, most sod growers in the region continue to fertilize zoysiagrass heavily during establishment in an attempt to enhance grow-in.

The U.S. marketing rights to Z-NET technology were licensed by Winrock Grass Farms in 1998. In an attempt to evaluate this technology further, a study was designed to test it against traditional sprigging methods for 'Meyer' zoysiagrass. The effects of postplanting N rates on establishment of turf cover were also tested.

RESEARCH DESCRIPTION

Propagation studies were conducted at two sites in the state. The first site was at Winrock Grass Farms near Little Rock (loam soil, pH 6.7), and the second was at the University of Arkansas Agricultural Research and Extension Center, Fayetteville (silt loam soil, pH 6.2).

Each site was fertilized with 20 lb of 0-20-20/1000 ft^2 and prepared to seedbed quality prior to planting. Because of different climatic conditions, the Little Rock site was planted on 13 May 1999 and the Fayetteville site planted on 8 June 1999. The planting design and method were identical for each site.

The experimental design of the study was a split-plot design, with propagation method as the main plot and postplanting fertilization rate as the subplot. Main plots were 8 x 40 ft and treatments were as follows: (1) Z-NET planting with 200 bushels of sprigs/acre and topdressed with 0.5 in. of native soil, (2) traditional sprigging at 800 bushels/acre, and (3) traditional sprigging at 800 bushels/acre and topdressed with 0.5 in. native soil. The subplots were 8 x 8 ft, and treatments consisted of 0, 0.25, 0.5, 0.75, and 1.0 lb of N/1000 ft^2/mo. All fertilizer was applied as agricultural-grade urea (46-0-0).

To assure uniform planting densities in the traditional sprigged plots, the main plots were planted in 8 x 8-ft increments using a volume of sprigs obtained from shredding 1.17 yd^2 of 'Meyer' sod. This sprigging rate (800 bushels/acre) is based on the definition that 1 bushel of sprigs equals the sprigs obtained from 1 yd^2 of sod (McCarty et. al, 1999). Sprigs were uniformly broadcast over the entire plot, pressed lightly into the soil using a disk, and rolled with a water-filled roller to smooth the site. The soil used for topdressing the plots was screened through a soil sifter prior to application to a 0.5-in. depth with a track-mounted topdresser. Oxadiazon (Ronstar) was applied to all plots at 3 lb a.i./acre immediately after planting to suppress weeds, and water was applied as needed during the test to provide optimal growing conditions.

Plots were rated monthly for percentage of cover using a grid that separated each plot into four 4 x 4-ft quadrants. Each quadrant was visually rated from 0 to 100% cover, and the four subsamples were averaged for a final cover value. Data from each measurement date were analyzed by analysis of variance procedures using the split-plot model.

FINDINGS

A uniform, weed-free stand was established at both sites with all propagation methods. Analysis of the data across sites indicated a significant location effect (analysis not shown); therefore, all subsequent data are presented by location. Propagation method had a significant effect on turf cover at all evaluation dates and at both locations (Fig.1). Nitrogen also had a significant influence on percentage of cover at the Fayetteville location, but less of an effect at Little Rock (Fig. 2). There were no significant interactions between planting method and N fertilization for any evaluation period.

There were significant differences between the two sites relative to propagation method (Fig. 1). An interesting aspect of the location effect is that all plots at the Little Rock site lagged behind the Fayetteville site relative to percentage of cover at 60 and 90 days after planting (DAP), even though the site was planted 4 wk earlier. A possible explanation for this is a difference in soil temperatures between sites: soil temperature at the time of planting in Little Rock was 75 °F, while in Fayetteville it was 88 °F. This would suggest that early planting of zoysiagrass sprigs may not be advantageous and, in fact, may suppress the sprigs that are planted. Although there are no data in the literature to support this, it would appear that an 80 to 85 °F soil temperature should be attained before planting zoysiagrass sprigs.

At the Fayetteville site, the Z-NET method outperformed traditional sprigging at 60, 90, and 120 DAP, with the Z-NET method producing 10 to 15% faster cover rates (Fig. 1). However, at the Little Rock site, Z-NET produced similar cover rates relative to traditional sprigging and even lagged behind traditional sprigging at 120 DAP. It should be noted that the Z-NET technology uses only 200 bushels of sprigs/acre compared with 800 bushels/acre for traditional sprigging, so this technology did produce similar or better results with far less planting material. At both locations, the best propagation method proved to be the traditionally sprigged plots topdressed with 0.5 in. of native soil. This is an interesting finding and suggests that covering the sprigs with either soil or some other form of mulch may be more important than the method in which the sprigs are placed on the ground.

Nitrogen had a very small, but significant effect on rate of cover of zoysiagrass sprigs at the Fayetteville site, with 0.75 and 1.0 lb of N/1000 ft^2/mo outperforming the lower rates at 60 and 90 DAP. However, it should be noted that even though the increase was statistically significant, the actual increase due to fertilization was generally only 5 to 10%. There were no N fertilization effects at 60 and 90 DAP in Little Rock, and a slight decrease in rate of cover at 120 DAP was noted with the highest rates of N. Collectively, these data suggest that N fertilization has a minimal effect on growth of zoysiagrass sprigs, a finding supports previous work (Carroll et al., 1996). The minor increase in growth may not justify the cost of fertilizer.

LITERATURE CITED

Carroll, M.J., P.H. Dernoeden, and J.M. Krouse. 1996. Zoysiagrass establishment from sprigs following application of herbicides, nitrogen, and a biostimulator. HortScience 31:972-975.

Fry, J.D., and P.H. Dernoedon. 1987. Growth of zoysiagrass from vegetative plugs in response to fertilizers. J. Amer. Soc. Hort. Sci. 112:285-289.

McCarty, B., G. Landry, Jr., J. Higgins, and L. Miller. 1999. Sod production in the southern United States. Clemson University Cooperative Extension Service, Circular 702, 43 pp.

Miyachi, Y., F. Yano, H. Tonogi, and Y. Maki. 1993. A newly developed zoysia-net planting system for quick establishment of zoysiagrass. Int. Turf. Soc. Res. J. 7:877-881.

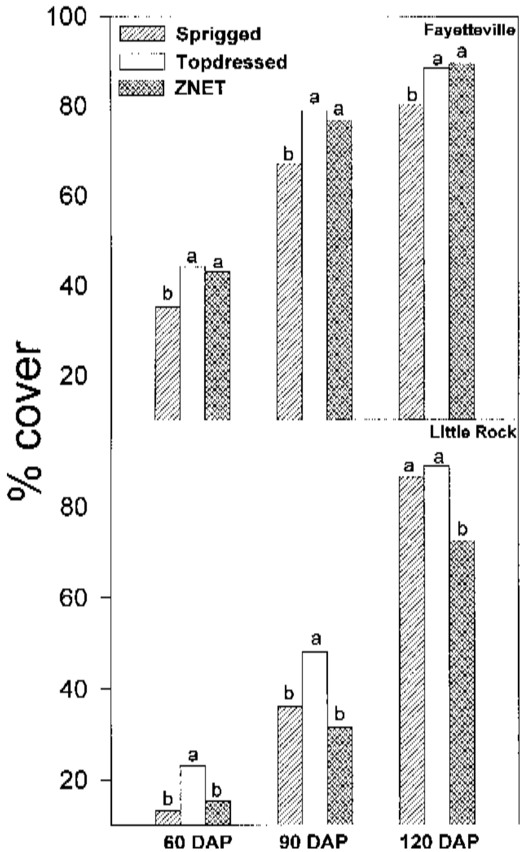

Figure 1. The effect of propagation method on establishment of 'Meyer' zoysiagrass at various days after planting (DAP) at two locations in Arkansas. Different letters within a location and evaluation date indicate a statistical difference between means at the 0.05 level of probability, as determined by least significant difference.

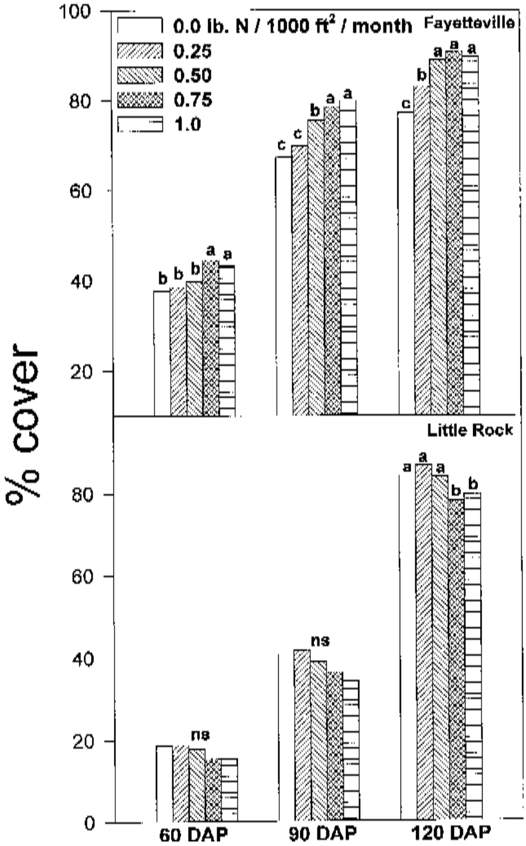

Figure 2. The effect of nitrogen fertilization rates on establishment of 'Meyer' zoysiagrass at various days after planting (DAP) at two locations in Arkansas. Different letters within a location and evaluation date indicate a statistical difference between means at the 0.05 level of probability, as determined by least significant difference. ns = nonsignificant.