SOD PRODUCTION AND TRANSPLANTING RESEARCH - 1973 REPORT

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Selected portions of the sod production and transplanting research that are underway will be reported in this paper. Specifically, included will be sod production and transplanting practices for shaded areas plus an update on the transplant rooting studies involving sod produced on organic and mineral soils and comparative sod strengths among Kentucky bluegrass cultivars. The research relating to sod production efficiencies and mowing-fertilization practices for clipping utilization will be reported in a separate paper by Dr. Paul Rieke that is also included in the 1974 Proceedings.

SHADE SOD PRODUCTION AND TRANSPLANTING

A series of five sod production studies were established at the MSU Muck Experimental Farm. Standard production practices were employed on the Houghton muck soil with the plots being mowed twice weekly at 1.5 inches. Irrigation was practiced as needed to prevent desiccation. The specific studies included (a) cultivar comparisons - 36 Kentucky bluegrasses; (b) Kentucky bluegrass blends - 15 comparisons; (c) Pennlawn red fescue - Merion Kentucky bluegrass mixtures - 11 comparisons; (d) nitrogen fertilization studies - both rate and time of application comparisons; and (e) mowing height and frequency studies. The experimental plots were established in August of 1969. Turfgrass quality ratings and sod strength measurements were taken during 1970 and through mid-1971.

The sod produced under the various treatments were lifted and translocated to a naturally shaded woodland site on the Michigan State University campus in August of 1971. The site had previously been prepared by selective pruning of high limbs, surface tree root removal, and installation of an irrigation system. This resulted in a uniform fairly dense shade over an area of approximately 10,000 square feet. Following transplanting of the various treatments on the site the area was maintained at a cutting height of 2.5 inches at a frequency of once per week with the clippings returned. Irrigation was applied as needed to prevent desiccation and a complete analysis fertilizer applied in the spring and again in the fall at a rate equivalent to one pound each of N, P, and K per 1000 square feet per application. No pesticides were applied to the experimental area except for differentials superimposed on the Kentucky bluegrass cultivar plots by Dr. Joe Vargas. This involved a split plot design. The data presented in the following sections were taken during August of 1973, two years after transplanting. Differences during the initial growing season were not great. This was attributed to the minimal incidence of powdery mildew on the Kentucky bluegrasses. However, substantial differentials occurred during the 1973 growing season which merited the collection of data.

Red Fescue Introduction Studies: Two methods of introducing red fescue seed at the time that a Merion Kentucky bluegrass sod is transplanted were evaluated. One

method involved application of seed to the surface followed by placement of the sod directly over the seed and underlying soil. This method is being used by some landscapers in the state. The second method involved transplanting the sod followed by almost immediate overseeding of the red fescue into the sod. In both treatments, the Pennlawn red fescue was seeded at a rate 3 lbs/100 sq. ft. A third treatment involved sodding with Merion Kentucky bluegrass alone with no red fescue seeding utilized.

Results of this study are summarized in Table 1. The low visual turfgrass quality ratings are primarily a result of thinning due to powdery mildew incidence during the 1973 growing season. The treatment involving seeding of red fescue over the transplanted Merion Kentucky bluegrass sod ranked superior due to the significant amount of Pennlawn red fescue existing in the sod which was not affected by the powdery mildew. Visual estimates of the red fescue contents showed an average of 28% present in the treatment involving sod transplanting followed by overseeding, whereas essentially no fescue was evident in the plots where the seed was applied and the sod transplanted over the top. Thus, the former method is definitely the superior procedure for introducing fescue into Kentucky bluegrass sod. Also, this method can apparently be utilized successfully at the time of Kentucky bluegrass sod transplanting. It should be kept in mind however, that daily irrigation was practiced during the first three weeks of sod rooting which also enhanced germination of the red fescue seed. It is obvious that the application of seed under the sod should not be utilized, as has been practiced by some landscapers.

Pre-Transplant Nitrogen Fertility Effects: The objective of this study was to assess the effect of various nitrogen fertility levels during the formative phases of sod production on the subsequent shade adaptation after transplanting. The three nitrogen fertility levels selected from Dr. Paul Rieke's nitrogen fertility study were 15, 30, and 60 pounds of nitrogen per acre per 60-day growing period. The original composition of the sod at the time of seeding was 50% Merion Kentucky bluegrass and

Table 1. Effect of two seeding procedures on the conversion of Merion Kentucky bluegrass sod to Pennlawn red fescue in dense shade.

Procedure	Visual turfgrass quality rating (1-best; 9-poorest)	Percent red fescue in stand
Sodded only	9.0	0
Seed applied and sod placed on top	8.0	0
Sod transplanted followed by overseeding into sod	5.3	28

50% Pennlawn red fescue on a seed number basis. The nitrogen differentials were not maintained following transplanting, rather both treatments received one pound of nitrogen per 1000 square feet in the spring and again in the fall of each year.

To date the sods that have been maintained at the lower fertility level rank decidedly superior in visual turfgrass quality (Table 2). Serious thinning of the higher

nitrogen fertility level was primarily the result of powdery mildew on the Kentucky bluegrass plus the lack of red fescue to partially compensate for or mask the powdery mildew thinning. In contrast, there is sufficient red fescue retained in the low pre-transplant nitrogen fertility treatment so that the overall turfgrass quality was decidedly superior. Two years after transplanting there was approximately 42% red fescue persisting in the lowest nitrogen treatment whereas the higher treatments contained 5% red fescue or less. This reflects the basic reason for the differential in turfgrass quality. No doubt the red fescue content of both the high and low nitrogen fertility treatments had declined somewhat from the original planting rate during the production period at the MSU Muck Experimental Farm. This is due to the moist, fertile condition of the muck soil which the fescues are not well adapted to, plus the highly competitive characteristic of Kentucky bluegrasses under these growing conditions. However, after two growing seasons there was sufficient fescue persisting in the lower nitrogen treatments so that it enabled the turf to maintain a reasonable density for the two-year period following transplanting. These results emphasize the importance of maintaining a low nitrogen fertility level during the sod production period for those Kentucky bluegrass-red fescue sods which one anticipates transplanting onto shaded sites.

Kentucky Bluegrass Cultivar Evaluations: Two years after transplanting there were two Kentucky bluegrass cultivars which ranked decidedly superior; they were A-34 and Nugget Kentucky bluegrass.

Table 2. Effect of preharvest sod nitrogen fertility levels on the shade adaptation of a Merion Kentucky bluegrass-Pennlawn red fescue mixture.

Nitrogen level (lb. N/Acre/60 days)	Visual turfgrass quality ratings (1-best; 9-poorest)	Percent red fescue in stand
15	4.6	42
30	8.3	5
60	8.7	0

Merion Kentucky Bluegrass-Pennlawn Red Fescue Mixture Production for Shaded Sites: Eleven treatments were established at the MSU Muck Experimental Farm ranging from 100% Merion Kentucky bluegrass to 100% Pennlawn red fescue with various percentages in 10% increments in between such as 90-10, 80-20, all the way to 10-90 on a seed number basis. These eleven treatments were then transplanted into the shade area to evaluate the effectiveness of utilizing Merion to achieve a certain degree of sod strength, which after transplanting, will thin out due to powdery mildew while the Pennlawn red fescue present in the polystand will persist and maintain the turfgrass quality under shaded conditions.

Results of this study showed that during the sod production period as little as 10% Merion Kentucky bluegrass on a weight basis (30% on a seed number basis)

provides adequate sod strength and visual turfgrass quality. Actually, as little as 10% Merion Kentucky bluegrass on a seed number basis (3% on a weight basis) is adequate in terms of sod strength but the visual turfgrass quality is not acceptable due to clumpiness of the Merion Kentucky bluegrass. However, after transplanting onto the shaded site it is obvious that the higher percentage of Pennlawn persisting in the stand the better in terms of successful transplanting. The second observation is that the primary factor affecting this is the pre-transplant nitrogen fertility level. To maintain the originally planted percentage of red fescue it is important to keep the nitrogen fertility level as low as possible and still achieve an adequate sod within an acceptable period of time. Similarly, it is preferable to establish this on as dry a soil as possible, with a sandy soil being preferable since red fescue is not only poorly adapted to high nitrogen fertility levels but is also much more prone to disease thinning under wet soil conditions.

Thus, the results from this study indicate that a relatively nominal percentage of Merion will add considerable sod strength to the Pennlawn red fescue sod; but that an even more important factor in successful transplanting red fescue-Kentucky bluegrass turfs to shaded sites is the maintenance of a low nitrogen fertility level and also to select production sites that are not excessively wet.

TRANSPLANT ROOTING OF MUCK VERSUS MINERAL GROWN SOD

In both 1968 and 1969, reports were given at this Conference regarding the comparative transplant rooting of sod grown on muck and mineral soil. Most of these were relatively short term studies of 30 to 60 days and utilized either the glass-faced root observation box technique or the Michigan Transplant Rooting Strength Test to evaluate comparative differentials in rooting. In all eleven studies the data showed that there is no significant difference in the initial transplant rooting capability of sod no matter whether it is grown on organic or mineral soil if the production practices prior to transplanting were comparable, in terms of cutting height, nitrogen fertility level, irrigation, and grasses used.

One question raised following this series of studies was that maybe differences between sod soil types will not show up until subsequent years. In order to check out this aspect of transplant rooting, a study was set up in which sods from a mineral and an organic source were transplanted onto a sandy loam soil at the Michigan State University Crop Science Field Laboratory. The sods were placed in wooden frames which had a fiberglass screen stretched across the underface. A sufficient number of framed sods were set up so that four replications could be lifted at 30-day intervals throughout a 24-month period following the initial transplanting. At 30-day intervals a block and tackle having a mechanical advantage of 5 was attached to the wood frame containing the rooted sod piece and the cable connected to a bucket into which sand was poured at a uniform rate. The weight of sand required to lift the sod and frame free from the underlying soil was expressed as the transplant rooting strength. This technique was originally developed at Michigan State University in 1965 and is known as the Michigan Transplant Rooting Strength Test.

The two-year study evaluating sod grown on organic and mineral soil was completed during the 1973 growing season. Throughout this period no significant differences were evident between sods grown on mineral and on muck soil, as was the case during the initial transplant rooting period. One further observation that arose from