every 3 weeks or 12 cubic feet applied spring and fall. Also included were an untreated check and a plot which received 12 cubic feet of sand spring and fall after cultivating with 1/2 inch hollow tines.

Turfgrass quality ratings (Table 10) reflect the improvement observed after topdressing as observed previously. For that reason the light frequent topdressing program ranks better through much of the season than when topdressed only in spring and fall. But following spring and fall topdressings at high rates these plots freqently outranked the light, frequent topdressing program for a period of time.

Plots receiving the soil based mix outranked those receiving sand alone on several dates. This has been observed previously. We are still of the opinion that a soil based topdressing material is preferred if the soil mix in the green is no finer textured than the topdressing mix. Try to match the original soil if it is acceptable. If not, use a sandier mix but be sure the topdressing mix is sandy enough to permit good infiltration and will resist compaction. If a quality, consistent source of a soil based mix is not available, then sand can be used. It is essential to use light rates (2-4 cubic feet per 1000 sq ft except when applied after core cultivation) at intervals which are adjusted to the growth rate of the grass (an approximation of the rate of thatch accumulation). This means more frequent topdressing in spring and fall when growth is greater and traffic is lower, perhaps at 2 week intervals. By contrast, in the summer with greater stress and traffic it may be possible to stretch the interval to as much as 4 weeks. This must be determined on a site by site basis requiring careful observation by the superintendent.

Wetting agent study

The wetting agent treatments shown in Table 11 were applied to a Penncross creeping bentgrass green at the Hancock Turfgrass Center on June 26, 1989. Repeat treatments were made on July 25 and August 16. This study was designed to evaluate the effect of these wetting agents on prevention of localized dry spots. As was the case in 1988 we observed no significant development of localized dry spots on these plots. The soil is a modified loamy sand. Heavy irrigation of adjacent plots utilized for another study likely prevented localized dry spot development on these plots.

Significant differences in dew formation occurred on several dates, however (Table 11). Effects on dew suppression tended to be short term (2 to perhaps 4 days) for the sprayable wetting agents. Granular materials have a less dramatic effect short term but tend to provide dew suppression over a longer period.

Control of moss with Safer

A study to evaluate the effect of Safer in controlling moss in a shaded Kentucky bluegrass lawn in Okemos was established June 9, 1989. Safer was applied at 4 oz per 1000 sq ft. The degree of moss control was very good as observed by the relative ratings taken 1 week after treatment and at 1 and 2 month intervals. There was some short term phytotoxicity observed but this was limited in effect and duration. This product seemed to work very effectively but should be applied carefully according to label instruction to

Table 12. Effects of applications of Safer on moss control in a shaded Kentucky bluegrass lawn. Safer applied at 4 ounces per 1000 sq. ft. on June 9, 1989.

Treatment	Moss Control (1 = no control)			Phytotoxicity(1=none)	
	6/15	7/12	8/11	6/15	8/11
Safer	8.0a	8.7a	8.0a	3.0a	1.0a
Check	1.0 b	1.3 b	1.3 b	1.0 b	1.0a

* - Means followed by the same letter are not significantly different at the 1% level using Duncan's Multiple Range Test.

Table 13. Effects of cultivation on force required to lift rooting boxes.[1] Study V. Treatments initiated 8/1/88.

Treatments	Mean Lifting Force - Kg*		
	8/31/88	9/30/88	6/8/89
Check	27.4 b**	41.5 b	67.9 c
Compacted	26.5 b	33.9 c	66.2 c
Hollow tine coring	30.7ab	48.3a	79.6ab
Solid tine coring	33.0ab	51.0a	84.8a
Rototilling	35.2a	52.6a	73.5 bc

* - Extraction of rooting box at 10 to 11% soil moisture by weight.
** - Any two means followed by the same letter are not significantly different at p=.05 by Duncan's Multiple Range Test.
1- From, Lee, Douglas Kwai-Keng. 1989. "Effects of soil cultivation techniques on rooting of Kentucky bluegrass sod." M.S. Thesis. Michigan State University.

prevent significant injury to the turf. It is especially important to utilize adequate water when making application.

Sod Rooting Studies

The study on the effects of cultivation techniques on sod rooting was concluded in 1989. The objective of this study was to determine the effect of utilizing vertical operating tine (VOT) cultivation as a means of soil preparation for sod establishment. The treatments compared were untilled, rototilling and cultivation with half-inch diameter hollow or solid tines. One treatment consisted of compacting the soil before sodding. VOT treatments were made with the Toro greens aerifier. One of the means used to evaluate how quickly the sod roots into the underlying soil was the sod lifting device. This involves placing the sod in a 1 sq ft rooting box. This box has plastic screen attached to the bottom of the box. A wire hook on each corner of the box permits lifting the box. A lifting device which measures the force required to lift the box was designed and constructed. Sod was placed on the appropriately treated soils and maintained as a lawn. At three times after sodding (about 1 month, 2 months and 10 months) sod rooting boxes were lifted for each time interval.

As was reported in 1988, VOT cultivation is a viable means of preparing soil for sodding. Data in Table 13 point out there was no difference among the cultivation treatments in the force required to lift the sod at 1 and 2 months after sodding. After 10 months, solid tine coring was superior to rototilling, however, and all three cultivation treatments were better than the untilled or compacted plots.

Other observations were that solid tine coring was more beneficial as a cultivation practice if the soil was very dry. Significant loosening of the soil occurred with solid tine treatment when the soil was dry but was somewhat less effective when the soil was wet. Under more wet soil conditions rototilling was somewhat better than VOT coring. All cultivation treatments gave improvement in loosening the soil over the one to two month period but by ten months later (after a winter season) much of the benefit of cultivation was lost in terms of soil physical property measurements. However, it was clear that soil preparation by these cultivation methods did improve sod rooting. For long term rooting and stress tolerance we feel proper soil preparation is essential. The addition of a soil amendment, such as desirable topsoil or peat could improve the stability of the improved soil properties gained with cultivation.

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