TURFGRASS SOIL MANAGEMENT RESEARCH REPORT - 1991

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Research conducted in 1991 emphasized several areas of soil management. This research was supported financially in part by the Michigan Turfgrass Foundation. Michigan State University Agricultural Experiment Station as well as several companies which provided support financially or with products and equipment and is gratefully acknowledged.

CULTIVATION STUDIES

Two long term cultivation studies previously established were continued. One was designed to determine the effect of timing of cultivation on annual bluegrass fairway turf. This study was initiated in 1989 in cooperation with J.M. Vargas Jr. at the Hancock Turfgrass Research Center. Cultivation treatments are applied with .5 inch diameter tines on 2 inch centers. Plot size is 6 ft by 10 ft with 3 replications. Turf quality ratings taken in 1991 are shown in Table 1. As observed in past years, there is little effect of cultivation timing on overall turf quality. It may be that since this plot area does not receive intensive traffic or moisture stress, differences are not appearing. In 1992 we will provide traffic and moisture stress treatments to determine if differences will develop. The weed count data is an estimate of the relative crabgrass presence in the plot. There is a tendency for spring (May and June) cultivation treatments to have higher crabgrass ratings, although there is considerable variability in the data. Certainly, if one opens the turf by cultivation during prime periods of crabgrass germination, it is very important to provide water and nitrogen for quick recovery of turf density so there is little time for crabgrass to germinate. Fertilizing 7-10 days before cultivation should be considered on sites with a history of crabgrass infestation.

Evaluation of rooting of the annual bluegrass as affected by time of cultivation was done on three dates in 1991. The resulting data are given in Table 2. Generally, there is little clear evidence that time of cultivation affected root measurements at the times plots were sampled. It is of interest to note that the October treatment date had somewhat higher roots on 2 of the dates of evaluation.

Table 1

Cultivation Timing Study 1991

Initiated June 6, 1989, Quality Ratings, 1=poor 9=excellent

Cored with .5 inch tines on 2 inch spacings, April 19, June 12, July 16, September 11 and October 22, 1991. Weed count taken July 27, 1991.

Treatment	4/17	5/15	6/19	7/24	8/14	9/18	10/7	11/6	7/25**
Mid May	6.2	6.1AB*	6.2	6.0	6.9	7.1	7.0	7.0 B	67.0AB
Mid June	6.1	6.4AB	6.2	5.9	7.0	7.0	7.0	7.0 B	76.5A
Mid July	6.1	6.4AB	6.1	5.5	7.0	7.0	7.0	7.4AB	45.2AB
Mid Aug	6.0	6.5A	6.4	6.0	7.1	7.1	7.2	7.1AB	47.0AB
Mid Sept	6.0	6.0 B	6.4	6.2	7.0	7.0	7.0	7.5A	34.0 B
Late Oct.	6.0	6.2AB	6.0	6.0	7.1	7.1	7.2	7.1AB	42.0AB

* Means followed by the same letter are not significantly different at the 5% level using the LSD range test.

** Means followed by the same letter are not significantly different at the 10% level using the LSD range test.

Table 2

Cultivation Timing Study 1991

Initiated June 6, 1989, Root and Thatch Weights, Root weight reported in KG M^{-3} and thatch weights reported in KG M^{-2}.

Cored with .5 inch tines on 2 inch spacings, April 19, June 12, July 16, September 11 and October 22, 1991.

	April 18			July 24			October 10		
Treatment	Thatch	0"-3"	3"-6"	Thatch	0"-3"	3"-6"	Thatch	0"-3"	3"-6"
Mid May	2.1	4.0	0.4	0.6 B*	1.5	0.4	0.6	1.9AB	0.20 B
Mid June	1.8	3.0	0.4	0.6 B	2.2	0.3	0.6	1.3 B	0.25AB
Mid July	1.1	3.4	0.3	0.7 B	4.0	0.4	0.9	1.9AB	0.26AB
Mid Aug	1.4	3.7	0.4	0.7 B	2.1	0.5	0.8	2.1A	0.28AB
Mid Sept	3.5	3.5	0.3	0.6 B	2.1	0.4	0.6	2.0AB	0.30AB
Late Oct.	1.5	3.3	0.5	1.1A	2.9	0.5	0.8	2.2A	0.42A

* Means followed by the same letter are not significantly different at the 5% level using the LSD range test.

At this point, we cannot say that there is enough evidence to recommend this timing of cultivation as a standard practice. However, based on other studies we believe that fall is a very appropriate time to consider cultivation. The maximum root production period for cool season grasses is in the spring. Loosening the soil by cultivation in the fall to late fall should provide maximum opportunity for good root growth the next spring.

The objective of another cultivation study is to determine the effect of several cultivation treatments on turf quality and thatch accumulation on Ram-I Kentucky bluegrass. This study was initiated in 1987 on a turf which had about 1 inch of thatch. Treatments include the Verti-Drain with hollow and solid tines, Toro greens aerifier used once and 3 times annually, a vertically operating tine aerifier which is set to penetrate to only 1 inch and an untreated check. The solid tine treatment brings no soil to the surface so there is no mixing of soil with the thatch. As a result, the solid tine treatment has had little effect on thatch accumulation. The shallow treatment is purposely set so there is very little soil brought to the surface to simulate what happens when an ineffective aerifier is used on a thatch site. There have been no differences in turf quality ratings taken, so no data are presented here. This study will continue in 1992.

EFFECT OF HIGH POTASSIUM RATES ON TURF AND SOIL TESTS

In recent years there has been a dramatic increase in the use of potash in fertilizing turfs, especially in high traffic and/or stress situations. This has occurred as a result of recent data indicating that greater wear tolerance has resulted from potash applications above those recommended based on soil tests and the generally accepted view that higher potassium will enhance stress and disease tolerance of turfgrasses. Some turf specialists are concerned that the rates being used by become excessive due to nutrient imbalances and/or high salt levels. The studies reported here were initiated in 1990 in cooperation with J.N. Rogers at the Hancock Turfgrass Research Center, one each on Bristol Kentucky bluegrass growing on loam soil, an annual bluegrass fairway height turf growing on loam soil and a creeping bentgrass green growing on a loamy sand soil. Treatments were applied at 0, 4, 8, and 12 lbs. K_20 (as potassium chloride) per 1000 sq. ft. annually in 2 lb. increments during the growing season. There was also a 12 lb. K_20 treatment applied as potassium sulfate. Each study also had a treatment based on soil tests as recommended by the Michigan State University Soil Testing Lab. Clippings were returned on the Kentucky bluegrass and annual bluegrass studies, but removed from the bentgrass green. Plot size was 4 ft. by 6 ft. with 3 replications.

There were no observable differences in turf quality in any of the 3 studies as reported last year. Soil samples were collected in November and tested for potassium, calcium and magnesium. The soil samples were separated into thatch, 0-3 inch and 3-6 inch depths for analysis. Data are shown in Tables 3, 4 and 5 for the Kentucky bluegrass, creeping bentgrass and annual bluegrass studies, respectively. The rates of K_20 applied for the soil test based treatments were: Bristol Kentucky bluegrass 3.0 lbs. in 1990 and 0.5 lb. in 1991; Penncross creeping bentgrass green - 5.5 lbs. in 1990 and 4.5 in 1991; annual bluegrass fairway - 3.5 lbs. in 1990 and 4.0 in 1991.

Soil test results indicate there are some differences in the responses observed to the potash applications. The higher K soil tests in the check plot on the Kentucky bluegrass study is reflected in the higher K tests at each rate of K_20 application compared to that observed in the annual bluegrass study, even though both are growing on loam soil. In both these studies, the downward movement of K at the higher rates of application is very apparent. As the K level in the surface layer becomes high, there is a natural leaching downward, even in these loam soils. At the excessive rates of 12 lbs. K_20, this would be expected to occur even when clippings are returned.