GREENS TOPDRESSING RESEARCH

Topdressing programs outlined in Table 11 have been applied since 1986 to a Penncross creeping bentgrass green at the Hancock Turfgrass Research Center. Plot size is 4 feet by 12 feet with 3 replications. The straight sand treatments are applied either on a light, frequent program with 3 cubic feet of sand per 1000 sq. ft. applied every 3 weeks during the growing season or twice annually (spring and fall) at the rate of 12 cubic feet. The 80:20 mix is composed of 80% sand and 20% peat on a volume basis. The 60:20:20 mix is sand:peat:sandy loam soil. The "Sand aerified" plot is aerified with a Greensaire aerifier both spring and fall using 1/2–inch hollow tines followed by topdressing with 12 cubic feet of sand each time.

The depth of the layer composed of topdressing material and/or thatch is shown in Table 11. Note that there is no difference in depth of the topdressing layer among all plots receiving topdressing (4.7 to 5.0 cm), regardless of whether straight sand or a mix was applied. All the topdressed plots had a layer about 3 times thicker than the thatch layer (1.6 cm) on the non–topdressed check plot. Interestingly, based strictly on calculations the depth of sand applied during the 7 years of the study should amount to about 5 cm (2 inches).

Samples were collected from each plot and taken to the laboratory for physical analyses. The amount of organic matter found in each plot is given in Table 11. Plots topdressed with the 60:20:20 mix resulted in more organic matter than those topdressed with sand alone. There was no difference in organic matter present among plots treated with sand alone or that were untreated (check). One reason for the soil based mix producing slightly more organic matter could be that having more soil in the topdressing layer may have enhanced growth sufficiently to increase the amount of thatch produced.

During 1992, the 4 feet by 12 feet plots were split in (4 feet by 6 feet) half with one half of the plots receiving 5 lbs. K20 per 1000 sq. ft. applied as 0–0–60 in 5 separate applications during the growing season. The plots were sampled in October and analyzed for available soil K, Ca and Mg levels. Samples were separated into either the topdressing/thatch layer; or the 0–3 inch soil depth just beneath the topdressing/thatch layer.

The soil tests from these plots are given in Table 12. Plots treated with K had higher soil K tests as would be expected. Plots topdressed with the 60:20:20 mix which contains 20% topsoil tended to have higher soil K tests that those without topsoil, although differences were not often statistically significant. Soil tests in the topdressed/thatch layer tended to be higher than in the underlying soil. This probably occurred for two reasons. The potash was applied to the surface and was placed in the topdressed/thatch layer, so it would show up there first.

Table 11

Great Lakes Topdressing Study Organic Matter Data 1992 Initiated 1986		
TREATMENT	**DEPTH OF TOPDRESSING LAYER** (cm)	**AMOUNT OF ORGANIC MATTER** (grams)
SAND 3 cu ft/1000 every 3 weeks	5.0 a	5.7 cd
SAND spring & fall 12 cu ft/1000	4.7 a	6.3 bcd
80:20 mix every 3 weeks 3 cu ft/1000	4.8 a	7.8 abc
80:20 mix spring & fall 12 cu ft/1000	4.7 a	7.5 abc
60:20:20 mix every 3 weeks 3 cu ft/1000	5.0 a	8.8 a
60:20:20 mix spring & fall 12 cu ft/1000	4.9 a	8.4 ab
CHECK PLOT	1.6 b	4.5 d
SAND AERIFIED spring & fall 12 cu ft/1000	5.0 a	5.8 cd
Means followed by the same letter are not significantly different at the 5% level using the LSD mean separation test.		

Table 12

Great Lakes Topdressing Study 1992

+K treatments received 5 pounds of potassium in 5 equal applications.
–K treatments received no potassium for the season.

TREATMENT	POTASSIUM LEVELS				CALCIUM LEVELS				MAGNESIUM LEVELS			
	Topdressing		0–3 inches		Topdressing		0–3 inches		Topdressing		0–3 inches	
	- K	+K	-K	+K	-K	+K	-K	+K	-K	+K	-K	+K
SAND every 3 weeks 3 cu ft/1000	67.7 g	154.3 cd	53.0 d	124.7 bc	1187.0 e	1110.0 e	977.0 cdef	959.3 def	167.0 e	168.0 e	170.0 bc	135.3 c
SAND spring & fall 12 cu ft/1000	59.0 g	152.7 cde	45.3 d	121.7 c	987.0 e	983.7 e	1082.0 bcdef	931.7 ef	138.0 e	133.7 e	188.3 ab	140.0 c
80:20 mix every 3 weeks 3 cu ft/1000	99.3 efg	162.3 bc	45.3 d	159.3 a	1703.0 d	1879.0 bcd	1283.0 ab	1380.0 a	251.7 d	281.7 bcd	226.0 a	205.3 ab
80:20 mix spring & fall 12 cu ft/1000	96.3 g	181.3 bc	47.3 d	149.3 a	1654.0 d	1658.0 d	1214.0 abc	1181.0 abcd	280.7 cd	260.0 d	197.7 ab	195.3 ab
60:20:20 mix every 3 weeks 3 cu ft/1000	98.3 fg	197.3 bc	44.3 d	145.3 ab	2152.0 a	2039.0 abc	1191.0 abcd	1248.0 ab	328.0 abc	328.3 abc	205.7 ab	222.3 a
60:20:20: mix spring & fall 12 cu ft/1000	103.7 defg	210.7 ab	41.3 d	153.7 a	2027.0 abc	2090.0 ab	1163.0 abcde	1188.0 abcd	338.7 a	318.0 abc	206.7 ab	193.0 ab
CHECK PLOT	152.0 cdef	267.0 a	44.3 d	139.3 abc	1806.0 cd	1672.0 d	1121.0 bcdef	933.0 ef	331.3 ab	313.0 abc	184.3 ab	170.7 bc
SAND AERIFIED spring & fall 12 cu ft/1000	71.7 g	169.0 bc	47.0 d	145.0 ab	1102.0 e	1126.0 e	1118.0 bcdef	907.3 f	181.3 e	167.7 e	163.3 bc	138.7 c

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

Secondly, the organic matter in that layer tends to reduce the weight of the soil sample. Thus the K soil tests would read higher than in the underlying soil since most soil testing labs use a volume sampling procedure rather than taking a sample based on weight. In the underlying 0–3 inch soil depth, the soil K tests tended to be higher in plots treated with the 60:20:20 mix than in sand topdressed plots, but differences were generally small. Perhaps K present in the soil mix (60:20:20) contributed to these higher soil K tests.

The soil Ca tests in the topdressed/thatch layer pointed out the additional cation exchange capacity in the soil–based (60:20:20) topdressed plots with much higher soil Ca tests than in sand topdressed plots. This was evident in both K treated plots and those receiving no K. A similar response was observed for soil Mg tests.

LONG TERM CULTIVATION STUDIES

The effect of long term cultivation treatments on a Ram I Kentucky bluegrass turf at the Hancock Turfgrass Research Center was established in 1987. Cultivation treatments are shown in Table 13. The Toro treatment is a Toro greens aerifier with 1/2 inch tines, applied once per year in the fall (1X), spring and fall (2X) or spring, summer and fall (3X). The Core Master Full treatment utilizes 1/2 inch tines to a full depth (approximately 3 inches) while the Core Master Shallow treatment is set to penetrate only 1 inch. The Core Master was used for this particular treatment to simulate the effect of an aerifier which does not penetrate deeply into the soil as is the case for some relatively ineffective aerifiers. The use of the Core Master unit for this treatment should not be construed as an indication this aerifier will not penetrate adequately into the soil. The flexibility of being able to vary the depth of penetration of aerifier tines could be a distinct advantage under some turf conditions. The Verti–Drain was used with hollow and solid tines. Soil and thatch samples were taken from these plots in September, 1992 for evaluation of the amount of thatch found.

Data in Table 13 point out that there was no difference in the thickness of thatch found among any of the treatments. It was apparent that the plots which had significant amounts of soil brought to the surface by aerification had the soil mixed rather uniformly with the thatch layer, but the thickness of the layer of thatch or thatch and soil was not different among treatments. Further, there was no difference in the weight of organic matter found in plugs taken from these plots (Table 13), regardless of treatment. It is thus clear that cultivation and returning the soil cores to the turf has not influenced the amount of organic matter found in the thatch layer. Either thatch degradation is not taking place in spite of mixing soil with the thatch layer or the rate of thatch development is equal to the rate of thatch degradation. This is in opposition to the generally held theory that cultivation enhances thatch degradation. A more proper terminology may be thatch control, a situation where mixing soil from the cultivation cores is mixed with the thatch layer. This keeps the thatch under control and provides a more uniform rooting medium in contrast to the solid thatch layer observed on the check plots or those which receive only very shallow cultivation in this study. Because of the presence of so many stones in this plot area, evaluation of soil compaction and pore size distribution could not be carried out as planned.