1987 TURFGRASS SOIL RESEARCH REPORT

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Topdressing Studies

A study of the effects of topdressing programs and nitrogen fertility was initiated in 1982 on a Penneagle creeping bentgrass green at the Hancock Turfgrass Research Center. Plot size was 4 feet by 12 feet with 3 replications. Treatments utilized in this study are outlined in Table 1. The objective was to evaluate the effects of the sand topdressing regime on the greens turf at two nitrogen levels, 3 and 6 pounds per 1000 square feet annually, divided into monthly applications. The nitrogen was applied as urea and watered in to prevent burn. The soil materials used in this study were sand (medium and fine sand donated by the Standard Sand Co.) and a soil-based mix which is two parts sand to one part of native sandy loam topsoil. The greens were mowed at 3/16 inch 4-6 times per week depending on growth rate.

Treatment effects on visual turfgrass quality ratings for 1987 are shown in Table 1. While some natural variability occurred during the growing season the higher nitrogen rate frequently results in higher turf quality ratings as would be expected. The plots receiving soil mix topdressing ranked well at each nitrogen level. Although the reasons for this response are not conclusive there are several potential explanations: some nitrogen and other nutrients exist in the soil mix which would not be present in the sand; or the presence of organic matter, silt and clay in the soil-based mix may increase water holding capacity providing better stress tolerance and a better environment for desirable soil microorganisms in the soil.

Plots receiving no topdressing frequently had poorer turf quality than topdressed plots. The turf became thatchy and puffy, resulting in scalping several times during the season. Although the infrequent sand topdressing regimes rated well, the potential for development of layers would likely result in subsequent management concerns in the future.

Topdressing with sand or soil mix resulted in a thicker "thatch" layer compared to the untreated check (Table 2). This measurement was made in late summer, 1987 and was determined by measuring the depth of the accumulated layer from the top of the "thatch" layer down to the original soil thatch interface found on all plots. This measurement will be referred to as the "thatch layer" in all thatch evaluations in this report.

Because no soil or sand was added to the check plots the organic matter content of the "thatch layer" was much higher than in treated plots (Table 2), having over 20% organic matter compared to the 5 to 6% on other plots. The total amount of organic matter found in the "thatch layer" (in the grams of organic matter column in Table 2) as determined by loss on ignition was not different among any of the treatments. This suggests that none of these

Table 1. Effect of topdressing and nitrogen fertility programs on the turfgrass quality ratings of a Penneagle creeping bentgrass green. Treatments initiated in 1982. Hancock Turfgrass Research Center. Averages for 3 replications.

Topdressing Treatment				Turfgrass quality rating (9-best)					
Material	Rate	Frequency	Annual N	4/10	5/29	6/12	7/6	7/30	9/8
	cu ft/1000		lbs/1000						
Sand	3	3 weeks	3	5.0c*	6.7b	7.0ab	6.0b	7.2b	7.5bc
Sand	6	6 weeks	3	5.7bc	6.2bc	6.8bc	6.2b	7.0bc	7.bc
Sand	12	Spring/Fall	3	6.0bc	6.3bc	7.2ab	6.3b	6.8bc	7.0c
Soil/sand	12	Spring/Fall	3	6.3b	6.5bc	7.7ab	6.0b	6.8bc	7.5bc
None	-	-	3	5.0c	5.5c	5.2d	5.3c	6.0c	6.3d
Sand	3	3 weeks	6	5.2c	8.0a	7.2ab	7.2a	7.8ab	8.5a
Sand	6	6 weeks	6	6.3b	8.5a	7.8ab	7.5a	8.5a	8.8a
Sand	12	Spring/Fall	6	6.7ab	8.5a	7.8ab	7.7a	8.5a	8.5a
Soil/sand	12	Spring/Fall	6	7.5a	8.5a	8.2a	7.2a	7.3b	8.8a
None	-	-	6	5.8bc	6.3bc	5.7cd	6.5b	7.3b	7.8b

* Means in columns followed by same letter are not significantly different from each other using Duncan's Multiple Range test (5%).

Table 2. Effect of topdressing and nitrogen fertility programs on the thatch of a Penneagle creeping bentgrass green. Treatments initiated in 1982. Hancock Turfgrass Research Center. Averages for 3 replications.

Treatment				"Thatch"	Organic matter in "thatch"	
Material	Rate	Frequency	Annual N	Thickness	%	grams
	cu ft/1000		lbs/1000	mm		
Sand	3	3 weeks	3	38.4ac*	5.5b	1.56a
Sand	6	6 weeks	3	39.9ab	5.1b	1.55a
Sand	12	Spring/Fall	3	38.1bc	4.9b	2.48a
Soil/sand	12	Spring/Fall	3	39.2ac	6.2b	1.86a
None	-	-	3	18.5d	21.7a	1.47a
Sand	3	3 weeks	6	39.6ac	6.2b	1.66a
Sand	6	6 weeks	6	43.7a	5.2b	1.66a
Sand	12	Spring/Fall	6	41.4ab	5.4b	1.75a
Soil/sand	12	Spring/Fall	6	34.5c	4.9b	1.56a
None	-	-	6	16.9d	25.8a	1.48a

*Means in column followed by same letter are not significantly different from each other using Duncan's Multiple Range test (5%).

treatments influenced the amount of organic matter generated by the grass during the course of this study. Treatment apparently did not affect the rate of organic matter decomposition in the thatch either. Or at least the balance between organic matter production by the grass and the rate of decomposition of organic matter was uniform across all treatments.

Higher nitrogen applications resulted in a turf more susceptible to wilt. Plots receiving 6 pounds nitrogen per 1000 square feet annually wilted sooner than those receiving 3 pounds, an observation made previously. In mid-August striking differences in dew patterns were evident. All high nitrogen treated plots had little or no dew. Further, the plots receiving light, frequent sand topdressings had little dew at the 3 pound nitrogen annual rate (Table 3). The 6 cubic foot treatment every 6 weeks also had significantly less dew than other low nitrogen plots. There was little treatment effect on stimpmeter readings taken twice during the growing season. To convert these stimpmeter readings to feet divide the millimeters by 25.4 to get inches, then by 12 to convert the number to feet.

Several effects of treatment on soil tests were evident (Tables 4 and 5). One of the concerns with aggressive topdressing programs is how to collect the soil samples when a significant layer has developed. How deep should the sample be taken? Since the depth of the "thatch" layer (thatch and topdressing material) which has been accumulating over the six years of this study has reached about 1.5 inch should this be sampled separately? Data in Tables 4 and 5 suggest some differences occur in soil tests among treatments. It is suggested that until the thatch/topdressing layer reaches 3/4 inch in depth that the thatch be discarded, using only the soil below for the soil test. As the thatch soil layer exceeds 1 inch or more it would be wise to sample that layer separately. When the layer reaches over 2 inches that sample will suffice for soil testing purposes in most circumstances.

In this study the pH of the "thatch" is lower than in the soil below. The untreated check plots are a special case in evaluating soil tests. Note the phosphorus (P), potassium (K), calcium (Ca) and magnesium (Mg) tests are higher in the thatch than in the soil below on the untreated plots. This is most likely caused by the lower bulk density of the thatch which is high in organic matter in contrast to the thatch/topdressing layer found on topdressed plots. If one were to compare these numbers on an area basis there would likely be only small difference in level of available nutrients. Thus sampling depth and technique are very important on thatchy or heavily topdressed turfs. Follow the guidelines suggested above under such soil conditions. Another significant difference was the lower available potassium levels on the higher nitrogen treated plots. When using higher nitrogen levels or when practicing sand topdressing it is wise to use more frequent and higher annual rates of potash. This is needed to provide a turf which is more stress tolerant.

A second topdressing study using soil or peat as amendments for sand topdressing was initiated in 1986. Topdressing materials used in this study were provided by the Great Lakes Minerals Company. The grass was Penncross creeping bentgrass mowed at 3/16 inch at the Hancock Turfgrass Research Center. Plot size was 4 feet by 10 feet with 3 replications. Treatments outlined in Table 6 were utilized. The TDS-50 is a sand primarily in the medium and fine sand ranges. The 80:20 mix is 80% sand and 20% peat on a

Table 3. Effect of topdressing and nitrogen fertility program on dew and stimpmeter readings on a Penneagle creeping bentgrass green. Treatments initiated in 1982. Hancock Turfgrass Research Center. Averages for 3 replications.

Treatment			Dew Rating Aug 14	Stimpmeter reading, cm	
Material	Rate	Frequency	(9 = heavy dew)	June 15	Aug 7
	cu ft/1000				
Sand	3	3 weeks	2.0c*	207ac	195bc
Sand	6	6 weeks	4.7b	203ac	217a
Sand	12	Spring/Fall	7.0a	196bc	196bc
Soil/sand	12	Spring/Fall	7.0a	217a	188c
None	-	-	6.8a	212ab	208ab
Sand	3	3 weeks	1.0c	201ac	186c
Sand	6	6 weeks	1.0c	191c	187c
Sand	12	Spring/Fall	1.0c	201ac	180c
Soil/sand	12	Spring/Fall	1.3c	196bc	179c
None	-	-	1.7c	199ac	186c

* Means in columns followed by same letter are not significantly different from each other using Duncan's Multiple Range test (5%).

Table 4. Effect of topdressing program on soil tests of a Penneagle creeping bentgrass green. Treatments initiated in 1982. Hancock Turfgrass Research Center. Averages for 3 replications.

Topdressing Treatment			N Rate	pH		P		K	
Soil	Frequency	Rate		Thatch	Soil	Thatch	Soil	Thatch	Soil
			lbs/1000						
Sand	3 weeks	3	3	7.0a*	7.5ab	51c	56ab	233cd	70.a
Sand	6 weeks	6	3	7.1a	7.5ab	36de	51b	183cd	62ac
Sand	Spring/Fall	12	3	7.0a	7.3b	38d	53b	233cd	76a
Sand/soil	Spring/Fall	12	3	7.1a	7.5ab	67b	45bc	264c	65ab
None	-	-	3	7.2a	7.6ab	103a	66a	637a	48cd
Sand	3 weeks	3	6	7.2a	7.5ab	29de	36cd	159cd	49bd
Sand	6 weeks	6	6	7.2a	7.5ab	24e	25d	150d	42d
Sand	Spring/Fall	12	6	7.2a	7.4ab	30de	33cd	161cd	40d
Sand/soil	Spring/Fall	12	6	7.3a	7.6ab	35de	31d	241cd	36d
None	-	-	6	7.3a	7.7a	62bc	37cd	553b	51bd

* Means in columns followed by same letter are not significantly different from each other using Duncan's Multiple Range test (5%).

Table 5. Effect of topdressing program on soil tests of a Penneagle creeping bentgrass green. Treatments initiated in 1982. Hancock Turfgrass Research Center. Averages for 3 replications.

Topdressing Treatment			N Rate	Ca		Mg	
Soil	Frequency	Rate		Thatch	Soil	Thatch	Soil
			lbs/1000				
Sand	3 weeks	3	3	1291cd*	1452a	264bd	236a
Sand	6 weeks	6	3	1064d	1280a	191d	240a
Sand	Spring/Fall	12	3	1176cd	1345a	201d	247a
Sand/soil	Spring/Fall	12	3	1853bc	1440a	310bc	263a
None	-	-	3	3704a	1363a	523a	241a
Sand	3 weeks	3	6	1459bd	1470a	221cd	228a
Sand	6 weeks	6	6	1232cd	1363a	218cd	260a
Sand	Spring/Fall	12	6	1204cd	1238a	206cd	247a
Sand/soil	Spring/Fall	12	6	2077b	1375a	361b	260a
None	-	-	6	3978a	1452a	590a	249a

* Means in columns followed by same letter are not significantly different from each other using Duncan's Multiple Range test (5%).

Table 6. Effect of topdressing a Penncross creeping bentgrass green with Great Lakes Minerals topdressing mixes on thatch and stimpmeter readings. Study initiated spring 1986. Hancock Turfgrass Research Center. Averages for 3 replications.

Treatment			Organic matter in "thatch"		Stimpmeter reading
Mix[y]	Rate	Frequency	%	grams	cm
	cu ft/1000				
TPS-50	3	3 weeks	9.0bc*	1.20de	190ab
	12	Spring/Fall	7.3bc	1.12e	178b
80:20	3	3 weeks	11.0ab	1.39bc	182ab
	12	Spring/Fall	9.6a-c	1.41b	190ab
60:20:20	3	3 weeks	12.8a	1.62a	191ab
	12	Spring/Fall	9.9ac	1.38bc	185ab
Check	-	-	13.2a	1.27cd	185ab
TDS-50	12	Spring/Fall	7.0c	1.16de	194a

* Means in columns followed by same letter are not significantly different from each other using Duncan's Multiple Range test (5%).

[y] TDS-50 is 100% sand; 80:20 is 80% sand, 20% peat; 60:20:20 is 60% sand, 20% peat and 20% loamy topsoil.