STOP 8

TURFGRASS ESTABLISHMENT AND MANAGEMENT REQUIREMENTS FOR DIFFERENT SOILS

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Turfgrass is established and managed on every conceivable soil type ocurring in Michigan. As the soil texture changes, the establishment and management requirements necessary for turfgrass growth change accordingly. The soil is expected to provide good aeration and drainage, hold reasonable amounts of available water, have adequate nutrient holding capacity, allow deep rooting, have a minimum compaction susceptibility, have acceptable chemical qualities, and contain a reasonable amount of organic matter to help encourage desired organism activity. Not all of these can be found to their maximum in any given soil. Soils are modified to achieve a certain balance among these properties. As a general rule, the more intensively a turf area is utilized, the more sand should be used in the soil mix.

In establishing these plots we have encountered some of the typical problems of different soils. The green on the topsoil established very quickly because of the naturally high available water holding capacity (Table 1) and the high native fertility (Table 2). Rooting is very deep on this soil which has not yet received traffic beyond maintenance equipment.

The green established on the soil mix built essentially to USGA specifications also developed rapidly for similar reasons. But the greens built on dune sand (Purrwick) and on the 2NS sand-peat mix have established much more slowly. Maintaining proper water and nutrition during the establishment phase is obviously more difficult. Rooting at this time on the 2NS sand-peat green is limited to the depth of incorporation of the peat (approximately 6 inches) even though infiltration rates are very high. This points out the importance of preventing development of layers during construction.

The effect of the very low cation exchange capacity in the dune sand is evident from the data in Table 2. Even though the pH is high (8.3), the available calcium test is only 267 pounds per acre. The magnesium test is very low, prompting concern about a magnesium deficiency although no response has been observed to date. The available phosphorus and potassium levels in both sand soils are very low (Table 2) where no fertilizer has been applied.

The lack of cation exchange capacity and associated ability to hold potassium is apparent from the data in Table 3. When as high as 8 pounds K_2O per 1000 square feet was applied in mid-June, none was found by soil test in early November. Similar responses have been observed on these plots here at the Hancock Center. The potash is leached readily during the growing season and supports the necessity for regular potash application on irrigated sand soils.

This is particularly important for heavy traffic areas and where clippings are removed, such as on greens. A minimum of two applications of potash per year is essential on such soils, preferably 3 or 4. The use of sulfur coated potash on Kentucky bluegrass at Traverse City allowed retention of the potassium in the soil longer than from muriate of potash. The sulfur coating holds some of the potassium longer before it becomes available to the turf and susceptible to leaching.

TABLE 1. Soil-Water Properties of 3 Soils at the Hancock Turfgrass Research Center.

	2NS SAND + PEAT	SAND + TOPSOIL	TOPSOIL
Hydraulic Conductivity (Inches/Hour)	15.3	2.9	.07
% Water @ Saturation	27	34	52
% Water @ Field Capacity	9	14	21
% Water @ Permanent Wilt	3	5	8
Available Water @ Field Capacity (" H20/ " Soil)	.06	.09	.13

TABLE 2. Soil Tests of 4 Unfertilized Soils at the Hancock Turfgrass Research Center.

SOIL TEST	SAND	2NS SAND + PEAT	SAND + TOPSOIL	TOPSOIL
PH	8.3	7.5	7.8	7.3
Phosphorus Lbs/Acre	12	4	62	147
Potassium Lbs/Acre	8	40	24	88
Calcium Lbs/Acre	267	3543	850	1800
Magnesium Lbs/Acre	28	190	95	300

Table 3. Residual K soil tests on Kalkaska sand at Traverse City. Soils tested November, 1981.

Treatment			K soil test
Carrier	K_2O Rate lbs/M	Date of application	lbs/A
Muriate	1	June	76gh[#]
Muriate	2	June	89fg
Muriate	3	June	84fh
Muriate	4	June	83fh
Muriate	8	June	87fh
Muriate	1,1	June, Sept	120ce
Muriate	2,2	June, Sept	152b
S.C. Potash*	1	June	72gh
S.C. Potash	2	June	81gh
S.C. Potash	3	June	102ef
S.C. Potash	4	June	112de
S.C. Potash	8	June	124cd
S.C. Potash	1,1	June, Sept	135bc
S.C. Potash	2,2	June, Sept	188a
Check	0	-	67h

*S.C. Potash is sulfur coated potash from LESCO.

[#]Soil test values followed by the same letter are not significantly different at the 5% level using Duncan's Multiple Range Test.