- STOP 5 -

MODIFYING SOILS FOR TURF ESTABLISHMENT

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A number of the problems which turf managers encounter can be minimized if proper attention is given to the soil at establishment time. The intended use of the turf (relative intensity of use of the area), budget and availability of soil materials influence decisions on soil mix and construction techniques to be used.

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.

Acceptable quality turf can be grown on poor soils if the quality of turf desired is not too high, the intensity of use is minimal, and the maintenance is adequate. A good example is the home lawn established on clay loam or sand subsoils. More careful management is required on these soils.

For many turf areas, use of existing topsoil is the most reasonable approach. Preferrably, 4 inches of a loam topsoil can be used. A depth of 6 to 8 inches of topsoil provides a better soil environment, while 12 to 14 inches is strongly recommended on athletic fields. Good drainage is essential for best results, of course.

In selecting topsoil, give top priority to finding 1) the proper soil texture, followed by 2) availability of soil materials, 3) cost, 4) presence of undesired weeds (such as quackgrass) or seeds, 5) good soil structure, 6) acceptable soil tests, and 7) freedom from harmful chemicals (salts or residual herbicides).

For the more intensively used turfs sandy soils are normally utilized. On golf greens, for example, loamy sand topsoils and even straight sands are preferred. If one is fortunate these may be locally available. If not, soil modification of the existing soil is necessary. How much sand will be required for the optimum mix, depends on the texture of the topsoil to be used, the particle size range of the sand, and the depth of soil needed. Finer sands should be deeper to provide better drainage.

Several different soil mixes have been utilized on these greens established on these plots. The topsoil on site here is a sandy loam. On the general greens area (to the north) the mix used was 1.5 parts topsoil to 1 part dune sand from the Standard Sand Corporation. The dune sand is composed predominantly of medium and fine sands (0.1 to 0.5mm). The soil depth is about 12 inches. This area is not tile-drained but the subsoil in most of the area is loamy with a deep water table so drainage should not be limiting.

For the greens irrigation area the soil mix is 2 parts dune sand to 1 part topsoil. This green is constructed closely to USGA specifications with tile in a pea gravel layer under 13 inches of soil mix. Special attention was given to careful soil mixing and uniform soil depth to insure uniformity. This is necessary for careful irrigation research.

We have also established 3 "specialty" greens. One is constructed with 2NS concrete sand which is commonly available and has been used in several greens in the state. The sand is predominantly coarse and very coarse sands (greater than 0.5mm) and fine gravel. Two inches of peat were tilled into the surface 6 inches.

The Purr-Wick green is built according to the specifications of Dr. William Daniel of Purdue University. The area is completely lined with 2 layers of 6 mil plastic. Tile are installed on top of the plastic and sealed at the outflow. Sixteen inches of dune sand was placed in the area. There are two 20x40 foot areas so we can maintain 2 different water table depths in the greens if desired.

Another green is constructed with 16 inches of sandy loam topsoil. All these greens are tilled with 10 foot spacing.

Soil mixing for the large green was accomplished by putting the soil and sand through a Royer shredder two times. After moving the soil to the appropriate plot area by bulldozer we have very uniform soils for our research.

An indication of the effect of soil mix percentages on soil tests is shown below. These tests were taken before any fertilization. The figures shown are averages for several tests.

Soil Mix	pH	P, lbs/A	K, lbs/A
Topsoil	7.3	160	110
Dune sand	8.3	30	25
2NS sand	8.3	10	25
2 Dune sand: 1 soil	7.8	80	50
1.5 Dune sand: 1 topsoil	7.6	110	90

The dune sand has a pH of 8.3, but the excess free carbonates have been floated off in processing, so the pH will probably drop somewhat with time. The 2NS sand has more free carbonates and this pH will likely stay high. The pH of the irrigation water may keep the soil pH on all plots, however. Phosphorus is adequate in all but the straight sands. The potassium content in the sands is extremely low as expected. We are planning several potassium fertilization studies on these greens to gain insight into proper potassium fertilization on sands.

Acknowledgements

We must particularly acknowledge the Standard Sand Corporation and Tim Eagan for donating over 3000 cubic yards of sand for this site development. This has allowed us to prepare this very uniform soil for research. Ron Foote, superintendent of the Forest Akers Golf Course at M.S.U., loaned the use of his Royer

shredder for mixing all the soil. He and some of his crew provided very helpful suggestions during the soil mixing operations and donated some of their own time to assist us. Many golf course superintendents and other turf industry personnel, as well as students, contributed hundreds of hours to the soil mixing operations, assisting with drainage installation, and establishing grades. Special thanks to Bruce Wolfrom, Barton Hills Country Club, and Gordon LaFontaine, Lawn Equipment Corporation, for organizing these "work" days for us. Kurt Thuemmel, Walnut Hills Country Club, loaned use of his tractor and trencher; John Kosmelski of Travis Pointe Maintenance Co. and Ron Cameron of Cameron Landscaping donated men and equipment for drainage and soil moving. Mark Caverly, Caverly Construction donated time with his bulldozer to build the large greens. The Hancor Corporation donated all the tile used for drainage in these greens.

Without this kind and enthusiastic support, the quality of installation of this excellent research area would not have been possible. An M.S.U. hearty thank you is extended to each and others who may have been overlooked.