SOIL FOR TURF FACILITIES

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In the operation of modern turf-grass facilities, more problems are caused by improper physical condition of soil than probably any other single factor. While other symptoms may be more readily recognized and treated (such as disease, compaction, poor aeration, weeds or fertility problems), the real and underlying cause is usually poor soil physical conditions. It is time that we recognize this basic fact so that we can begin to cure the real problem and stop the never-ending, expensive job of just treating the symptoms.

True, most superintendents and managers of turf facilities inherit their soil problems. How sad it is, however, to see the great number of new facilities (including expensive and complicated golf course greens) that still ignore the importance of proper soil conditions, including surface and internal drainage, soil preparation, and use of amendments and soil conditioning. Certainly there is enough information available to guide the planners and contractors of these jobs in this age of technology.

Why, then, does our industry continue to make these inexcusable and expensive mistakes? As long as we continue to follow this course of extravagant ignorance, we will be burying our heads further in the sand instead of advancing our individual courses, our profession and our industry image.

What are the basic aspects of soil management that seem to be so often overlooked or ignored? First, let us consider the origin of soil.

Soil Origin

In its natural condition, soil is a complex mixture of mineral fragments, decayed plant residues and microscopic organisms. Each of these classes of ingredients have their influence on the nature of the soil. As a natural body, soil developed through a constantly changing pattern which was greatly dependent upon environmental conditions such as temperature, rainfall, plant life and location.

For the majority of cases, the native soil is most influenced by the mineral fraction (called parent material). These soils are called mineral soils. Parent material may have developed from underlying rock formation, or been transported by ice (glacial soils) or water. Thus, soils which developed from rocks through the age-long process of weathering will have properties akin to those kinds of rock. Examples are the heavier, more complex mineral soils such as clays. Usually these soils are more difficult to manage physically (poor internal drainage and aeration) but are richer in fertility potential (will hold more nutrients).

On the other hand, soils which were laid down from water deposits - such as sands, would reflect a lighter, simpler structure. These soils (such as our various Florida sands) are easier to manage physically (better drainage and aeration) but have much lower fertility capacity.

Then there are organic soils, derived from decayed plant residues. These are the muck soils of the rich Everglades region, and the peat deposits scattered around the state.

Native vs. Artificial Soils

If we were farmers, we would be growing crops on one of the types of native soils mentioned above. We would gather information about the nature of our particular soil from state and federal soil scientists who had surveyed, studied, classified nd mapped the major soil formations in every county in Florida (and likewise most other states). This information would provide guidelines as to the physical condition and fertility status of our particular soil, and this information would guide our crop production practices.

However, turf managers are not farmers - and, with few exceptions, (sod producers, perhaps), they are not growing turf on natural or native soils. Instead, they are managing turf facilities which were built by a mass mixing of soil, through excavation, fill, grading and leveling processes. For example, housing projects, apartment complexes, golf courses, athletic fields and highway sites have gone through mass movements of "dirt". When finally completed there usually is not resemblance between the resultant "dirt pile" and the original native soil profile that occurred on that same site.

What does this mean to us practically? It means simply that you have to throw the "book out the window" and start over. None of the previously compiled information of soil scientists applies. It could be that the original soil was improved (richer soil hauled in), but usually it works the other way. Often, damaging foreign material is mixed in (debris, chemical deposits, etc.). Another serious problem is that the mixing process was not uniform and therefore there is much greater variability in the final soil material. This is why we find "spotty" conditions in our turf from area to area. The grass is reflecting the "spotty" soil conditions underlying. In short, all of these factors mean that turf soils are more difficult to manage!

Where do we go from here? Good turf managers have learned the vital importance of proper soil conditions to the success of grass production and maintenance. Therefore the problem is simple. By carefully studying and evaluating the soils you inherit, you can then go

about an intelligent soil management program. For intensively managed turf areas (such as putting greens, tees, athletic fields, etc.) you may need to improve that inherited "dirt pile" by the use of soil amendments. We know generally, for example, that heavy, mucky soils can be improved by the addition of coarse sands; or that infertile, ball bearing sands may become more productive by the addition of heavier soil fractions like clay or organic matter such as peat.

Soil Amended to Improve Physical Condition

But just a minute! What really are we doing when we add the above soil amendments (and many others - natural processed or manufactured)? First and most importantly, we are changing the physical condition of the soil.

The management of turf facilities imposes unique and damaging requirements on the turf. Heavy traffic, continuous wear, regular movement of maintenance equipment, high rates of irrigation - all these factors work to destroy soil structure. Thus, turf soils must be constructed (remember - no more natural soil, so we must construct a usable soil base from that inherited "dirt pile") to take the punishment and still grow good turf.

Here is where the soil amendments come in - to change the inherited soil to a more desirable physical condition. Briefly, to produce good turf under our demanding conditions, soils must have proper pore space. There must be pores to move water through the soil and pores to move air so the grass can "breathe". Approximately half of the soil is made up of solids (the mineral matter plus a small amount of organic matter). The other half is pore space.

Pore space is of two kinds - large (macro) pores and small (micro) pores. Air moves into the soil (and harmful gases move out) through the large pores, except after a heavy rain or irrigation. Then they may be filled with water temporarily, which soon drains out. This is the ventilation system which aerates the soil. The large pores should comprise about half of the total pore space.

Small pores (also called capillary pores) move water through the soil. These pores conduct water to the grass roots (not the opposite - roots don't "grow to water" - water must be there first), from the water table, like a kerosene "hurricane" lamp moves kerosene up through the wick. The finer the pores, the farther the water will move, and the slower.

Proper Balance of Large and Small Pores

The most important aspect of soil porosity is the proper balance between the large and small types of pores. An excessive proportion of large pores will result in a well

aerated but dry soil (like most of our sandy soils). Water will move through (percolate) too rapidly and very little will be retained to grow turf. An excessive proportion of fine pores, on the other hand, will exclude air and may be water-logged (like heavy clay soils.

Thus, once we have determined our given soil situation, and knowing the physical requirements of our turf facility (percolation rates, drainage, etc.), we can then amend the soil to meet our requirements. A great variety of soil materials are available to do this including calcined clay, vermiculite, peat, colloidal phosphate, sand, etc.

If we are fortunate enough to take over the turf facility prior to planting, we have a golden opportunity to shape our future soil condition. If we inherit an established facility, the job is more difficult, expensive and time consuming. It can be done gradually, however, by periodically working proper amendments into the soil as topdressings following soil aeration.

The proper proportion of amendments can be determined by a soil testing procedure known as "mechanical analysis". Many soil testing laboratories and industrial firms can provide these tests, and will help you compound or construct a soil to meet your needs based on such factors as percolation rates, etc.

Once you have amended your soil to a proper physical condition, then the previously mentioned secondary symptoms such as compaction, weeds, restricted roots, etc., will be minimized. Then turf maintenance will be a more enjoyable and successful business.

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EDITOR'S CORNER

BRAD KLEIN, CGCS

The golf season is soon to be replaced by the snowblower season and with that we'll experience some joy and some regrets.

Regrets that our families had to enjoy the hot weather without us. Regrets that turf was lost and replaced by weeds. Regrets that some memberships didn't fully comprehend the problems we experienced and regrets that we didn't accomplish all our goals set for the past season.

It may be hard to find any joy but hopefully you've be-