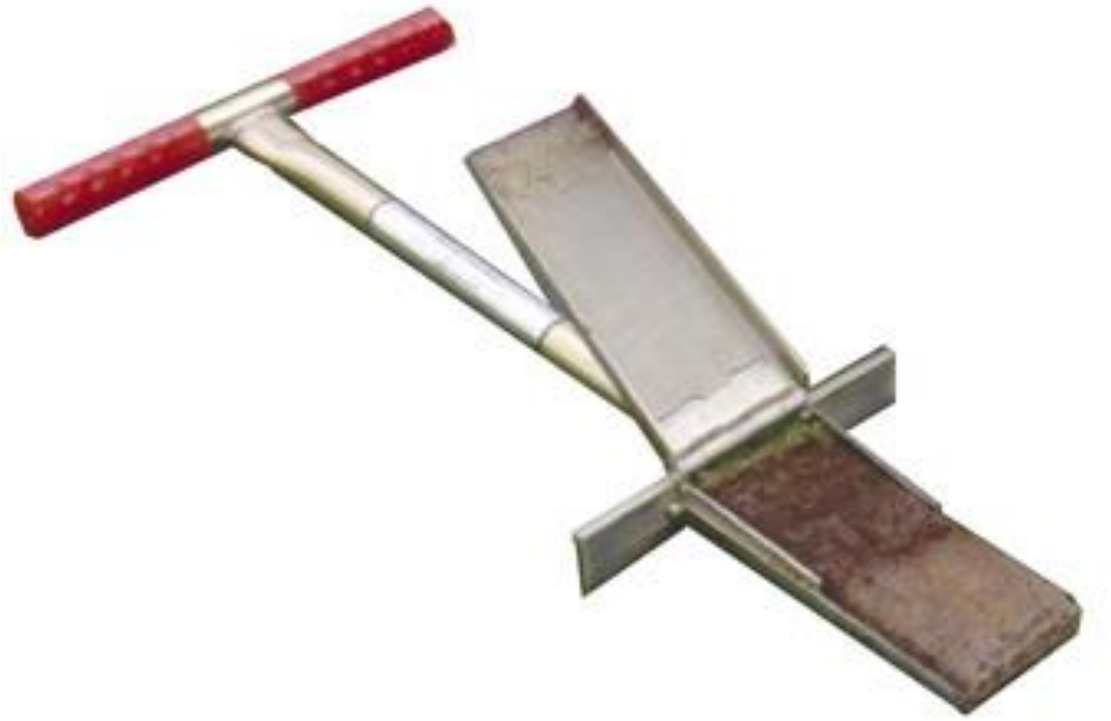
Mascaro Profile Sampler



From the inventor of the original **Soil Profile Sampler** comes the new and improved **Mascaro Profile Sampler.**

The sample is extracted and then the cutter blade is simply opened with the aid of a specially designed hinge. No bolts or screws to fumble with when opening sampler. Sample can be viewed instantly and has the quality you have come to expect from Turf-Tec International.

This well constructed device will take an undisturbed soil profile 7" deep, 3" wide and 1/2" thick. Sample can be photographed and easily replaced.

Sample can be dried and mounted for further reference. Use it for teaching to clearly show the root zone profile and thatch.

MPS1-S Mascaro Profile Sampler

The Turf-Tec Mascaro Profile Sampler

TAKING A SOIL PROFILE SAMPLE

When taking a soil profile sample, be sure cutter blades are securely closed. Next, raise the instrument a foot or two above the turf and drive it straight down quickly. This will make it cut through the surface thatch and make a clean cut through the turf.

Place foot on the ledge and push the sampler in until it is stopped by the footplate. DO NOT FORCE OR HAMMER the sampler into dry or severely compacted soil. Soil should be moist when taking samples for best results. On severely compacted soils it may be necessary to push the sampler without undue force, pull it out and remove the soil. Replace the sampler in the same slot and push it in a little farther. Repeat this until a full sample is taken.

To remove sampling tool, place feet on each side and with a slightly wiggling motion, lift it out of the ground.

To open the sampler, turn the sampler so the hinged side of the cutter blade is facing upward. Grasp the cutting shell with one hand, lift open the hinged side of the cutting blade with the other. If blades tend to stick, lubricate hinge with lightweight oil.

After observation, soil sample can be replaced by holding one hand on the open face of the one cutter blade and carefully inserting the cutting blade with the soil sample back into the turf. Lift the cutting blade straight up, leaving the soil sample in the turf. Use a knife to wedge the turf back against the replaced sample, using the same technique as repairing a ball mark on a green. Step on it and it will be almost invisible.

PHOTOGRAPHING THE SOIL SAMPLES

Hold, or place, soil sample while still in the cutting blade tilted at about a 45-degree angle for great shots for your records. Many photographs taken by USGA agronomists and others are always appearing in print. You may get an exceptional shot suitable for publication or lecture that you may give.

CARE OF YOUR SAMPLER

The hinge will need lubrication with a light oil from time to time. Be sure to keep the sampler waxed to keep it looking good. A liquid car wax does a good job.

A Practical Guide to Analyzing the Soil Profile of Golf Greens and Athletic Fields

Originally written my Tom Mascaro , USGA Green Section Committeeman and published in the USGA GREEN EECTION RECORD July 1992. Rewritten in 2021 by John Mascaro, President Turf-Tec International

Established Golf Greens and Sports Fields can reveal their secrets when you analyze the soil profile as they contain a world of information. The complete life cycle of new or old greens or fields can be easily analyzed by taking a close look at their profiles. With this information, the turf manager can develop a management program that can prevent, or at least minimize, future turfgrass problems. Monitoring the soil profile also helps to establish a record of existing conditions and reveals the progress of the management program. A soil profile can reveal a number of problems which could eventually affect the health and growth of turfgrasses.

The soil profile can be compared to the rings of a tree. Growth rings reveal the secrets of a tree's growth, and just as they tell us its age by counting the number of rings, they also tell us something about the climate and growing conditions by the space between rings. The soil profile also can reveal its secrets if observed properly. An undisturbed soil profile can reveal its origin and gives clues as to whether it is natural or man-made. If man-made, it reveals how well the soil was mixed during construction. A soil analysis can be carried out by allowing the sample to dry and then passing it through sieves to separate it into its component sand particle sizes.

There are numerous ways of exposing an undisturbed soil profile. One way is with an ordinary shovel. Digging away the soil and leaving a clean vertical wall exposes its profile for observation. Another method involves the use of a specially designed tool which extracts a clean soil sample without disturbing the playing surface, like the Mascaro Profile Sampler.

A clean soil profile, to a trained eye, can be read like a book. Close observation can reveal both good and bad conditions that may exist in the top 7-inch layer of soil.

Care should be exercised when taking soil samples so that the profile remains intact and in its undisturbed state. When studying a soil sample, observe everything.

Many times, more than one problem can be revealed. Start at the top of the profile and check each of the following characteristics in this list.

Turfgrass Leaves - Observe the sports fields surface or golf green surface leaves. Use a macroscope to observe the cut of the grass blade. A clean cut is necessary for proper appearance, health, and playability of the plant. A torn, ragged cut indicates that adjustments need to be made to the mower. Severely injured leaf tissue exposes more plant cells to infection from disease organisms. A ragged cut also causes an unsightly brown appearance in the turf. Look for disease spots or lesions on the leaf. Also, check for injury from leaf-sucking insects.

Topdressing - Observe the topdressing and how it is intermixed with the thatch. If recent topdressings have not made contact with the soil below the mat, there is a strong possibility that a layer is beginning to form. Make sure the buildup of topdressing is following the growth rate of the turf.

Thatch - Next, measure the depth of the thatch layer. Generally, the deeper the thatch, the more it affects the general health of the grass plant. The depth of the thatch on a sports field or golf green should form a cushion of no more than about 1/4 inch. A heavy thatch layer can affect turfgrass areas in many ways. It can harbor diseases and destructive insects and can impede the movement of water into the soil. It acts as a filter, keeping nutrients and pesticide from entering the soil. The depth of the thatch layer can have a pronounced effect upon the depth of the root system.

A soil profile tells the story of how a topdressing program has changed the profile over time. A consistent sand topdressing program has built a good rootzone over heavy clay soil.

Mat - Mat layers form beneath, and are intermixed with, the thatch layer. This layer is mostly decomposing thatch and will usually be dark brown or black in color. A heavy mat layer resting on the soil surface can create an impervious barrier when allowed to dry. When wet, it can seal off the free flow of oxygen into the root zone. It also can contribute to anaerobic conditions.

Fungi -Beneficial fungal activity sometimes can be observed in the mat layer. The white or brown mycelia (threads) of these beneficial organisms are in the process of breaking down organic matter which can be recycled as food for the grass plant. When conditions are favorable, disease spores can also germinate and grow rapidly in the mat medium.

Insects - Chinch bugs and other leaf sucking insects can sometimes be found in the thatch and mat layers of a soil profile. These layers provide an almost perfect environment for insect feeding and reproduction.

Grubs, Mole Crickets - Look for grubs and cutworm activity. Mole crickets also can be found in the thatch layer in southern turf. If present, sample other areas to determine if control measures should be taken.

Algae, Black Layer, Slim Mold -
Algae, black layer, and slime molds can often be observed growing in the mat layer, on the soil surface, and in the soil profile. Their growth is usually encouraged by soil acidity and excess soil moisture. These problems can be controlled by raising the pH with lime, and by aerifying and reducing water use.
Undissolved Nutrients - Undissolved nutrients can sometimes be found trapped in the thatch and mat layers, which act as a filter that can slow down or stop the downward movement of slow-release materials such as lime, potash, and other nutrients. Aerification and removal of excess thatch are important objectives of every turf management program.

Soil Texture - Next; study the texture of the soil in the profile. This can be accomplished mechanically, with sieves, or visually. Make a rough estimate of the percentage of sand, silt and lay, and record this information. A small microscope placed right on the sample will magnify the different particles. Many times, we find that the texture is ideal, but the blending and mixing of the components produces pockets of only one of the ingredients. Any concentration of one of the soil components can create problems with respect to water movement and root development in the profile.

Soil Structure - Soil structure indicates how the particles of sand, silt, and clay are held together in clusters in a soil profile. A soil in good tilth will have 50 percent solids, 25 percent space for water, and 25 percent space for air. Soil structure is created by manipulating the soil, using methods such as Aerification, and through freezing and thawing. Soil structure is often destroyed through a combination of rainfall or irrigation and heavy traffic, including maintenance equipment, foot traffic and events. Excess water provides the lubricant for soil particles to slide together, quickly forming a solid, compact mass. Due to their minimal soil content, today's high-sand content athletic fields and golf greens have little soil structure.

Soil Compaction, Bulk Density - Soil compaction or zones of high bulk density can be detected in an

This profile indicates how poorly the soil was mixed during construction. Concentration of any one of the soil components creates problems in water movement and root development in the profile.

undisturbed soil profile. The zone or zones of compaction often can be found in a layer near the top of the profile, due to heavy traffic. They also may be found two or three inches down in the profile, due to the compression of hollow tine Aerifiers at the base of their penetration.

Soil compaction restricts root growth, inhibits the downward infiltration of water and nutrients, and restricts oxygen from entering the root zone. Nutrients remain at the surface of a compacted profile, which in turn encourages shallow root systems. Soil compaction can have a profound effect on the sports field and golf green playability, safety and can also be measured with Penetrometers and the Clegg Impact Tester.

Hard Pan - In some profiles, thin, extremely compacted layers are present deep in the soil. These layers usually are due to the sliding effect of earth-moving equipment that manipulated wet soils during construction. These layers restrict roots, water, and air from moving down. Layers such as these have been known to remain in the soil profile for years.

Pore Spaces - The size of pore spaces can be estimated by using a medicine dropper and squeezing drops of water onto the face of the soil sample. If the droplets disappear quickly, the porosity may be excellent. If the drops of water ball up and move slowly through the soil, it may indicate insufficient pore space. Infiltrometers can also be used to determine pore space.

Hydrophobic Soils - Soils that become hydrophobic (commonly called dry spots) are very hard to rewet and should not be related to compaction problems. When a soil is allowed to dry excessively, natural oils, waxes, and organic materials sometimes prevent rewetting. Taking a sample at the edge of a dry spot will reveal the difference in the soil moisture in each side of the soil profile sample. Droplets of water on the dry side will confirm hydrophobic conditions. Aerification can be used to open the soil. Apply wetting agents to help rewet the soil.

Anaerobic Soils - Anaerobic soils develop in the absence of oxygen. Aerobic microorganisms die out and anaerobic microorganisms take their place. Soil color and odor are two methods used for detecting these conditions. Under anaerobic conditions, iron in the soil will turn grey, blue, purple, or black. The soil has an offensive odor and will smell like rotten eggs, sulpher, or methane gas. The methane gas will, under the right conditions, manifest itself by causing the turf to rise up into bubble-like shapes. Black layers may form under adverse conditions, putting the turf under even greater stress. Deep Aerification and drainage will help clear up these problems.

Layers - A layer or layers of unlike materials in the soil profile can contribute to plant stress, shallow root systems, and waterlogged soil. Layers can create false water tables in the profile. Research has demonstrated that, directly at the layer interface, water will be held until sufficient head pressure is developed to force it through the interface. Several layers, created by topdressing with different materials, represent different management programs over the years.

Layers in the soil profile often are created by ill-conceived topdressing practices. On old, established sports fields or golf greens, a soil profile can sometimes reveal the number of people who have supervised the maintenance program in the past. In one example, a soil profile has revealed as many as seven different layers of unlike topdressing over a period of 12 years, by seven different managers.

It appears that some of the most damaging layers are those that consist of heavy topdressing over thatch and

Soil drainage can be altered by manipulating the soil through hollow-tine aerification, and backfilling with a desirable topdressing mixture.

mat. These layers usually are well-preserved in the profile. This type of layer can be quite thin or very heavy, depending upon how much thatch and mat had accumulated before being buried with topdressing.

Roots - Root development can be observed by lifting away the soil with the point of a knife. Check for white, healthy roots and rhizomes. Use a Macroscope or a high-powered magnifying glass to observe the all-important root hairs. Another method is to soak the entire profile in a shallow pan of water and gradually wash away the soil until the roots ate exposed. Record

Several layers, created by topdressing with different materials, represent different management programs over the years.

the depth and quantity of roots to compare with future profiles. Brown roots are dead roots. Excess quantities of these roots may indicate poor aeration.

Rhizomes - Check the rhizomes. The sampler cutting blades will have severed them. Take note of the size and diameter of the rhizomes. If they are in a viable, healthy state, they will be white and will snap in two. Observe the spears at the end of the rhizomes to see that they, too, are in a healthy state.

Drainage - To test the drainage and capillary pull of the soil sample, while still in the cutting shell, slant it about 45 degrees and drip water at the top of the sample.

Saturate the top of the sample and check the time it takes the water to reach the bottom. If layers are present in the profile, the water will be stopped and will not begin moving down until saturation above the layer is reached.

Preserving Soil Profile Samples

Preserved soil profile samples can be used in many ways. They can become a permanent record of a soil improvement program, or they can be used for teaching or demonstration purposes. Preservation is simple.

Prepare mounting bases by cutting 4” or 8” pieces of either 1/8" of 3/9 inch thick plywood. Sand the edges and spray both surfaces and edges with clear epoxy enamel spray paint and allow to dry. A supply of these can be made before taking the soil samples.

After taking the soil profile sample, carefully slide it on the prepared mounting base. Position the sample so that it is centered.

While the sample is still moist, thoroughly spray it with a clear epoxy enamel coating, continuing until the sample is uniformly saturated. When dry, carefully turn the sample over and spray the other side. Be sure to spray the sides, too. After the first coat is dry, spray again over all surfaces and edges.

Repeat spraying to accumulate at least three coatings over the sample. Sandy samples will usually require more coatings than heavy clay soils.

After the final coat is dry, apply silicone glue to the underside of the sample and attach it to the center of the mounting board. Place a label with your name, date, location, and other pertinent information at the top or bottom of the mounting base.