

Depth Control for the Sweatless Soil Sampler

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Proper Soil Sampling

Soil testing provides farmers with the current nutrient and pH status of their soils, and also provides fertilizer and lime recommendations based on the crop to be grown in that field. This is a critical component in any forage or cropping system. However, any farmer will tell you that traditional soil sampling is a time consuming, labor-intensive process if done correctly. Agronomists recommend that 15 to 20 soil “cores” be taken from random spots in each 15-20 acre section of a given field or pasture, which are then mixed together to produce a single composite sample that provides an accurate picture of the soil nutrient status of that area. Pulling that many soil cores per field over many fields can wear even the most hardy worker down, especially if the soil is dry or hard.

“Sweatless” Soil Sampling

Several years ago the Soil, Water, and Forage Analytical Laboratory of Oklahoma State University developed a “Sweatless Soil Sampler” (<http://soiltesting.okstate.edu/sweatless-soil-sampler>). This soil sampler utilizes a Long Ship Auger-type wood drill bit, a cordless electric drill, and a simple pail to take soil samples. This revolutionary idea provided a way to obtain soil sample cores without the physical effort required when using conventional soil probes, spades, or shovels. It also allowed the farmer to collect all of the soil cores from an area in the pail before having to transfer them to the soil sample bag or box to be sent to the laboratory, which saved even more time.

There was, however, no way to accurately gauge how deeply the drill bit was going into the soil when obtaining a soil core. Many soil testing labs



Figure 1. The original Oklahoma State Sweatless Soil Sampler. (Image courtesy Oklahoma State University.)

recommend that tilled or plowed areas be sampled to a 6 inch to 8 inch depth, which is a normal tillage depth. They also recommend that pastures, hay fields, and no-till areas be sampled only to a 4 inch depth, since any lime applied to correct soil pH in those situations will require a considerable amount of time to move down through the soil profile by water movement alone. The general idea is that if deeper soil cores are taken in these areas, the resulting soil tests will result in recommendations of lime additions for one or more years after the required amount of lime has been initially applied, which may result in over-application of lime and corresponding issues due to a high pH soil in the upper 3-4 inches of the soil profile.

The Modified “Sweatless” Soil Sampler

Thankfully, modification of the Oklahoma State design to accurately gauge soil core depth is a relatively simple process. Simply adding a length of 3/4 inch Schedule 40 PVC pipe to limit the depth of travel of the drill bit into the soil, with exit holes near the bottom of the pipe for the removed soil core, provides an accurate soil depth measurement or gauging device.

The simplest way to determine the length of PVC piping required is to first slide a length of it firmly into a 3/4 inch Schedule 40 PVC male adapter (this may be simply friction-fit together instead of glued, since there will be no pressure and little force on the unit). Next, attach the Long Ship Auger to the drill to be used, and place the unit



Figure 2. Completed PVC pipes used to limit sampling depth (one 4” depth; one 8” depth). Note the hole which will allow soil to exit into the pail when installed.

on a table beside the pipe / male adapter assembly. Move the pipe assembly until the end of the male adapter is the desired soil core depth above the drill bit end, and mark the pipe just at the end of the drill chuck. Cut the pipe at this point and the length is set for that particular drill bit and cordless drill.

The soil exit holes can be made by carefully drilling a 3/4" hole through the PVC pipe just above the male adapter. Be sure to properly secure the pipe unit in a vise before drilling to prevent injury.

If all the soil sampling on your farm will be in pastures, hay fields, and no-till fields, a single pipe and male adapter assembly placed in the pail to allow a 4 inch sampling depth will be sufficient. If, however, your farm also has tilled fields, adding another pipe / male adapter unit that allows the drill bit to penetrate to a 6 to 8 inch depth in the same pail is a simple process. Be sure to mark the depth of sampling on each pipe with a permanent marker in this case to prevent confusion.

Modified "Sweatless" Soil Sampler Construction

Tools required:

- Electric Drill
- 1-1/8 inch hole saw (for pail bottom)
- 3/4 inch hole saw (for soil exit hole)
- Hacksaw or pipe saw

Materials required:

- Small pail (sturdier pails with thicker walls and flat bottoms are better)
- 3/4 inch Schedule 40 male adapter
- ~12 inches of 3/4 inch Schedule 40 PVC pipe (length depends on drill bit length)
- 3/4 inch conduit nut
- 3/4" Long Ship Auger drill bit
- Cordless drill

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Figure 3. Completed Modified Sweatless Soil Sampler. This model has two sampling tubes installed, one for a 4 inch sampling depth, and another for an 8 inch sampling depth. Note the conduit nuts on the bottom of the pail holding the male adapters in place.



Figure 4. Completed unit showing the drill bit extending 4 inches past the male adapter after the drill chuck comes in contact with the pvc pipe.



Figure 5. The completed unit in operation, showing soil exiting the pipe from the holes on both sides of the pvc pipe.

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