Testing and Selecting Soil

A good building soil has approximately 15-25% clay content and less than 30% silt. There are many kinds of suitable soil types: clay, sandy clay, sandy clay loam, clay loam, and loam. There can be a lot of complexity and things to think about with finding a good soil and it can be overwhelming to those who are new to earthen building. But just take a deep breath and relax!

In the end, its all very intuitive and you will learn to distinguish suitable soil for cob mostly by sight and feel. With some experience, all of the categories, numbers, and percentages won't even pass through your mind. You can stop thinking analytically and just judge its quality with your senses of touch and sight.

The aggregate (sand) and silt portions of soil will stay the same size whether they are wet or dry. These tiny aggregates need the clay to bind them together like a mortar. The clay by itself expands when its wet and contracts when its dry, thus making it unstable on its own. This is why you have to test your soils and determine their composition. You have to find a soil that will allow you to create the right balanced ratio.

Places to Look for Clay-Rich Soil

First, check the soil at your building site. The closer you can source your soil the better and more efficient you will be. Soil can be a lot of work to transport.

Do soil tests in different locations around your property: tops of hills, places where water pools after a storm, places where the ground cracks when its dry, or generally anywhere beneath your feet.

Soil Tests

There are lots of ways to test soil and analyze its suitability for cob. This is a list of some of the simple field tests that you can perform. Its not really practical to make your soil testing any more complex than these methods. Again, you will eventually gain a sensory discernment for what good soil is and you won't even need to use these tests the majority of the time.

Snake Test

Make a small ball of moistened soil, roll it out to make a "snake", and wrap it around one of your fingers. If you have a high clay content then you should not have much cracking in the snake.

Ribbon Test

Take a ball of soil in your hand and stretch it out between your thumb and index finger to make a ribbon. See how long you can stretch the soil out before it breaks off. If the soil stretches a few inches then you likely have a medium to high clay content. You can also do this with moistened soil. It should stretch and stay together even longer like this.

Arm Test

You can perform this simple test if you have hair on your forearms. That may sound silly, but this test can determine if there is clay in your soil. Just smear a bit of wet soil onto your arm, let it dry out, and then try to rub it off. If it pulls on the hair of your arm then that means there is clay in the soil. If it just rubs right off and feels dusty then that usually means that it's a sandy or silty soil. Note: This test can also be performed on a hairy leg.

Jar Test

The jar test is, in my opinion, the most complex soil test that you should need to perform. Its still quite simple too!

To get an accurate soil sample for this test never use topsoil, only use subsoil, remove stones from the sample, and break up any soil clumps before performing this test.

1. Select a variety spots for soil sampling. Dig down through the topsoil until you reach a clear subsoil layer. The subsoil layer will have a range of distinct colors such as: oranges, pinks, grays, and browns, and it is easy to distinguish from the topsoil layer. Subsoil is also harder to dig through than the soft topsoil.

2. Use one jar for each test (32 oz. mason jars work great), and fill each one with soil samples making sure not to include any topsoil or stones that could distort your results.

3. Fill your jars one-third to one half full with subsoil samples and break up any clumps with a stick or tool.

4. Add clear water into jars. Fill to just below the top of the jar.

5. Tighten the lid on the jars and shake each one vigorously for about thirty seconds to a minute making sure that all the clumps are well broken up.

6. Set your jars on a level surface and let the sedimentation take place. For the most accurate results, don't move the jars for at least 48 hours. Complete settlement can take days or even weeks depending on the type of clay, but it can also sometimes only take 30 minute to an hour. The clay settles out the slowest so its best to wait long enough for an accurate reading. If the water becomes clear within 15 minutes then there is a good chance that there is not enough clay content in the soil.

7. Once your sedimentation has occurred and everything has settled out the water should become clear and you should be able to distinguish the layers clearly in each jar to determine the amount of each component in the soil. Take a marker and mark out each individual layer on your samples without disturbing the soil inside.

You can measure the top layer of clay and divide it by the total height of all the material in the jar to get an approximate percentage of the clay. You can also do this math with the sand and silt.

Things you can do now:

- Select at least 3 locations to test the subsoil
- Take samples from each location
- Observe and analyze the soils you find