The goal of this research study is to find the most efficient way to determine what soil is made up of. Specifically, how much sand, silt, and clay it has. This matters because different soil compositions dictate how water flows through the medium. The way this water flows can affect how plants grow and how stable the ground is. Findings may be used in applications such as building, farming, and retention pond creation.

There are two ways to classify soils: 1) the sieve hydrometer method (SHM) and 2) the laser diffraction method (LDM). With SHM you dry the soil and shake it through screens of different sizes. For particles that are smaller and fall through the smallest screen, you mix them with water and measure how fast these tiny bits settle. Brownian motion causes finer particles to jitter in the water, making them difficult to measure accurately. This method is also time consuming. With LDM, a laser is shone through soil particles dispersed in water. Bigger particles scatter this light differently than the smaller particles. A computer is connected to the laser and sorts these particles into different size classes. This method is faster and better at finding these miniscule particles.

Our two main questions:

1. Do these methods produce different soil classifications?
2. Is the laser method better at finding those smaller particles?

Methods:

Collected a total of 75 samples from 5 sites across Florida. Each of these sites had a different soil type and texture corresponding with its geographical area. Brought these soils to the lab and performed both SHM and LDM on each of the soils.

Findings:

The two methods did not always agree. LDM often found more fine stuff like silt so it classified the soil differently. LDM was also better at spotting the finer particles such as silt and clay and was way faster - LDM took 13 hours per soil while SHM took 74 hours!

Implications:

For soils with a large quantity of fine particles the laser method works better and faster. For sandy soils, either method works fine. Consistency of method is important because they might not always match - so stick with one.



