# SOIL TEXTURE TEST (SAND SILT CLAY)
## BOUYOUCOS HYDROMETER METHOD

### WOODS END SOIL TEXTURE METHOD

Soil texture is a dynamic feature of all soils and varies widely across soil series, soil orders and landscape. The actual particles found in soils extends over 4-orders of magnitude in size and significantly influence water holding capacity & infiltration, plasticity, nutrient storage and microbial colonization. Indirectly, texture affects virtually all choices for soil management and cropping.

Woods End Soil Lab offers a precise analysis to reveal the relative portions of sand, silt and clay. The method is based on Particle Fractionation with a Bouyoucos Soil Hydrometer[1] [2]. The process measures the relative portions of dispersed soil as they fall in a water cylinder over a 24-hour period. The results can be graphed on log-paper (Fig 1) showing a proportional settling rate, from which sand, silt and clay amounts are interpolated. This forms the official texture class (see Table 1).

**Fig. 1 Soil Particle Size Distribution in Suspension**

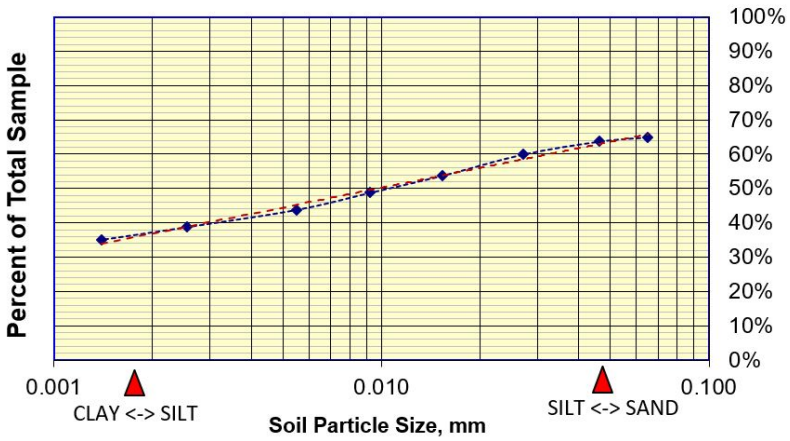



**Table 1.**

| Reference USDA Scheme Particle Class | Size, range |
|---|---|
| very coarse sand | 2 - 1 mm |
| coarse sand | 1 - 0.5 mm |
| medium sand | 0.5 - .25 mm |
| fine sand | 0.25 - 0.1 mm |
| very fine sand | 0.1 - 0.05 mm |
| Silt | 0.05 - 0.002 |
| Clay | < 0.002 |

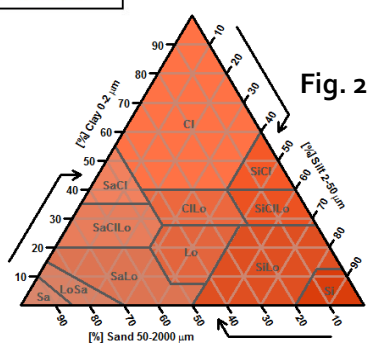
The basic for determination of texture by this method is based on the original 1851 Stoke's Law of the relation between the radius of a particle and its rate of fall in a liquid at standard temperature. Woods End's informative report (Table 2) represents the datapoints seen in Fig 1 fit to the texture class of Fig 2. [3].

**Table 2.**

| TIME of Test | 0.5 | 1 | 3 | 10 | 30 | 90 | 300 | 1275 |
|---|---|---|---|---|---|---|---|---|
| **40** | 26 | 25.5 | 24 | 21.5 | 19.5 | 17.5 | 15.5 | 14 |
| % Suspension | 0.6500 | 0.6375 | 0.6000 | 0.5375 | 0.4875 | 0.4375 | 0.3875 | 0.3500 |
| Size, µm | 0.0650 | 0.0461 | 0.0269 | 0.0150 | 0.0088 | 0.0051 | 0.0028 | 0.0014 |
| **RESULT** | **SAND = 36.2%** | | **SILT = 27.0%** | | **CLAY = 36.8%** | | CLAY LOAM | |

Soil texture may change slowly over time and does vary sharply with depth of soil sampling. Soil samples high in organic matter are difficult to classify by texture due to the influence of organic colloids on the apparent settling of soil particles. It is recommended to test soils that are previously unknown, or for which depth information is lacking and when management practices, tillage and other disturbances occur.

**Fig. 2**




[1] Hydrometer Test Method: Methods of Soil Analysis American Soc. Agronomy Monograph #9 Vol 1: 43-5.1

[2] Bouyoucos GJ. Hydrometer method improved for making analysis of soils. Agron. J. 1962; 54:464-465.

[3] The International ISSS classes of texture differ on the boundary of sand – silt.