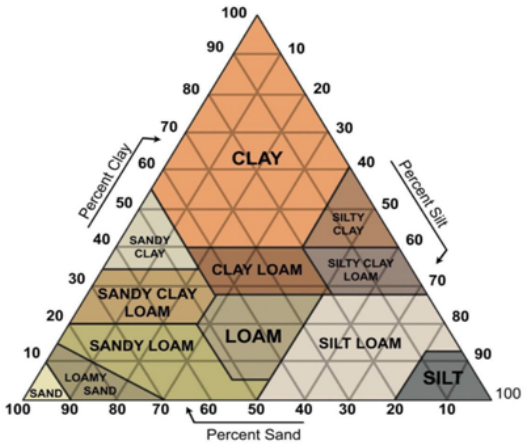
SOIL TEXTURE

DEFINITION

Soil texture refers to the relative percentage of sand, silt and clay in a soil. Natural soils are made of soil particles of varying sizes. It is an important soil characteristic because it will partly determine water intake rates (absorption), water storage in the soil, and the ease of tillage operation, aeration status etc. and combinedly influence soil fertility.

TEST

The soil jar test establishes the proportion of clay, silt, and sand of soils, which is key to understanding the retention of water and nutrients. Using the texture triangle will provide a rough estimate on the percentages of sand, silt, and clay in the soil.



SOIL TEXTURE

FIELD

- **Material :** 1 spade, 1 glass jar with lid per soil sample (use similar jar format to compare the samples), 1 permanent marker, Ruler/tape measure, water, camera (can be cellphone).
- **Time:** around 15 minutes in the field; then up to 24 hours to read the results (until the clay decanted, water will be clear again).
- **Procedure:**

1. Choose the sampling points where you want to look at the soil. Ideally you will sample at your reference site and the places you need to measure on the same day.
2. Mark your glass jar(s) at the halfway point of the total volume, and then split it each half further in two (you should end up 4 marks at ¼, ½ , ¾ and $^{4/4}$ of the jar's capacity)
3. Remove a mix of soil from 0-30 cm deep from each sampling spot. Remove the organic matter from the surface (above ground)
4. Remove any large rocks or organic matter, then break up all the lumps
5. Fill half of the jar(s) with soil
6. Fill the jar(s) to the ¾ mark with water and shake vigorously for 3 minutes until soil is suspended in water
7. Set down the jar(s) on a level surface where it/they can be left undisturbed for at least a day and start the timer
8. After 1 minute mark on the side of the jar the level of settled particles at the bottom – this is the volume of sand in the sample(s)
9. After 2 hours mark on the side of the jar the level of settled particles – this is the volume of silt in the sample(s)
10. After the water has cleared (this may take longer than 24 hours) mark on the side of the jar the level of particles – this is the volume of clay in the sample(s)

SOIL TEXTURE

11. Using a ruler, use the distances on the jar to calculate relative proportions of sand, silt and clay in soil sample(s)and write it down in the table (below)
12. Take a picture of the jar for data record and collection.
13. Using the soil texture triangle below, determine the type(s) of soil you are working with.

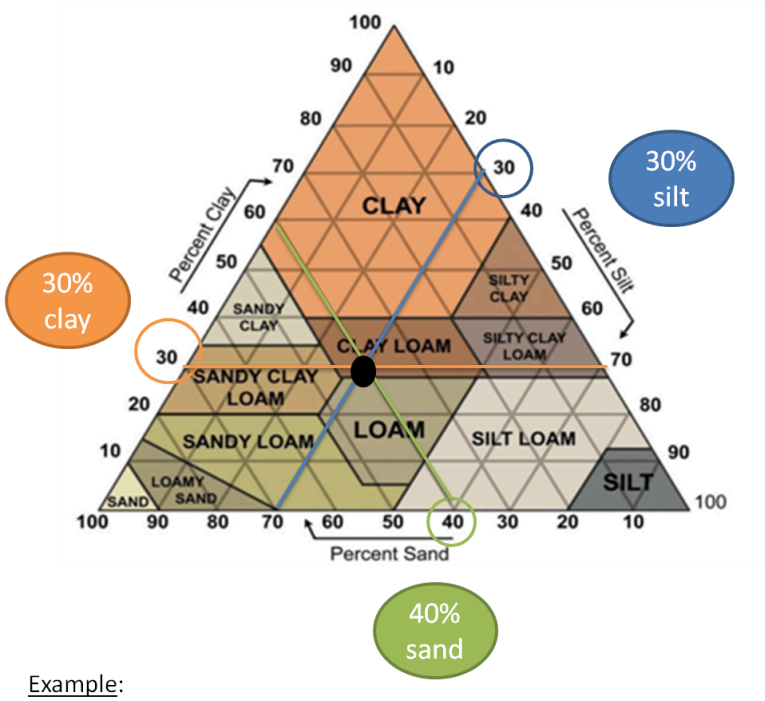
RESULTS

1. Write here the results for your jar tests : fill in each column for each jar test

	Jar soil example	**Jar test 1**	**Jar test 2**	**Jar test 3**	**Jar test 4**	**Jar test 5**	**Jar test 6**
Sampling location	Zone 1, Forest site						
Sample date	20/04/2024						
Total	10 cm = 100% soil						
Sand	4 cm, 40%						
Silt	3 cm, 30%						
Clay	3 cm, 30%						
SOIL TYPE	CLAY LOAM SOIL						

SOIL TEXTURE

2. Use your results in the texture triangle to determine your soil type for each of your sample points:



Example:
40% sand, 30% silt, 30% clay
The soil type is determined with the texture triangle by drawing the correspondent lines and mark the point where they join in the middle.

INTERPRETATION:

- Chemical and physical properties of a soil are related to soil texture.
- Fine textured soils generally have a higher capacity for water retention, whereas sandy soils contain large pore spaces that allow leaching:
    - Sandy soils contain large particles or grains and allow for easy root development/penetration, but they do not hold water/nutrients for long.
    - Silty soils contain medium sized particles and hold water, nutrients and roots well. However, silty soils are easily washed away through surface runoff and/or could become compacted.
    - Clay soils have very small particles with a high surface area-mass ratio, which means that clay soils can hold water and nutrients very well, perhaps

SOIL TEXTURE

too well sometimes... Too well, because they may form 'hard pans' when dry and/or become heavily compacted when wet, which makes for difficult penetration by roots and even garden tools.

- Particle size and distribution will therefore affect your soils' capacity for holding water and nutrients.
- Often described as the 'best garden soils', loamy soils are made up of a mix of 30-50% sand, 30-50% silt and 20-30% clay, with 5 to 10% organic matter.

HOW TO IMPROVE YOUR SOIL TEXTURE

- ☐ **Improving clay soil:** Deeply dig in as much organic matter (compost, manure) as possible to loosen the particles and improve structure; if the soil is too hard to work spread several centimeters on the surface. Do this in autumn when the soil is dry but still workable. Planting cover crops during fallow periods has similar benefits. Never walk on clay soil when wet as this will cause compaction; you can use boards to distribute your weight, or make paths. Another solution is raised beds which also improve drainage.
- ☐ **Improving silty soil:** Dig in organic matter annually to improve/preserve structure. Several centimeters of organic matter should be forked in or spread over the soil surface in spring or autumn. Use wooden boards or permanent paths to avoid compacting the soil. Try to prevent erosion of the soil through flooding or run-off.
- ☐ **Improving sandy soil:** Sandy soils are hungry and thirsty. They need lots of organic matter to bind the particles together and prevent loss of water and nutrients. It is best to work in organic matter in spring or autumn. Apply mulch in early spring whilst the soil is wet from winter to keep the soil moist. Sandy soils lose nutrients quickly so crops can become hungry; use liquid foliar feed like compost tea to give plants a boost.

***Note:** As with most physical attributes of soils, soil texture is more of an informative indicator rather than something we want to change. Of course, this too can be monitored over time if we aim to effect change in terms of soil texture, but we need to be aware of the (slow) expected rate of change.