This activity, and more like it, can be found in 4-H Canada's **Steeped in Soil Activity Book**.

Learn more at **4-h-canada.ca/steepedinsoil**

Let's Dig In! Soil Identification 101

When working with soil, it is important to know what type of soil you are dealing with. Here are a variety of simple soil identification tests that you and your members can do to figure it out! Try using soil samples from different depths, and from different fields, backyards, and gardens.

Remember: There are three main types of mineral particles found in soil: sand, silt, clay. Sand is the largest particle and is described as having a "coarse" texture (think about the texture of sand at the beach). Clay is the smallest particle and is described as having a "smooth" texture (think about it feeling slippery, sticky, and with no grit, like the clay you might use if you were sculpting something). Silt is the medium sized particle, and is described as having a "medium" texture (think about something between the sand and clay, like a fine grit sand paper).

Figure 7 on page 18 gives step-by-step instructions for these tests in a flow chart form.

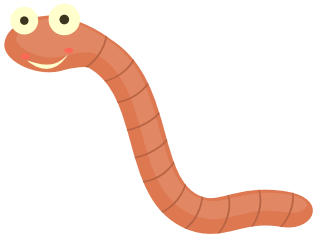
Feel Test[vii]

This test is really simple and can be used as a general identification test.

1. Take a bit of the soil you are testing, moisten it with a bit of water, and rub it between your fingers.

- If it feels gritty: there is sand in this soil. This soil has a coarse texture.
- If it feels smooth: there is a silt in this soil. This soil has a medium texture.
- If it feels sticky: there is clay in this soil. This soil has a fine texture.

As you are doing these tests, think about the biological, chemical, and physical properties of the soil mentioned on page 10.



Casting or Squeeze Test

1. Take the soil you are going to test and slightly moisten it.

2. Squeeze the moistened soil in your hand to form a ball.

3. Open your hand and gently poke the soil ball.

- Coarse textured soils (sand or loamy sands) will break with slight pressure.
- Medium texture soils (sandy loams and silt loams) will stay together, but change shape easily.
- Fine textured soils (clayey or clayey loam) will resist breaking, and resemble clay that you may have played with in art class.

Ribbon Test

In this test, you'll get your hands messy and identify the makeup of the soil based on how well it sticks together and produces a 'ribbon'.

1. Squeeze a moistened ball of soil out between thumb and fingers. This will produce a 'ribbon' of soil that squeezes out between your thumb and forefinger.

- Ribbon is less than 2.5 cm
  - Feels gritty = coarse texture (sandy) soil
  - Not gritty feeling = medium texture soil high in silt
- Ribbon is 2.5 cm to 5 cm
  - Feels gritty = medium texture soil
  - Not gritty feeling = fine texture soil
- Ribbon is greater than 5 cm = fine texture (clayey) soil
  - A soil with as little as 20% clay will behave as a clayey soil.
  - A soil needs 45% to over 60% medium to coarse sand to behave as a sandy soil. In a soil with 20% clay and 80% sand, the soil will behave as a clayey soil.

Measurement and the Soil Texture Triangle

In this test, you'll use water to separate your soil sample to figure out how much sand, silt, and clay is in the sample. Please note that this is a test that can take time and be spread over a couple of meetings, so read through the instructions to come up with a plan that is best for your club's meeting schedule.

Figure 6: Measuring soil after it settles in a jar.

1. Spread the soil sample in a thin layer on paper towels or newspaper. Pick out any large clumps, rocks, roots, and leaves. Prepare this ahead of time, or have members set it out one meeting, and come back to it the next meeting.

2. Once the soil sample is dry, break up any remaining clumps to get an even consistency of the soil.

3. Pour the soil into an empty, clear pasta sauce jar, with a lid.

4. Add water until the jar is ¾ full.

5. Put in a teaspoon of powdered, non-foaming dishwasher detergent.

6. Screw on the lid and shake vigorously for 10 to 15 minutes. This shaking breaks up any tiny soil clumps, separating the soil into its different particles (sand, silt, and clay).

7. Soil particles will settle out according to size. After 1 minute, mark on the jar where the particles have settled. This is the depth of the sand.

8. After 2 hours, mark on the jar where the particles have settled. This is depth of the silt.

9. When the water clears, mark this final level on the jar. This is the amount of clay, and typically takes 1-3 days for these clay particles to settle, so the club leader or a senior member could take the jar home and do this measurement for the group.

10. Have everyone record their measurements of the thickness of the sand, silt, and clay layers.

a. Thickness of sand deposit: _____mm

b. Thickness of silt deposit: _____mm

c. Thickness of clay deposit: _____mm

d. Thickness of total deposit: _____mm

Remember: Loam is a type of soil that is a mixture of soil, silt, and clay.

11. Calculate the percentage of sand, silt, and clay. Challenge members to try this math on their own, or have senior members support younger members. Alternatively, do the calculations as a group.

$$\frac{\text{[clay thickness]}}{\text{[total thickness]}} = \_\_\_\_\_ \text{ \% clay}$$

$$\frac{\text{[silt thickness]}}{\text{[total thickness]}} = \_\_\_\_\_ \text{ \% silt}$$

$$\frac{\text{[sand thickness]}}{\text{[total thickness]}} = \_\_\_\_\_ \text{ \% sand}$$

Sample of calculations:

$$\frac{\text{2 cm of clay}}{\text{10 cm total thickness}} = \text{20\% clay}$$

$$\frac{\text{5 cm of silt}}{\text{10 cm total thickness}} = \text{50\% silt}$$

$$\frac{\text{3 cm of sand}}{\text{10 cm total thickness}} = \text{30\% sand}$$

Using the Soil Texture Triangle, this soil sample would be a silt loam.

12. Using these percentages, refer to the Soil Texture Triangle in your kit to identify the type of soil.

13. Repeat these steps for each of the different soil samples you are testing.

Sieving

If you have access to a set of sieves of different sizes, you can filter dry samples by shaking them through the different sieves. You can also make your own with window screening, kitchen sieves, panty hose, fishing nets, or mosquito nets. Get creative and see what you can make!

For example, chicken wire could filter out gravel, window screen could separate the sand, fine plastic mesh could filter the silt, and pantyhose could be fine enough to separate the clay.

The process:

1. Once you've made your set of sieves, arrange them with the largest holes on the top, and the finest sieve on the bottom.

2. Pour your soil sample over the top sieve. The largest particles will remain on top, while the finer particles move through the sieves to the bottom layers.

3. You may have to gently tap the sieves to get your soil sample to get the soil to pass through all of the filters.

Once you've filtered out your soil sample into the different components:

1. Weigh the amount (g) that is filtered out as sand with the digital scale from your kit.

2. Weigh the amount (g) that is filtered out as silt.

3. Weigh the amount (g) that is filtered out as clay.

$$\frac{\text{[clay weight]}}{\text{[total weight]}} = \_\_\_\_\_ \text{ \% clay}$$

$$\frac{\text{[silt weight]}}{\text{[total weight]}} = \_\_\_\_\_ \text{ \% silt}$$

$$\frac{\text{[sand weight]}}{\text{[total weight]}} = \_\_\_\_\_ \text{ \% sand}$$

Using these formulas, compare the percentages to the Soil Texture Triangle to identify the type of soil you have.

CONSIDER WATCHING THIS VIDEO from the Missouri University of Science and Technology for an in-depth look at how to sieve soil samples. While it is at a university level, it will give you an idea of how to conduct this soil test and what you are trying to achieve.

https://www.youtube.com/watch?v=QqxfwpUtEoQ

Soil Test Flow Chart

Consider using this flow chart to walk you through the different tests and help you identify the soil samples you are using.

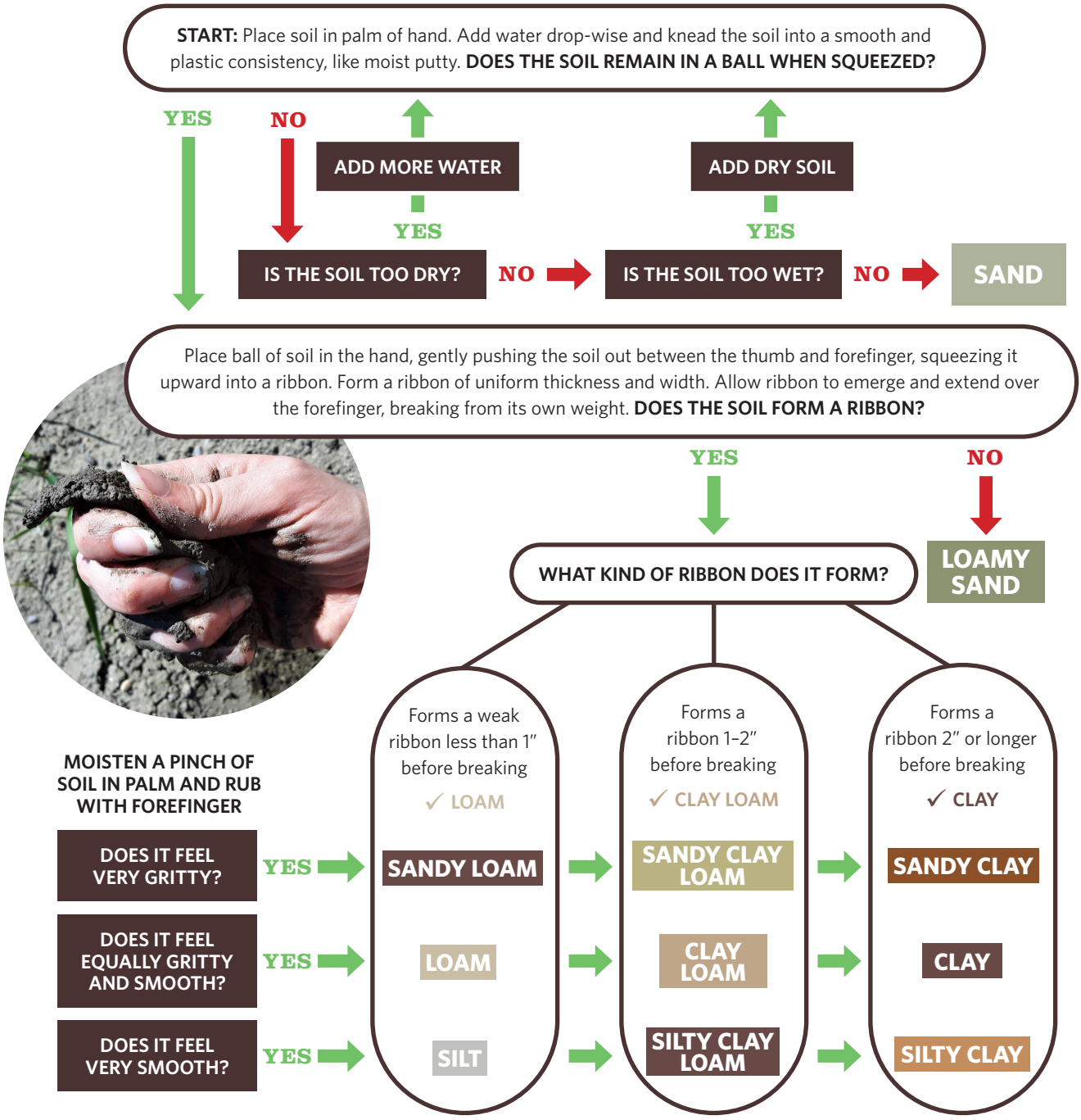


Figure 7: Soil Flow Chart.[viii]