Márta – Fócas ar Ithir

Paddy Madden continues his series of SESE tips

March Zoom in on soil

Background information

Soil consists of:

Mineral matter – silt and clay from broken down rocks;

Organic matter – humus from dead animals and plants;

Chemical compounds – mineral nutrients like nitrogen, phosphorous, potassium and calcium which feed plants;

Air, water – found in soil cavities;

Microscopic life – bacteria and fungi;

A mnemonic for quick recall: **All hairy men will buy razors**. (**A**ir; **H**umus; **M**ineral nutrients; **W**ater; **B**acteria and other microorganisms plus soil creatures; **R**ocks).

Layers

Three layers make up the soil profile: layer A is topsoil; layer B is subsoil; layer C is bedrock. This rock defines the type of soil in a place.

Soil pH

- A soil is either acidic (sour), neutral or alkaline.
- Neutral=pH 7.0. A pH reading between 6.5 and 7.0 is suitable for most plants.
- Below 6.0 soils are acidic. Suitable for heathers, rhododendrons, azaleas, camellias.

Mineral nutrients

- Nitrogen (N) – good for shoots.
- Phosphates (P) – good for roots.
- Potassium (K) – good for fruits.

Active learning indoors and outdoors

Indoors

- Place soil in a sieve and shake it over white paper. Examine with hand lenses.
- Get a 2 litre clear plastic bottle and cut off the neck and shoulder. Put two handfuls of soil into the container. Add water to cover. Shake vigorously using cardboard as a lid. Leave overnight to settle. Children will be able to observe the different layers. Label these. Try soils from different parts of the school grounds. See www.blackrockec.ie, click on 'Paddy's School Garden' for video on above activity.

- Get 3 containers similar to the one pictured below. Put clay in one, loam in the second and sandy soil in the third. Shake and observe the layers. Which one has the most humus? (Floats on top).

Safety note: If children are handling soil from the grounds, get them to use disposable gloves. Often this soil is contaminated by domestic animals.

- Investigate the porosity of soil. Cut the top parts from the shoulder up off 4x 2 litre plastic bottles. Tie small pieces of J-cloth around the openings. Using these top parts as funnels place them over the cut bottles. Three quarters fill each funnel with clay soil, sandy soil, peaty soil and loamy soil. Pour equal amounts of water into each and leave for an hour. Measure the amount of water in each to determine the soil's porosity.

- Make a wormery. See www.blackrockec.ie, click on 'Paddy's School Garden' for video on same.

- Use an apple to demonstrate the thin layer of soil on which we depend for our food: ● Slice off three quarters. The top surface of these represents the amount of water covering the earth. Insert a cocktail stick with a label stating 'water'. ● Slice the remaining quarter in half. One eighth of the surface is inhospitable-mountains and ice caps. Label. ● Slice one eighth in half. One sixteenth is too wet, dry or rocky. Label. ● The other sixteenth is suitable for food production. ● Slice one sixteenth in half. ● One thirty second is covered with roads, houses etc. so only one thirty second can grow food for humans and animals. See www.nsta.org

Outdoors

- Use a pH kit to test the soil. Purchase in a garden centre. Use soil c. 5cm below surface. Red indicates acid soil; blue indicates alkaline soil; green indicates neutral.
- Cheap test! Take soil from 5cm below surface. Place in container. Allow to dry. Add 120ml of vinegar. Bubbling indicates alkaline soil. No reaction may indicate acidic soil. Get fresh soil and place in container. Add 120ml of water. Then add some baking soda. Fizzing indicates an acid soil. (AG)
- Make compost to improve the soil. Ensure a good balance of 'greens' (vegetable peelings, fruit scraps, young weeds, grass cuttings) and 'browns' (shredded cardboard, shredded paper, tough vegetable stems). Some recommend a ratio of 50:50 greens to browns; some 2:1 greens to browns. See www.blackrockec.ie, click on 'Paddy's School Garden' for video on composting.
- Check soil health by digging out a 30cm x 30cm square of soil to a depth of 15cm. Count the earthworms. There should be at least 10 if it's healthy.(AG)

Red soil in Australia

Soil types

TYPES	CHARACTERISTICS
Peaty soil	Made up of organisms living or dead. Has very few rock particles
Sandy soil	Light soil consisting mostly of coarse particles of sand. Drains well. Cannot retain water. Plant nutrients easily washed away. Add organic matter to improve it.
Clay soil	Consists of tiny mineral particles closely bonded together. Drainage and aeration poor. Very fertile. Becomes rock-hard in hot, dry weather. Add organic matter to improve it.
Silty soil	Fine soil consisting of mineral particles smaller than sand and bigger than clay.
Loamy soil	Soil with a good balance of coarse sand, medium-sized silt, fine clay and humus. Ideal for growing.

Left: Leaf mould enriches soil

Literacy/litearthacht

- **Soil/Ithir:** The top layer of the earth's surface, consisting of rock and mineral particles mixed with organic matter. www.thefreedictionary.com *An ciseal is uachtaraí de dhromchla an domhain, déanta as carraigeacha agus cáithníní mianra atá measctha le hábhar orgánach. www.focal.ie.*
- **Clay/Cré:** Sedimentary material with grains smaller than silt. It gets sticky when wet and hard when dry. *Ábhar dríodrach le gráinní níos lú ná cáithníní siolta. Éiríonn sé greamaitheach nuair a bhíonn sé fliuch agus crua nuair a bhíonn sé tirim.*
- **Loam/Dúrabhán:** Fertile soil made up of a good balance of clay, silt and sand. *Ithir thorthúil a bhfuil cothromaíocht mhaith de chré, de shiolta agus de ghaineamh inti.*
- **Silt/Siolta:** Sedimentary material finer than sand and coarser than clay. *Ábhar dríodrach atá níos míne ná gaineamh agus níos gairbhe ná cré.*
- **Alkaline soil/Ithir alcaileach:** Soil with pH of 8.5 or above. *Ithir le pH de 8.5 nó os a coinn.*
- **Acidic soil/ Ithir aigéadach:** Soil with pH below 6. *Ithir le pH níos ísle ná 6. Buíochas do Marie Whelton (MIE) don aistriúchán.*

Useful websites

- **Powerpoint on soil:** *www.moyleparkcollege.ie/Geography/geo/.../soils.ppt*
- **Soil profiles:** *www.youtube.com/watch?v=_Vho8o_ObrQ*
- **Good for facts:** *www.kidsgeo.com/geology-for-kids/0002-the-earths-soil.php*

Useful books

- *I Before E (Except After C): Old-school Ways to Remember Stuff* by Judy Parkinson (Michael O' Mara Books, 2007, London)
- *Amateur Gardening Magazine* 23 Oct 2010 & 9 Feb 2013

Strands covered this month

Environmental awareness and care, Materials, Living things, Natural environments.

Paddy Madden *lectures on SESE in the Marino Institute of Education. He also gives short courses to whole staffs on school gardening. Paddy's book,* **Go Wild at School**, *has recently been reprinted. Available for €15 plus €3 p&p from paddy.madden@mie.ie His podcast on teaching about spring: Programme 129 www.insideed.com*