Know Your Soils

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Texture

- Soil texture is defined by the **proportion of three types of particle**; the small clay particles (less than 0.002 mm), silt (between 0.002 and 0.06 mm) and sand (between 0.06 and 2.0 mm).

- Texture is measured by either **particle size distribution** (laboratory) or **hand texturing** (free!)

Sand, silt and clay

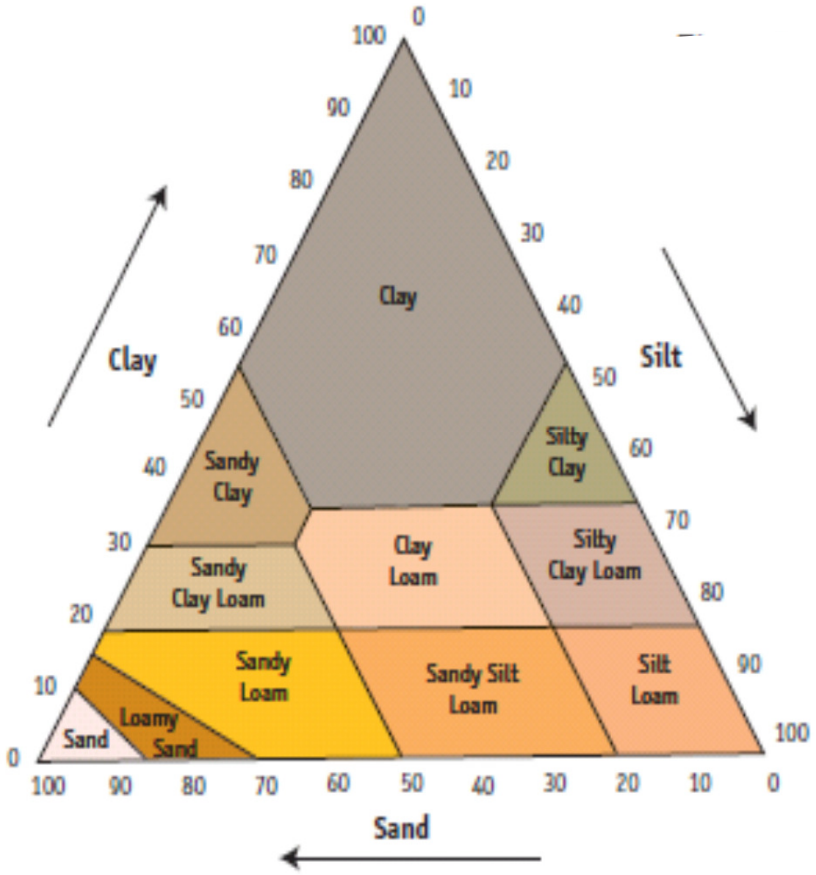
Sand – mostly quartz, feldspar and mica (fragments) traces of metals, low surface area

Silt – mineralogical composition is similar to sand, intermediate surface area

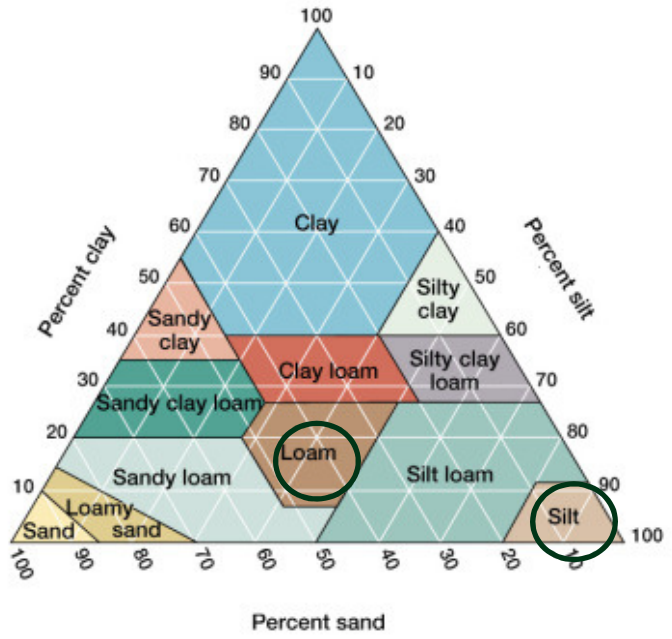
Clay – reactive fraction of soil, colloidal, large surface area, high charge density, more metals

Texture Triangle

The soil textural triangle uses the proportions of these three particles to describe the soil texture of mineral soils in the field. Organic (peaty) soils are not included.



UK soils (Soil Survey of England and Wales)



USDA texture triangle

Field assessments of soil texture

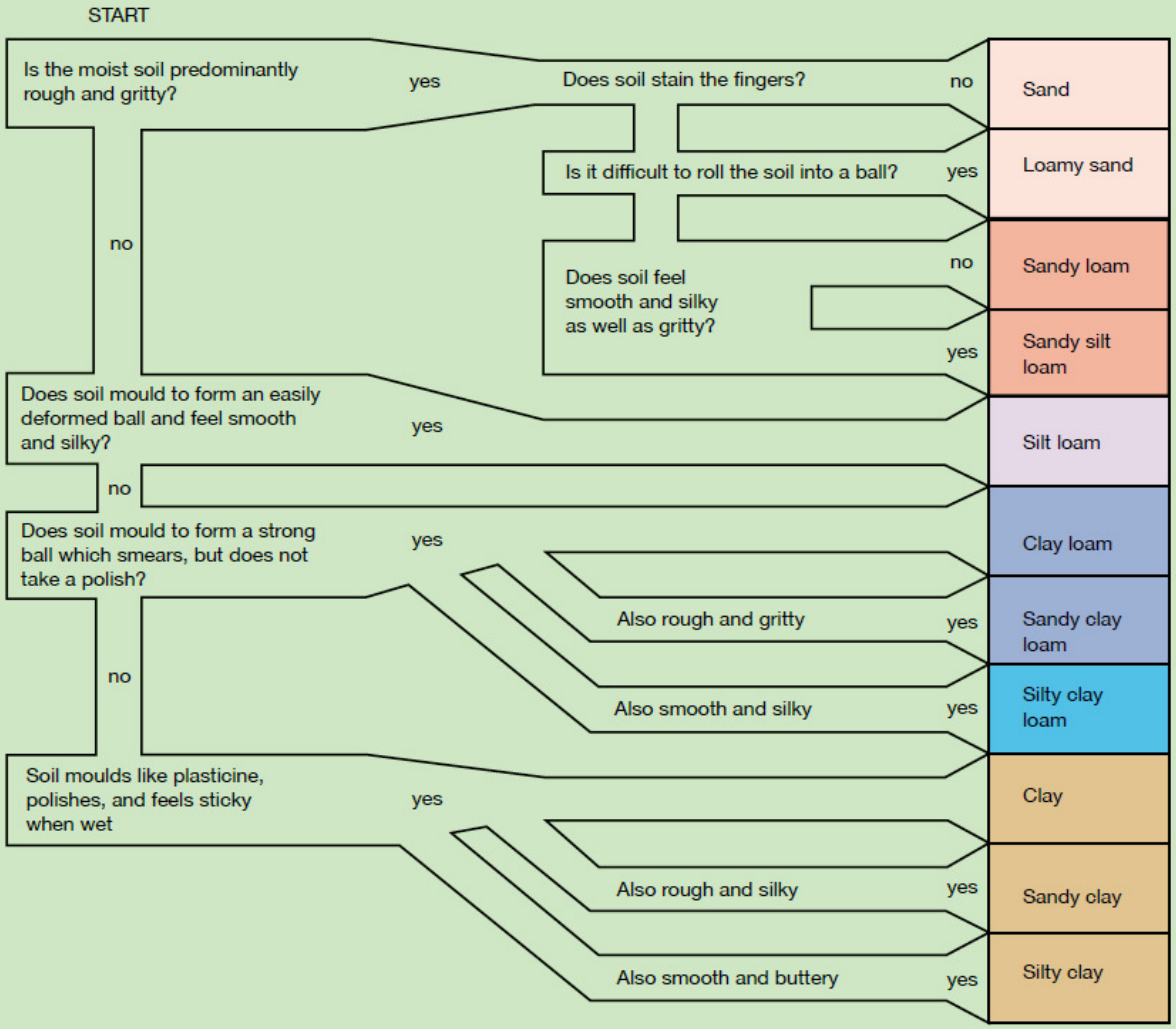
Texture	Colour/Feel	Ribbon length before it breaks
Organic (peaty)*	Dark, contains plant remains	Not possible to mould in to a ribbon
Sandy	Gritty and non-cohesive	Not possible to mould in to a ribbon
Loamy sand	Slightly cohesive	Not possible to mould in to a ribbon
Sandy loam	Gritty and cohesive	< 2.5 cm
Silt loam	Smooth	< 2.5 cm
Sandy clay loam	Gritty, cohesive, takes a polish when rubbed	2.5–5 cm
Silty clay loam	Extremely sticky, smooth, takes a polish when rubbed	2.5–5 cm
Clay loam	Moderately sticky, neither smooth nor gritty, takes a polish when rubbed	2.5-5 cm
Sandy clay	Gritty, very cohesive and sticky, takes a polish when rubbed	> 5 cm
Silty clay	Extremely cohesive, smooth, high degree of polish when rubbed	> 5 cm
Clayey soils	Extremely cohesive, neither gritty nor smooth, high degree of polish when rubbed	> 5 cm

**Organic soils are not included in the soil textural triangle classifications*

Assessment of Soil Texture

Accurate measurement of soil texture requires laboratory analysis, but for practical purposes texture can be assessed by hand using the following method:

Take about a dessert spoonful of soil. If dry, wet up gradually, kneading thoroughly between finger and thumb until soil crumbs are broken down. Enough moisture is needed to hold the soil together and to show its maximum stickiness. Follow the paths in the diagram to get the texture class.



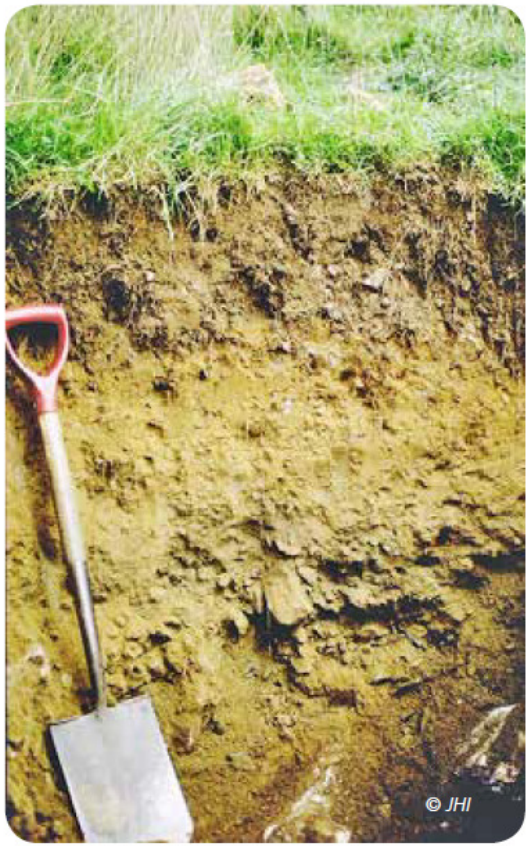
What can happen to soils with different soil textures?

SRUC

Sand, Loamy sand, Sandy loam, Sandy silt loam (Light or sandy soils)

Light soils have a low clay content (< 18%) with a high sand, loam or silt content. They are usually well drained and will warm more quickly in the spring. They typically have a low organic matter content and are easier to cultivate but are susceptible to erosion and nutrient leaching.

Light sandy soil under oilseed rape



Loamy brown earth soil profile

What can happen to soils with different soil textures?

Silt loam, Clay loam, Sandy clay loam and Silty clay loam (Medium or silty/loam soils)

These soils have a clay content between 18 and 35%, free draining but usually slower to drain and can still be susceptible to surface capping.

As the clay content increases there is a greater potential for structural damage with the chance of surface run-off and soil erosion.

Medium soils are good for intensive cropping systems if they are drained.

Silty soils and fine sandy soils are susceptible to surface capping after heavy rainfall. Surface crusts or caps make it harder for seedlings to emerge and can increase run-off.

Silty soils are prone to surface capping

Slaked topsoil surface

Soil texture classes in Nitrate Vulnerable Zones – interactive map
http://soils.environment.gov.scot/maps/map-of-soil-texture-in-nitrate-vulnerable-zones/

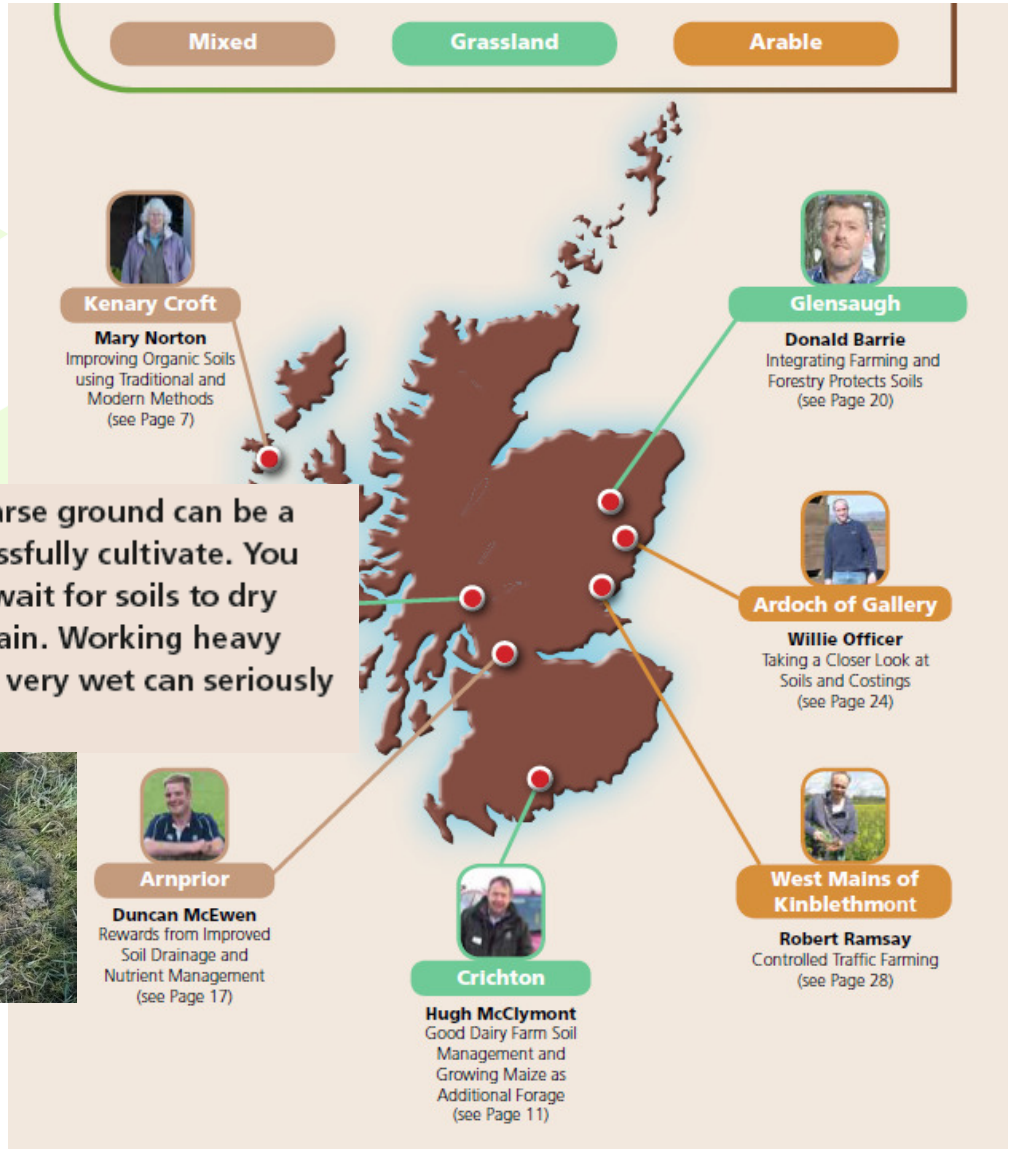
What can happen to soils with different soil textures?

Clay, Sandy clay and Silty clay (Heavy or clay soils)

These soils have a clay content greater than 35%, are mainly acidic and are generally poorly drained. They hold water and nutrients (calcium, ammonium and potash) well but can be waterlogged for part of the year.

Heavy soils also have a high risk of structural damage especially compaction and smearing (localised spreading and smoothing of soil by applied pressure such as slipping tractor wheels) as well as erosion of the soil from surface run-off. Surface smearing leads to restricted movement of water and roots, reducing crop productivity.

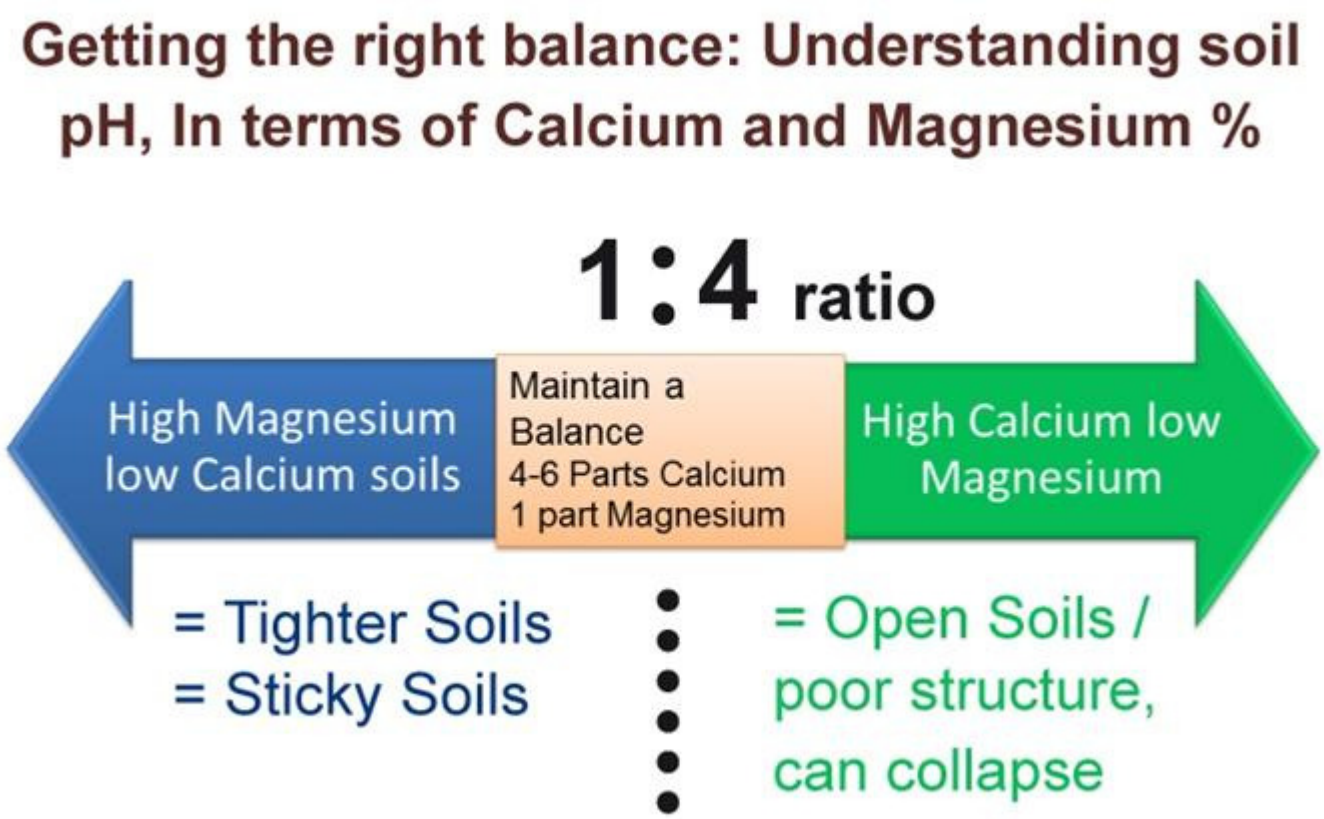
Case study farmers



"Heavy and saturated carse ground can be a huge challenge to successfully cultivate. You have to be patient and wait for soils to dry after prolonged heavy rain. Working heavy clay soils when they are very wet can seriously damage them."

Using the right liming product for your soils

Test your soil for pH, magnesium and calcium and then use the right liming product.



http://farmnw.co.uk/news/rdpe_uplands_getting_soil_ph_right_calcium_or_magnesium_lime

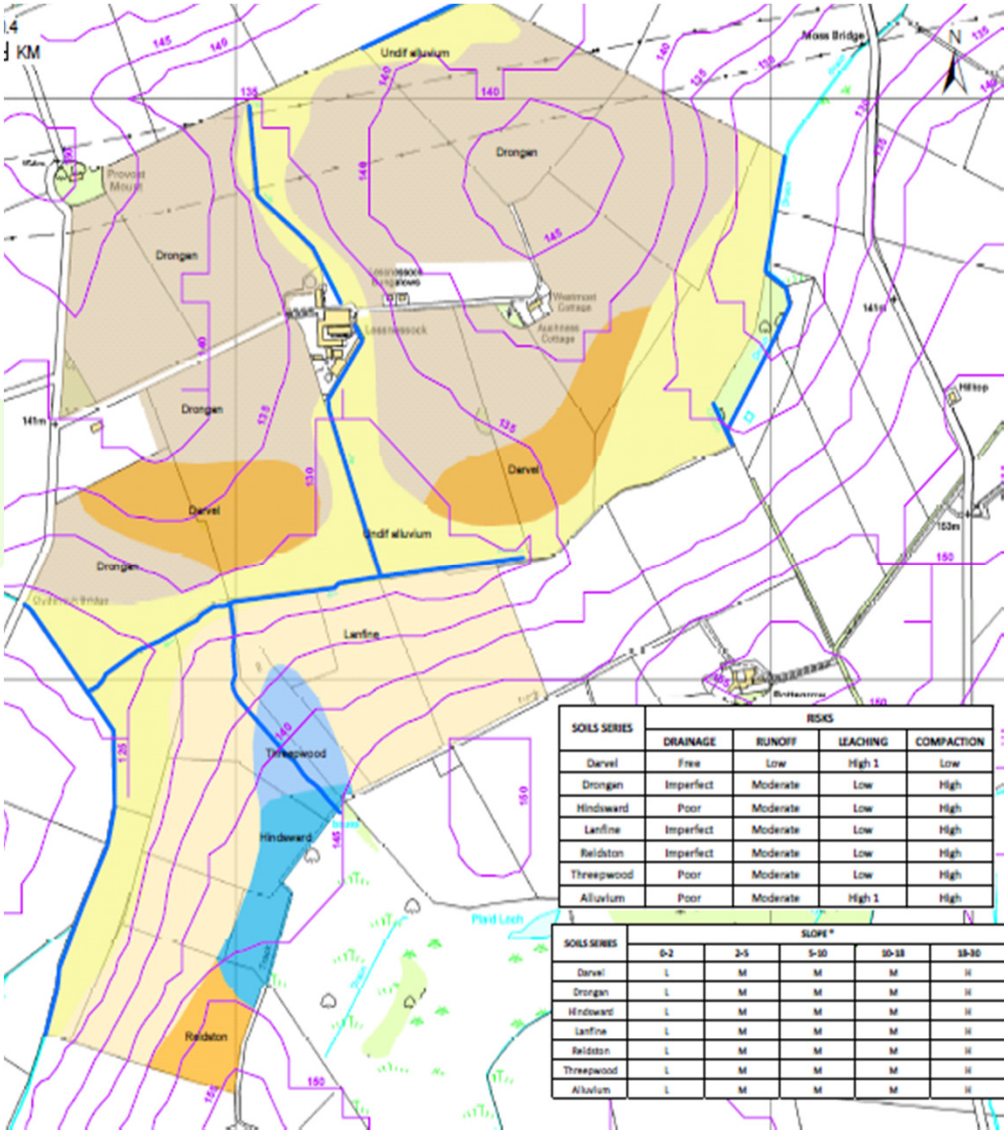
Examples of good sward lifting and subsoiling

Dumfriesshire, May 2016

Poor subsoiling

Soil variability

- Soil variability as shown by changes in soil type as soil series
- Important to include soil variability in precision farming

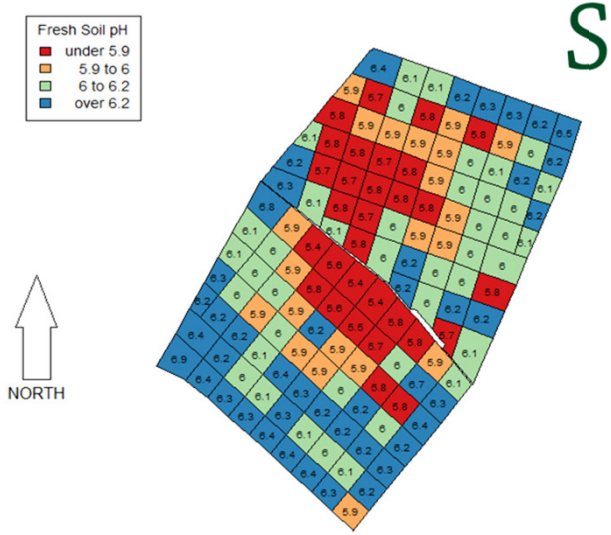


SOILS SERIES	RISKS			
	DRAINAGE	RUNOFF	LEACHING	COMPACTION
Darvel	Free	Low	High 1	Low
Drongan	Imperfect	Moderate	Low	High
Hindward	Poor	Moderate	Low	High
Lanfine	Imperfect	Moderate	Low	High
Reldston	Imperfect	Moderate	Low	High
Threepwood	Poor	Moderate	Low	High
Alluvium	Poor	Moderate	High 1	High

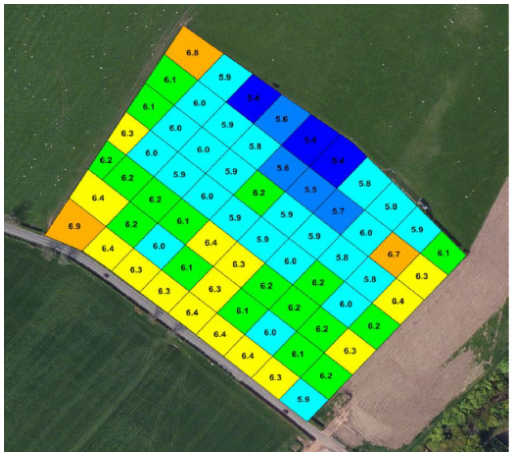
SOILS SERIES	SLOPE °				
	0-2	2-5	5-10	10-18	18-30
Darvel	L	M	M	M	H
Drongan	L	M	M	M	H
Hindward	L	M	M	M	H
Lanfine	L	M	M	M	H
Reldston	L	M	M	M	H
Threepwood	L	M	M	M	H
Alluvium	L	M	M	M	H

Soil testing - nutrient management

- Soils must be maintained at a suitable pH with adequate soil nutrients to provide fertility for growing crops.
- Soil testing is an essential nutrient management tool that allows you to assess fertiliser requirements for optimal crop growth.



- ***Soils vary across a field – precision agriculture uses the principal of only applying what is needed, where it is needed.***
- GPS sampling for soil pH and variable lime application can be an effective cost and carbon footprint reducing option.



Find your soil type from http://www.soils-scotland.gov.uk/data/soils or **download the app at** http://sifss.hutton.ac.uk/ **to identify your field soils using your postcode**.

Results

When SIFSS has identified the soil map unit it will display a menu with the soil types that make up the map unit. The soil types are named after the area where they were first found, thus Forfar soils were first mapped around Forfar.

In the results section, you will see a brief description of the different soils found in that area to allow you to select the one that most closely matches your own sample. You are then able to select a range of soil properties for that specific soil type and choose whether to display results for cultivated or semi-natural soils.

If your soil sample has a value for a specific soil property that lies within the box surrounding the red dot (which is the median value), then your soil has a value in the same range as 66% percent of all those particular soil types. If it is outwith the box but lies along the line then it is close to the maximum (above the box) or minimum (below the box) values recorded in our database.

For properties such as pH, carbon content, loss on ignition and calcium content which all affect plant growth, it is important to try to maintain these at optimum levels. If your sample is below the box on the graph, particularly for topsoils (Ap horizons) then you may need to think about adding lime or organic matter to you soil.

You can restart the process by selecting from any menu or by reloading the page.

Cultivated soils:

Mouldyhills series belongs to the noncalcareous gleys major soil subgroup. It is a poorly drained soil with mineral topsoil generally dull colours and orangy flecks in topsoil; subsoil may be greyish.

Canonbie series belongs to the brown earths with gleying major soil subgroup. It is a moderately well drained soil, colours dullish often with orange flecks in subsoil.

Semi-natural and woodland soils:

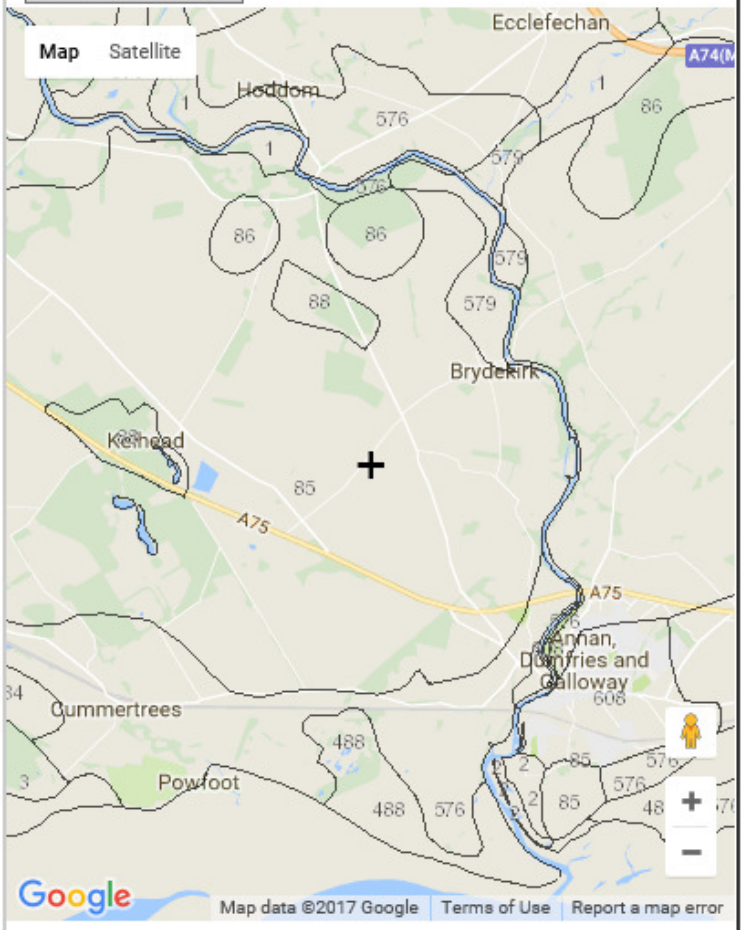
Select Soil Attribute

Enter your postcode **or** latitude/longitude **or** National Grid **or** just use the mouse.

Postcode: OS (e.g. NJ905047):

Latitude: Longitude:

Zoom to location



Questions?