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Information compiled from following sources:

Hewitt, A. 2004: Soil properties for plant growth. Landcare Research
Shepherd, G., Stagnari, F., Pisante., Benites, J. 2008: Visual soil assessment, Annual crops, field guide. Food & Agriculture Organisation of the United Nations
Shepherd, G. 2009: Visual soil assessment, Horizons Regional Council

Key soil attributes

The soil serves the needs of plants by providing:

- Water
- Air
- Nutrients
- Stability

The soils ability to provide these key soil attributes can be evaluated.

Key soil attribute	Relevance to plants
Wetness	Water supply, exclusion of air and, consequently exclusion of oxygen
Root barrier	Controls the depth of soil available for roots to extract water and nutrients, and to anchor the plant
Stoniness	Stones and rocks dilute the volume of soil within the root depth that is available for water storage and nutrients
Porosity	Promotes stability by allowing deep rooting. Drains excess water, and circulates air to roots
Natural nutrient status	Controls nutrient supply and reserves
Drought proneness	An interaction between climate and soil attributes

Soil colour

Soil colour is another very useful indicator of soil quality, in general, the darker the colour, the greater the amount of organic matter and humus in the soil.

Wetness

When a soil is very wet for a prolonged time the supply of air to roots may be limited. This level of wetness may be observed.

Features to look for are:

- Rust coloured mottles – indicate saturation with water by an intermittent water table
- Dominant grey colours – indicate prolonged saturation with water by a water table
- Depth at which these features occur – the depth from surface to the intermittent or prolonged water table, this is used to classify the soils' drainage class.
- Peaty topsoil – peat in the topsoil, or extending to a greater depth, indicates saturation for most of the year

PLATE 5 How to score soil mottles



GOOD CONDITION VS = 2
Mottles are generally absent.



MODERATE CONDITION VS = 1
Soil has common (10-25%) fine and medium orange and grey mottles.



POOR CONDITION VS = 0
Soil has abundant to profuse (>50%) medium and coarse orange and particularly grey mottles.

Root barrier

Root barriers control the depth of soil that is available for roots to extract water and nutrients, and to anchor the plant.

Features to look for:

- Tightly packed very stony layer
- Sandy very stony layer
- Rock
- Hard pan
- Compact soil layer
- Wetness in form of high, prolonged, water table

Stoniness

Stones and rocks dilute the volume of soil within the root depth that is available for water storage and nutrients. They have an especially important effect on water storage in soils in seasonally dry climates.

This effect will be significant if stones comprise >33% of soil volume.

Features to look for:

- Stones or rocks

Natural nutrient status

The natural nutrient status includes both the ability of soil to make nutrients readily available to plant roots and to store nutrients in reserves that will become available in the future as the soil matures. It is an expression of the fertility in the absence of fertilisers.

Determining fertility

- Collect soil sample for laboratory analysis
- Plants can be useful indicators of soil fertility and acidity
- Portable pH test kits – allow estimation to within about 1 pH unit.

Drought proneness

Drought proneness is mainly a climate factor but in seasonally dry areas soil properties affect the severity of drought experienced by plants.

Drought proneness is increased if if water storage in soil is reduced by:

- Depth to a root barrier of less than 45 cm
- Stone contents above 35 % of soil in layers above the root barrier
- Sandy textured group in layers above the root barrier

Porosity

Soil pores are cracks or tubular holes in the soil filled with water or air. They can store water or circulate air to roots, and larger pores drain excess water.

Features to look for:

- Sandy texture
- Weak soil strength
- Cracking patterns
- Roots

PLATE 3 How to score soil porosity



GOOD CONDITION VS = 2

Soils have many macropores and coarse micropores between and within aggregates associated with good soil structure.



MODERATE CONDITION VS = 1

Soil macropores and coarse micropores between and within aggregates have declined significantly but are present on close examination in parts of the soil. The soil shows a moderate amount of consolidation.

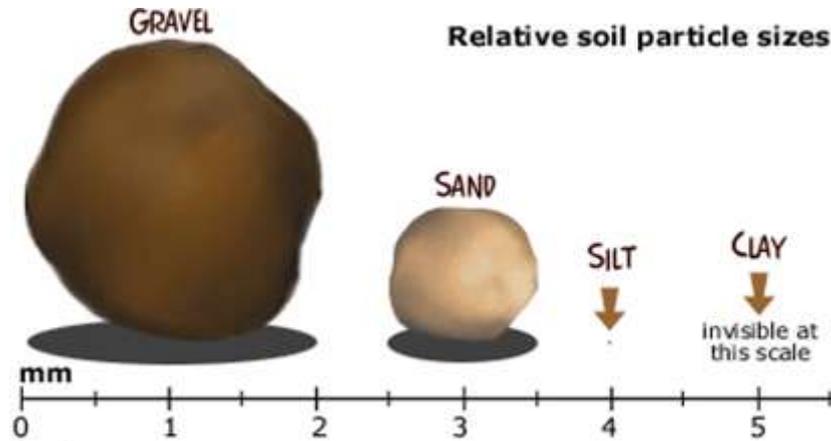


POOR CONDITION VS = 0

No soil macropores and coarse micropores are visually apparent within compact, massive structureless clods. The clod surface is smooth with few or no cracks or holes, and can have sharp angles.

Soil texture

Soil texture defines the size of the mineral particles, in particular, the relative proportions of sand, silt and clay.



<http://school.discoveryeducation.com>

- Gravel (> 2mm) feels coarse
- Sand (2-0.05mm) feels gritty
- Silt (0.05-0.002mm) feels like flour
- Clay (<0.002mm) feels sticky when wet

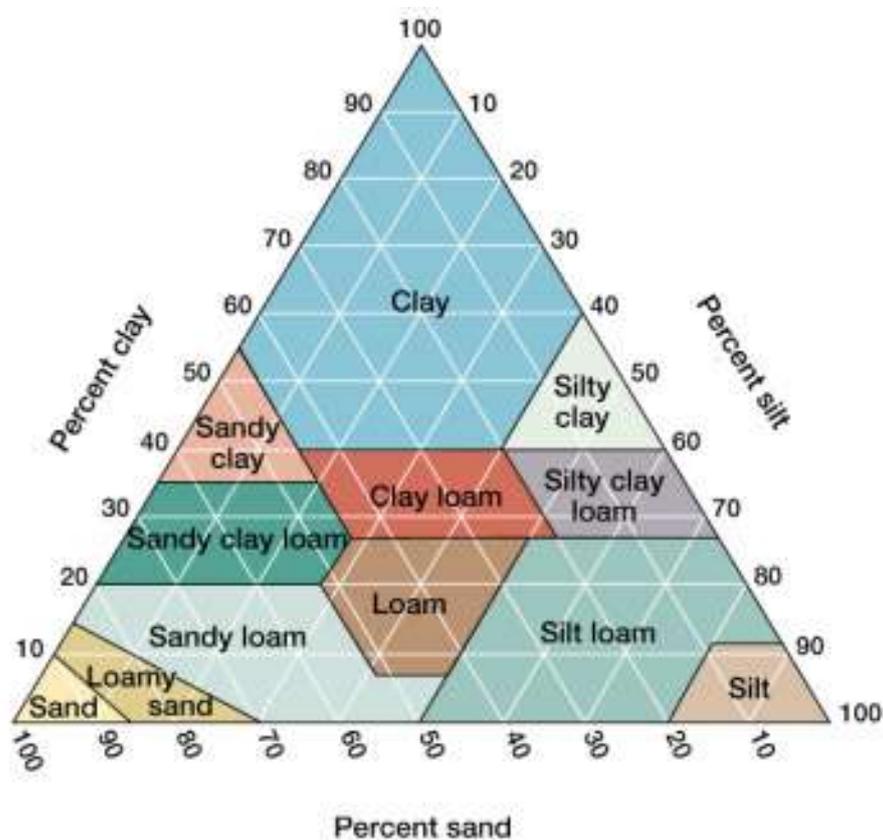


TABLE 1 How to score soil texture

Visual score (VS)	Textural class	Description
2 [Good]	Silt loam	Smooth soapy feel, slightly sticky, no grittiness. Moulds into a cohesive ball that fissures when pressed flat.
1.5 [Moderately good]	Clay loam	Very smooth, sticky and plastic. Moulds into a cohesive ball that deforms without fissuring.
1 [Moderate]	Sandy loam	Slightly gritty, faint rasping sound. Moulds into a cohesive ball that fissures when pressed flat.
0.5 [Moderately poor]	Loamy sand Silty clay Clay	Loamy sand: Gritty and rasping sound. Will almost mould into a ball but disintegrates when pressed flat. Silty clay, clay: Very smooth, very sticky, very plastic. Moulds into a cohesive ball that deforms without fissuring.
0 [Poor]	Sand	Gritty and rasping sound. Cannot be moulded into a ball.

Soil structure

Soil structure is a very important soil property:

It regulates soil aeration and gaseous exchange rates, soil infiltration and erosion, movement and storage of water, soil temperature, root penetration and development, nutrient supply and resistance to structural degradation by compaction.

Soil structure is ranked on the size, shape, firmness, porosity and relative abundance of soil aggregates and clods.

