



# Soil and irrigation: soil texture and structure

Soil consists of five main components:

- air
- water
- organic matter
- mineral solids (sand, silt and clay)
- living plants and animals.

Air and water are stored in the spaces (soil pores) between the soil particles. The size and number of these pores are influenced by the soil texture and the soil structure.

## Soil texture

The relative proportion of sand, silt and clay present in a soil is known as the soil texture (Figure 1). Sand particles are the largest in size followed by silt with clay having the smallest particle size.

Texture will influence the movement of water through the soil, how much water can be stored in the soil, and how much of the stored water is available to plants (see Table 1 overleaf).

In irrigation terms, texture will determine the rate at which water should be applied, how much should be applied and how often irrigation should occur. For example, clay soils only infiltrate water slowly, so applying large volumes quickly will lead to run-off. However they can store large amounts of water and will therefore require less frequent irrigation.

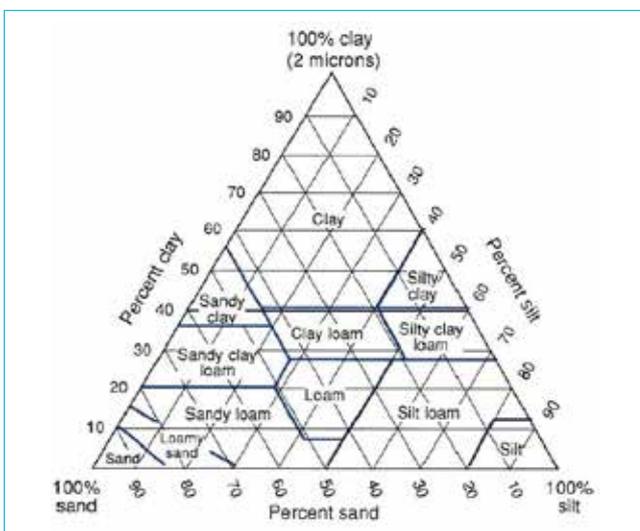


Figure 1: The percentage of sand, silt and clay determine soil texture.

## Soil structure

The structure of a soil is the way the soil particles are grouped together to form a soil crumb or 'ped' (Figure 2). Organic matter will aid in providing good soil structure because it acts like glue, binding soil particles together.

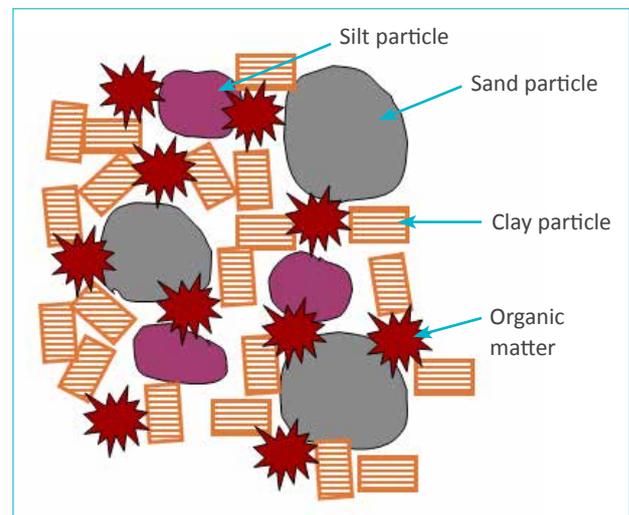


Figure 2: Representation of a soil particle showing the arrangement of sand, silt, clay and organic matter.

Good structure allows for improved infiltration and drainage (see Table 2 overleaf). It also enhances root growth. This provides the plant with the ability to access a greater amount of water and nutrients.

While soil texture remains constant, soil structure can be lost through destructive tillage practices and compaction. Poor structure reduces infiltration and water holding ability and will make irrigation more difficult to manage.

## Reference

Schroeder B, Wood A, Panitz J (2007) Accelerating the adoption of best practice nutrient management: Burdekin district. BSES Limited, Brisbane.

Anon. Soil texture diagram. <http://www.jsu.edu/dept/geography/mhill/phylabtwo/lab12/soiltextdiag.html> (accessed 12 June 2014).



# Information Sheet

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**Table 1:** Texture effects on soil properties relating to irrigation (Schroeder *et al.*, 2007).

Soil property	Soil texture				
	Sand	Loam	Silty loam	Sandy clay loam	Clay
Internal drainage	High	Moderate	Moderate-low	Moderate-low	Moderate-low
Plant available water	Low	Moderate	High	Moderate	Moderate-high

**Table 2:** Soil structure effects on soil properties relating to irrigation (Schroeder *et al.*, 2007).

Soil property	Level of soil structure				
	Structureless	Weak	Moderate	Strong blocky	Strong prismatic
Internal drainage	Moderate-high	Low-moderate	Moderate	Moderate	Low (within) Moderate-high (between) *
Plant available water	Low	Moderate-high	Moderate	Moderate-high	Low

\* Soils with a strong prismatic structure have poor drainage within the soil peds, but because they tend to crack, the drainage between the peds can be high.