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# Improving soil moisture

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Moisture is a key limitation on the productivity of your soil. Three main factors affect soil moisture content:

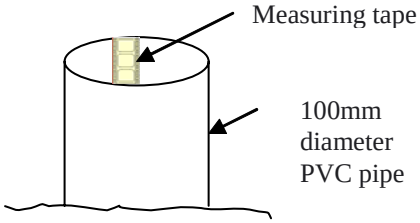
- how well your soil can absorb water;
- how well your soil can store moisture; and
- how quickly the water is lost or used.

Although these factors are strongly determined by the proportions of clay, sand and silt, good soil management also plays a critical role.

## INFILTRATION RATE

The rate at which water can infiltrate into soil can be measured with some simple equipment.

When the soil has been thoroughly wetted and allowed to drain for 24 hours, a tube is lightly embedded in the soil surface. The tube is filled and one minute later, the fall in the water level is recorded. A fall of ten millimetres in one minute is a good infiltration rate.




Soils can have poor infiltration if the soil aggregates have broken down and the spaces between them are small (degraded soil structure). This can be due to:

- compaction;
- continued cultivation;
- declining soil organic matter; and
- surface crusting due to sodic clay soil.

Please refer to the specific Soil Sense leaflets that address the individual management of these problems.

Poor infiltration means more rainfall will become runoff. Not only does this mean an increased risk of erosion but also means you are losing water that your plants might need.

## MOISTURE STORAGE

It is useful to know how well your soil can carry water between rainfall events and whether you can improve the situation.

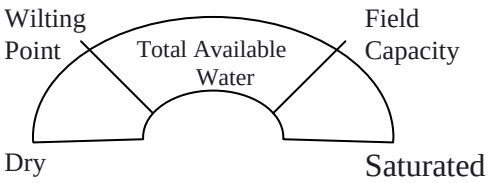
A soil which has been saturated and then allowed to drain for 24hrs is said to be at Field Capacity. You can approximately measure this by using 100mm PVC pipe. Push a 65 mm section of the pipe into the ground then carefully dig it out with the soil core inside. Extract the soil and weigh it on kitchen scales and then once again after the soil has been thoroughly dried. Subtracting the second weight from the first and dividing by 5 will give you the field capacity as a percentage of the soil volume – between 10 and 20% is fairly good.

Unfortunately, some of the water held in soil is bound to clay particles and is unavailable to plants.

Plants can wilt permanently long before the soil is completely dry. The Wilting Point will vary a lot depending on the plants involved and the type of soil, however 7% is a relatively common figure.

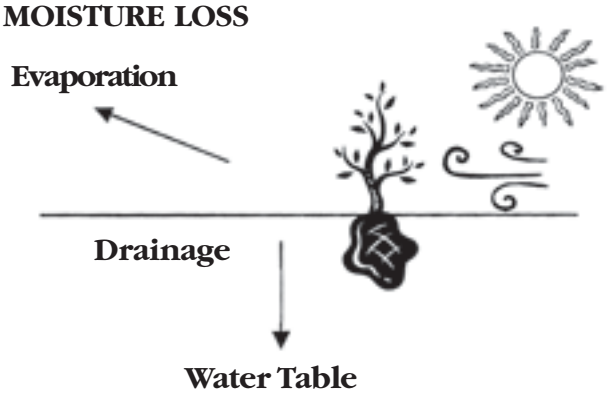
The water actually available to a plant is the difference between its Field Capacity and Wilting Point. This is called Total Available Water (TAW) and a figure of 15% is good except where drainage is poor. Compacted soils, sandy soils and heavy clays generally have lower TAW values.

Soil management that improves soil structure or organic matter should gradually improve TAW. When trying to measure an improvement it is important to take into account that TAW can vary with seasons or the severity of a season. Another measure of available water takes into account the depth of the roots [Plant Available Water (PAW)].



Remember that plant growth can stop well before the Wilting Point is reached. The proportion of TAW that is available to plants without causing stress is called Readily Available Water (RAW). For many crops, this is estimated as half of TAW.

## MOISTURE LOSS




The two main sources of moisture loss are drainage and evaporation.

Improving soil organic matter will reduce drainage losses by improving Field Capacity and will also reduce the leaching loss of important minerals.

A ground cover of mulch or low growing plants will reduce evaporation from the top soil as well as providing protection against erosion. Wind breaks reduce evaporation losses and retain soil moisture up to 100 metres away. Wind breaks can provide other benefits such as reduced temperature stress in stock or a habitat for insectivorous birds.

An old saucepan filled with water is a simple means to monitor net evaporation losses, provided it is exposed to wind and rain but not animals. If the water level falls, for example 10mm in a week, then it can be replaced by irrigation to the equivalent of 10mm of rainfall.



## MOISTURE USE

Much of the water absorbed by a plant's roots is lost as evaporation from its leaves. The rate of water use by a plant will vary depending on many factors such as its leaf area, planting density, growth rate and development stage.

Efficiently matching irrigation water to plant needs requires some thought and investment. To monitor soil moisture from day-to-day requires a measuring device such as a tensiometer, capacitance probe, neutron probe or time domain reflectometer. These devices need to be calibrated to the specific needs of your crop or pasture.

Efficient use of irrigation water also means considering the irrigation method used (e.g. flood, spray or drip), when to irrigate and how often. These questions and the use of soil moisture probes are addressed in detail by the WaterWise training program available through NSW Department of Primary Industries.

## FURTHER INFORMATION

Please refer to the following NSW DPI publications:

- Soilpak series
- Soil Sense book
- Soilnotes series
- Soil Management series



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