

Vineyard activities 10: Monitoring soil moisture

Current titles in this Vineyard activities series include:

1. Taking soil samples
2. Measuring soil pH
3. Measuring soil salinity
4. Measuring organic carbon in soil
5. Assessing soil structure
6. Measuring soil porosity
7. Measuring soil strength
8. Measuring the infiltration rate of water into soil
9. Examining grapevine root systems
10. Monitoring soil moisture

Soil moisture monitoring is critical when attempting to increase winegrape quality or save water. It is essential for application of regulated deficit irrigation or partial root zone drying. Soil moisture monitoring measures the effects of management practices on:

- vine water stress
- vineyard evapotranspiration
- root system extent
- irrigation wetting pattern
- changes in soil water holding capacity
- rainfall effectiveness

MEASUREMENT UNITS

Soil moisture is measured either as soil water tension or total soil water content.

Soil water tension is the suction a root must exert to extract water from the soil and is sometimes referred to as suction or matric potential. Soil water tension is a good indicator of vine water stress and is measured in pressure units of kilopascals (kPa) or centibars (cbars). When the root zone soil water tension is greater than 50kPa, vines show symptoms of water stress.

Soil water content is a measure of the amount of water in the soil. Changes in soil water content help estimate the volume of water taken up by the vines and the amount of irrigation to apply.

Total soil water content is measured as a percentage of a soil volume (%v/v) or as a depth of water per unit depth of soil (mm/m). Measurement of soil water tension is recommended when assessing vine water stress.

To determine vineyard evapotranspiration or changes in soil water-holding capacity, soil water content should be measured. Either soil water tension or content can be used to measure root system extent, the irrigation wetting pattern or rainfall effectiveness.

EQUIPMENT

Soil water tension can be measured using:

- tensiometers (0–80 kPa)
- gypsum blocks (30–1000 kPa)
- watermark (10–200 kPa)

Soil water content can be measured using:

- capacitance probes
- time domain reflectometry
- neutron probes

Some instruments can measure soil moisture automatically and feed the data directly into computerised systems and others must be measured by hand and recorded.

Handheld meters often have the capacity to store data for later processing by computer. Otherwise, you will also need a recording sheet and pen.

WHEN TO MONITOR

Depending on your reasons for wanting to know the status of water in your vineyard soils, you may need to measure soil moisture at regular intervals (approximately three times a week) and/or before and after irrigation (or rainfall) events.

METHOD

1. Install sensors at the appropriate depths and positions in relation to the root zone and wetting pattern as per manufacturer recommendations.
2. Record and store readings for comparison with other records in current and future seasons.

LIMITATIONS

One limitation of soil moisture monitoring is the amount of soil measured. Instruments can only measure a small part of the soil, therefore it is important to bury soil moisture sensors at the appropriate depth and position in relation to the root zone and the wetting pattern, and where the soil profile changes in texture. Some soil moisture monitoring equipment can be costly to purchase and may require some time to operate.

FURTHER INFORMATION

Product or service information is provided to inform the viticulture industry about available resources, and should not be interpreted as an endorsement.

The information in this Vitinote has been trialed by viticulturalists as part of the Cooperative Research

Centre for Viticulture's Viticare On Farm Trials project. For information about On Farm Trials, visit www.crcv.com.au/viticare/

A key reference on these topics is:

- Nicholas P, (Ed.) (2004) Soil, irrigation and nutrition, Grape Production Series 2, SARDI, Adelaide.

Another useful reference is:

- Nicholas P, Magarey PA and Wachtel M, (Eds.) (1994) Diseases and pests, Grape Production Series 1, Hyde Park Press, Adelaide (a glove box edition of this book is also available).

Both of these publications are available from Winetitles, 08 8292 0888, or visit www.winetitles.com.au.

Also see:

- Charlesworth P, (2000) Irrigation Insights No. 1 Soil Water Monitoring. Eds A. Munro and A. Currey (Land and Water Australia: Canberra)

Water management for grapevine production: Research to Practice® and *Grapevine nutrition: Research to Practice®* are training programs whose delivery can be fine-tuned to suit each region. They include topics on soil management issues.

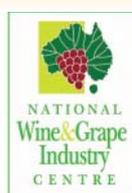
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