



## Vineyard activities 9: Examining grapevine root systems

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

It has been shown that grapevines respond to soil that is soft, friable, well aggregated and aerated by vigorous root systems that permeate the soil evenly and deeply.

On the other hand, compacted soils have roots that are poorly distributed, shallow, stubby ended and grow horizontally.

Visual observations of root growth and abundance in the soil are an integral measure of soil physical quality.

Effective root depth is also an important factor when estimating water availability and determining the presence of restrictive physical or chemical layers or toxicity (e.g. salinity) to vine roots.

The presence or absence of vine roots is also dependent on climate, vegetation type and land management. For example, mid-row cover cropping or tillage will decrease root growth into the inter-row. All these factors will vary from region to region and with variety and rootstock.

Capturing some quantitative measure of root growth is a time-consuming and labour-intensive exercise.

The best method is to excavate and measure part of the root zone and make assumptions about what the

remainder is doing. As grapevine roots can grow to depths greater than 1 metre, an ideal tool is a backhoe excavator.

### EQUIPMENT

- Backhoe excavator
- Counting framework (e.g. 1m length of 100mm x 100mm weldmesh)
- Geologist pick
- Recording sheet and pen

### TIMING

Cutting into a vine's root system will impact on the performance of that vine, so roots are best examined when in an inactive state.

Examination should therefore be avoided between bud burst and veraison, and for six weeks post harvest.

### WHERE TO SAMPLE

Ideally, root systems should be examined in parts of the vineyard corresponding to the sites selected for soil analysis, though it isn't necessary to dig a pit at every point soil samples were selected from.

For each soil type in the vineyard, depending on the size of the area concerned, 1–2 sites for root analysis should be sufficient.

## METHOD

1. Dig a soil pit with a backhoe 300mm from the base of the middle vine in a panel at your designated investigation site. Dig the pit parallel to the vine row so that it is approximately 1m wide and 2–3m long and at least 1m deep.
2. Clean the face of the soil pit with the geologist pick (or an air gun on a portable compressor if available) so there is no smearing from the backhoe.
3. Place the counting framework (1m length of ten 100mm<sup>2</sup> grids) vertically in the soil pit, in line with the vine.
4. Estimate the number of visible roots <2mm diameter within each of the counting framework grids.
5. Classify these as either: few (<10), common (10–200) or abundant (>200).
6. Record your observations.

## INTERPRETING RESULTS

The table below provides a guide to interpreting root assessment from a soil pit. This data is not specific to grapevines and there may be variation from one soil type to another and from one climatic region to another. The limit of effective root depth is defined as that soil depth, measured from the soil surface, where the amount of roots decreases to few (i.e. <10 roots per 100mm x 100mm).

	Soil depth (m)	Root abundance (roots per 100mm x 100mm)	Growth suitability for many plants
<b>Topsoil</b>	0–0.50	>200	Very good
	0–0.15	>200	Good
	0–0.50	10–200	Fair
	0–0.15	10–200	Poor
	0–0.50	<10	Very poor
<b>Subsoil</b>	>0.50	>10	Very good
	0.15–0.50	>10	Good
	>0.50	10	Fair
	0.15–0.50	<10	Poor

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## 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/](http://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](http://www.winetitles.com.au).

Also see:

- Fitzpatrick RW, (1996) Morphological Indicators of Soil Health, in Indicators of Catchment Health: A Technical Perspective, Eds Walker, J and Reuter, DJ, CSIRO Publishing, Melbourne, pp75-88.

*Winegrape quality management: Research to Practice®* and *Grapevine nutrition: Research to Practice®* are training programs whose delivery can be fine-tuned to suit each region.

Visit the web site at [www.crcv.com.au/viticare/vitinotes/](http://www.crcv.com.au/viticare/vitinotes/) for updates and more Vitinote titles.

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