



A method for examining grapevine root systems

Viti-note Summary:

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Other topics in this Viti-Notes series include:

- Measuring the infiltration rate of water into soil using the ring infiltrometer method
- *A method for examining grapevine root systems*
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- Measuring soil porosity
- Measuring soil strength
- A method for assessing soil structure
- Taking soil samples
- Measuring soil pH
- Measuring soil salinity
- Measuring organic carbon in soil

Grapevines respond to soil that is soft, friable, well aggregated and aerated by developing vigorous root systems that permeate the soil evenly and deeply. Alternatively, compacted soils cause roots to be poorly distributed, shallow, stubby-ended and to grow horizontally.

Visual observations of root growth and abundance in the soil may be used as an indication of soil physical quality. Additionally, effective root depth is used to estimate available water, and to indicate the presence of restrictive physical or chemical layers (e.g. salinity) to vine roots. The presence or absence of vine roots is dependent on climate, vegetation type and land management. For example, cover crops or tillage in the mid-row may decrease root growth. All of these factors will vary from region to region, and with variety and rootstock.

The quantitative assessment of root growth is a time-consuming and labour intensive exercise. The most convenient method is to excavate and measure part of the root zone and then make assumptions about the rest. As grapevine roots can grow to depths greater than 1 metre, an ideal tool is a backhoe excavator.

Equipment

Backhoe, grid (e.g. 1m length of 100 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 6 weeks post harvest.

Where to sample

Ideally, root systems should be examined in those parts of the vineyard that were used for soil analysis. 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. With a backhoe, dig a soil pit 30cm from the base of the middle vine in a panel. 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 geologists pick (or an air gun on a portable compressor if available) so there is no smearing from the backhoe.
3. Place the grid (1m length of ten 100cm² grids) vertically in the soil pit, in line with the vine row.
4. Count the number of visible roots <2 mm diameter within each square.

Interpreting results

Table 1 provides a guide to interpreting root assessment from a soil pit – these data are not specific to grapevines. The limit of effective root depth is defined as that soil depth, measured from the soil surface, at which the number of roots decreases to fewer than 10 per 100 mm x 100 mm.

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Table 1. Root abundance assessment guide at different soil depths. Reproduced from Fitzpatrick.

Root abundance (roots per 100mm x 100mm)	Depth class (m)	Growth suitability for many plants
>200 >10	0 - 0.50 >0.50	Very Good Very Good
>200 >10	0 - 0.15 0.15 - 0.50	Good Good
10 - 200 =10	0 - 0.50 >0.50	Fair Fair
10 - 200 <10	0 - 0.15 0.15 - 0.50	Poor Poor
<10	0 - 0.5	Very poor

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Further information

- Nicholas, P. 2004. Soil, irrigation and nutrition. Adelaide: Winetitles.
- 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.

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