Soil sampling methods for monitoring vineyard soil quality

In order to assess and monitor whether viticulture practices are having an impact on soil quality, it is necessary to measure soil properties over time. The sampling strategy for soil quality monitoring should be standardised and consistent to be able to have confidence in the comparisons. 

*i.e. same time, same place, same method!*

1. When to sample:
   Approximately 4 weeks after harvest. This takes advantage of the impact of grower management during the season and a flush in root growth to target maximum soil biological activity.

2. Where to sample
   Choose a single panel (or a paired site) that is representative of the vineyard. Mark it with tape and geo-reference it using GPS for repeat sampling.
   
   For benchmarking your property against industry standards, it is suggested to look at one site of good quality vines. For identifying a soil constraint it is suggested to use paired sites within the same site and clone/variety. One site should represent good quality and one site represent the poorer quality.
   
   Sampling should be performed with a 5 – 7 cm diameter auger from undervine, in the midrow, and if possible in an adjacent non-viticultural site (preferably with native vegetation) within 50 m of the adjacent vineyard. Any surface growth or debris should be scraped off the surface of the soil before sampling.

3. Detail of sampling areas
   
   3.1 Undervine: near a dripper, approx. 20 cm from grapevine trunks and 20 cm out from the drip line or centre line. (If the site has been recently delved and the under vine row raised, start sampling deeper in the undervine row. i.e. make an allowance for the impact of delving).
   
   3.2 Midrow: in the centre of the midrow, avoid machinery tracks and make an allowance for the depth to ensure you are sampling a similar soil layer to the undervine samples. i.e. if the site has been delved it is likely the top 10 cm will have been moved, so sample closer to the vine row.
   
   3.3 Native Site
   
   Note: At each site and depending on the depth, either 3 or 5 cores are pooled into a plastic bag and mixed thoroughly. Then 500 g sub-samples are placed into well-labelled plastic bags and sent to a commercial laboratory for testing.
4. **Depth of sampling**

4.1 Two depths: surface soil 0-15 cm and sub-surface soil 35-45 cm (it is important to sample comparable layers between the midrow and undervine row).

5. **Amount of soil required by commercial laboratories**

5.1 Chemical samples (500 g). Biological samples (500 g). Biological samples are normally only taken for the surface layer. Physical samples require additional sampling of intact peds from each depth (See Section 6).

6. **Diagram of sampling within a panel or at native sites**

6.1 Sampling positions (5 cores at 0-15cm; 3 cores at 35-45cm) for both undervine and midrow samples. Pool the surface samples together and the subsurface samples together.
This figure shows repeat sampling in the midrow, aligning with the undervine holes. Again, pool 5 core samples from 0-15 cm for surface samples and three samples from the subsurface (35-45 cm).

These figures show repeat sampling from a native site. Again, pool 5 core samples from 0-15 cm for surface samples and three samples from the subsurface (35-45 cm).
7. Physical Testing

The soils for physical analyses are taken by a different method to preserve the soil structure. The surface of the soil is removed with a shovel and a small trench dug at the designated location. The first vertical face is to be 0-15 cm, a small step and then a vertical face at 35-45 cm. Make slices with the shovel around the target area at one side of the trench and gently lift out the target area. Several small clods ('peds') should be gently broken off, avoiding any surface area affected by shearing. The peds are to be placed into rigid containers or open plastic bags and carefully handled to preserve the soil structure.

In cases where the soil is dry and hard to dig, a mechanical auger can be used to remove the soil first in order to collect undisturbed peds at depth.
An example of undisturbed peds required for physical assessments.

8. Soil storage in field:
Soils for the physical measurements should be stacked in a single layer if in plastic bags. Do not stack on top of one another to prevent peds being broken up or squashed. Otherwise, store representative peds selected in the field in rigid plastic containers for transport back to base.

Soils for biological and chemical measurements are to be immediately stored in a cool place (e.g. esky with ice blocks) to keep as cool as possible.

9. Soil storage once returned from field (before shipment):
Soils for biological and chemical measurements should be stored at 4ºC immediately upon return to base – a cold store or a fridge is fine. They should then be sub-sampled if necessary and the required quantity sent to laboratories for analysis – this factsheet assumes 500 g, but these amounts should be checked with the commercial laboratories. Samples should be sent to the laboratory within 1-5 days after collection.

The peds should be allowed to air dry for several days prior to doing assessments of the physical properties slaking, dispersion and strength.

For methods of assessment, see accompanying fact sheet ‘Soil indicators for measuring vineyard soil quality’ and the references below.

References