Plant Tissue Sampling Protocol

Leaf Tissue Sampling -for Pasture and Trees

Soil and plant tissue analyses highlight mineral imbalances that might be affecting the health of pasture or animals that feed on it. Tissue analysis at the vegetative growth stage provides an excellent opportunity for the application of nutritional products to correct for any nutritional deficiencies.

Pasture tissue tests complement soil tests and allow important trace nutrients like cobalt, selenium, copper and iodine to be adjusted for improved animal health and crop performance. Using both tissue and soil testing will provide a better overall picture of the farm nutrient status for an improved fertility programme.

1. Collection of Sample – Timing and Growth Stage

Timing is extremely important as interpretation guidelines are established at a specific growth stage for different crops. Correct timing is also especially important as some nutrient levels can change fairly rapidly and any significant differences in time of sampling can lead to a variation in the interpretations. If possible avoid sampling after fungicide or nutrient spray applications, as this will contaminate samples.

The optimum sampling time for pasture samples is generally during the active growing cycle, that is, during the spring or autumn flush.

If you have a weed concern, a plant tissue analysis can provide valuable information about functional nutrient deficiencies. Collect 50 weed leaves from a representative area.

2. Collecting the Sample

To keep your sample as representative as possible, avoid field gates, eroded hillsides, water troughs, urine patches, feed rings etc.
Take 20 samples along a 60m (200 feet) transect. Take photos and GPS.

Using a pair of clean rust-free scissors or shears, collect 15 to 20 small handfuls of grass (about 5cm/2 inches from the ground) from sites throughout the sampling area and combine in a paper bag.

- ≈ Each sample should be taken from a uniform section of the pasture on the same soil type.

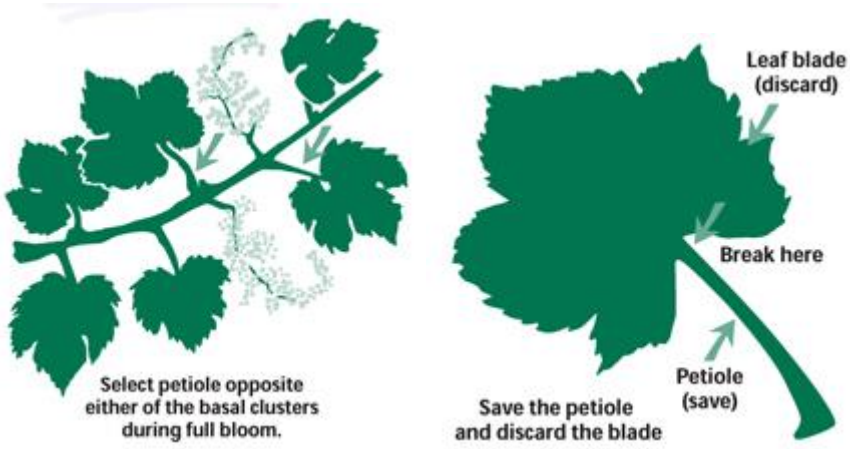
- ≈ Complete the details on the analysis request form and include Growth Stage

3. Care of Samples – Collection and dispatch

Samples can be contaminated by some fungicides and nutrient sprays, which may give incorrect laboratory results. Wash hands and preferably use a paper bag to collect sample. Avoid the use of plastic bags for plant tissue samples because of moisture condensation and possible breakdown of the samples. Wherever possible, please collect and dispatch samples by the first half of the week to ensure that the samples arrive at the laboratory before the weekend. Always mail samples on the same day as they are taken.

Plant Tissue Analysis- Vines

In most other fruit crops, the entire leaf is used, but research has shown that petiole tissue is best for grapes. Once a vineyard is established it is best to determine the fertility status of the vines with the use of petiole analysis.



- For grapes, there are two times of the season recommended for testing – full bloom and early verasion.
- Vines should be of the same age, variety, and rootstock, growing on a relatively uniform soil of the same fertility. If these conditions are not met, divide the vineyard into uniform blocks and sample separately.
- For full bloom time sampling, take the petioles from leaves opposite the bottom flower cluster. For samples collected during verasion, take petioles from the most recently developed matured leaf.
- Collect a total of 75 to 100 petioles (more may be required from cultivars with short petioles) from 2 or 3 leaves on the vine. Do not pick more than 1 leaf from any one shoot. Discard the blade and keep the petiole. Leaves showing insect, disease, or mechanical damage should not be selected for sampling.
- If you are trying to diagnose specific symptoms, send in two samples – one set of 75-100 petioles from vines showing the symptoms and another set from vines not showing symptoms. This can be done at any time of the growing season.
- If petioles are dusty or dirty, they can be rinsed in distilled or deionized water. Do not let petioles soak in water, because nutrients will leach out. Dried petioles should not be washed.
- Send immediately to a laboratory. If there is a delay, place petioles in a clean paper bag and dry at room temperature. Do not use plastic bags unless samples have been previously dried.

When you submit your sample, tell the lab that the analysis is for grapes, the type of grape (vinifera, labrusca, or hybrid), the variety, and the growth stage (bloom or veraison). Based on these sampling parameters, the lab should print the critical levels for each nutrient across the bottom of the report.

It is important to ask the lab if the critical levels that they include in your report are based on university research or their personal experience. Unfortunately, sometimes labs develop their own set of critical or desirable levels for individual nutrients and do not indicate the basis of these numbers. It is not that the values that a lab uses are not appropriate, but you should be aware of their source. It is also a good idea to use an “independent” lab, not one associated with an ag chemical dealer.

Plant Tissue Analysis- Horticulture

Obtain a bulk sample of 200 leaves from the block by sampling 20 trees in a systematic pattern (for example, by following two diagonals in an "X" pattern across the block).

Mid-shoot leaf: a fully expanded leaf from the mid-portion of the current season's terminal growth. Shoots selected should be of average length and vigour (not water shoots) and free from disease, insect or mechanical damage.

Take 10 leaves from each tree, from around the periphery of the tree at about shoulder height. Record those observations or information on orchard history that may aid the accurate interpretation of the analytical data - such as visual symptoms, crop load (heavy, light), tree vigour, soil management and fertiliser practices, irrigation, soil drainage and possible foliar spray contaminants. If a deficiency/toxicity is suspected, also sample a "control" block of healthy trees of the same crop, cultivar and soil type. Comparison of the analytical results may confirm or deny the deficiency/ toxicity.

Factors affecting the results of leaf analysis

Seasonal conditions and orchard management have important effects on the content of nutrient in leaves. These effects may be just as large as those caused by the addition of fertiliser. The following factors affect the content of nutrients in leaves:

Dry seasons- In dry seasons the concentration in leaves of almost all elements (except manganese, sodium and chloride) will be lower because of decreased uptake. In dry years, manganese, sodium and chloride levels may be higher than normal.

Weeds- Competition from weeds and grasses will lead to lower levels of nitrogen in leaves, particularly if soils are more bacterially dominated than ideal for trees/vines. Conversely, the use of herbicides around trees will increase the uptake of nitrogen and its concentration in leaves often more effectively than would nitrogen fertiliser.

Waterlogging- Waterlogging caused by poor drainage and/or excessive irrigation can cause many problems including loss of nitrogen because of denitrification. Waterlogging also reduces the uptake of calcium and potassium but may increase the uptake of sodium.

Crop load- Heavy crops are associated with higher concentrations of nitrogen, calcium, and magnesium in leaves. Conversely, light crops are associated with lower concentrations of nitrogen, calcium and magnesium in leaves.

Variety/rootstock- research/ask labs what the different ranges of nutrient uptake is for different rootstock.

Fungicides/foliar fertilisers- When fungicides or foliar fertilisers containing zinc and/ or manganese are used, the levels of these two elements will be high even after the leaves are washed. When copper fungicides are used during the season, they will raise the levels of copper in leaves.

Stress; pruning, drought, insect and disease pressures – avoid sampling plants which are under stress.

Other elements- High levels of one element may result in low levels of another. A good example is the relationship between potassium, calcium and magnesium. Applying too much potash fertiliser may result in magnesium deficiency. Applying magnesium may result in bitter pit or poor performance in storage caused by low levels of calcium in the leaves and fruit etc.

Interpreting the results obtained during the first year

Because of the factors listed above, which can bias the results obtained from leaf analysis, caution should be used when interpreting the first results that come from a particular block. If the value is only in the low or high category, it is worth monitoring nutrient levels during the following year rather than changing the fertiliser program in the current year. However, if the value is consistently (over two or more years) in the low or high range, remedial action is justified.