Grapevine tissue analysis

GRAPEVINE TISSUE ANALYSIS can provide critical information about vine nutrient status to assist with fertiliser decisions, problem diagnosis and monitoring the impacts of management practices. This column provides answers to some of the most common questions on this topic.

WHAT FACTORS SHOULD I CONSIDER WHEN THINKING ABOUT TISSUE ANALYSIS?

While tissue analysis is a useful tool, it has some limitations. Like humans, grapevines are in a state of 'nutrient flux', that is the nutrient status of the vine is constantly changing depending on the time of day and the stage of growth. It is important to remember that plant tissue analysis therefore represents a snapshot of nutrient concentration in the sampled tissue at a particular time.

When sampling and interpreting results, there are a number of factors to consider including:

- Location of the block. This may influence soil type, drainage and other factors which affect grapevine nutrition;
- General vine appearance (thriving or poor) and performance (e.g. yield, grape quality);
- Inherent characteristics of the varieties and rootstocks grown;
- Fertiliser history (pre-planting and in recent seasons); and
- Other treatments which might influence test results (e.g. water used for frost control can increase chloride levels; fungicides that contain manganese, copper or zinc may contaminate plant tissue samples).

TO MAXIMISE INFORMATION GAINED FROM TISSUE ANALYSIS, STANDARD SAMPLING PROTOCOLS SHOULD BE EMPLOYED FOR EACH TYPE OF ANALYSIS:

- Ensure samples are representative of the soil/vines in the area being investigated;
- Take samples at the same growth stage each year;
- Use the same laboratory (or those that use the same analysis techniques) for all samples. This will minimise the variability in the results and also enable the establishment of a consistent historical record; and
- Record test results and any subsequent management practices for future reference, as the ability to accurately make comparisons over a number of years is invaluable.

WHAT TYPES OF SAMPLES SHOULD I TAKE?

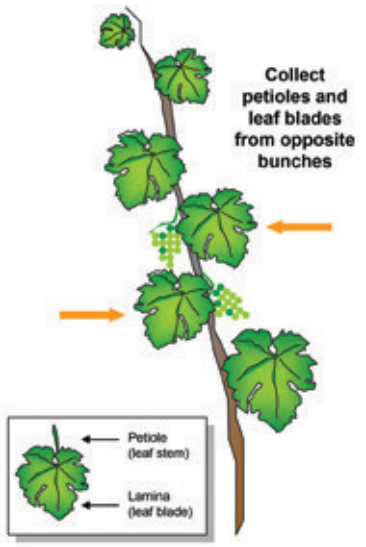

Figure 1. Standard tissue types for grapevine nutrient analysis.

The most common tissue type used for grapevine tissue analysis is petioles (leaf stalks). These are collected from opposite bunches at 80% flowering. Leaf blade samples can be collected at veraison for late season analysis (Figure 1). For specific nutrient analysis following the application of foliar fertiliser (e.g. molybdenum), shoot tip analysis is preferable. Samples should be collected at least two weeks after fertiliser application to ensure the newly emerged shot tips are fresh and free from contamination. When sampling for specific nutrients or for problem diagnosis, mobile nutrients (e.g. nitrogen, phosphorus, potassium) are best analysed in older leaves. Immobile nutrients (e.g. calcium and zinc) should be targeted by sampling leaves near the growing tip of shoots.

HOW SHOULD SAMPLES BE PREPARED AND TRANSPORTED?

There are a few general points to remember when preparing and transporting samples for analysis:

- Check the sampling and storage guidelines for the laboratory being used;
- Collect samples into labelled paper bags (samples packaged in plastic can sweat causing changes to nutrient concentrations, fungal growth or contamination);
- Send samples early in the week. Samples posted late in the week risk being left in freight warehouses or post offices over the weekend. If it is necessary to collect samples late in the week or over the weekend, store them in the refrigerator until reopening of business on Monday;
- Label all samples carefully and keep copies of the information sent to the laboratory; and
- Make sure all quarantine requirements are met.

WHAT CONSTITUTES A GOOD ANALYSIS REPORT?

It is surprising how often the AWRI is asked to interpret a nutrition report that has been reproduced incompletely by a third party. A thorough analysis of the results and recommendations can only be made with the following critical elements:

- Date, growth stage and tissue type;
- A list of all analysis methods used;
- Units of measure for all numbers;
- Standards used for the recommendations; and
- Name and contact details of the person who prepared the report.

HOW DO I INTERPRET THE RESULTS AND WHAT DO THE GRAPEVINE NUTRIENT STANDARDS MEAN?

Results of tissue analysis are usually provided in relation to a set of grapevine nutrient standards. The grapevine nutrient standards used in Australia are the result of a significant body of survey work and field trials conducted over many years (Reuter and Robinson, 1986). These standards are based on petioles collected at 80% flowering and dried prior to analysis. The standards represent parameters for optimum vine growth; however, this may not be the most important factor when managing vines for specific grape quality outcomes. Flowering and veraison leaf standards developed by Weir and Cresswell (1993) are also occasionally used.

Sometimes analysis is conducted on the sap present in fresh petioles rather than on dried petioles. The standards for sap analysis of wine-grapes have not undergone rigorous research and statistical analysis, and are as yet unpublished. In most cases the standards presented in reports represent the range of analyses collected by the laboratory. As such, the sap analysis standards vary between laboratories.

From a user's perspective, all standards should be interpreted with on-site knowledge and 'calibration'. Results should be interpreted in conjunction with observations of vine growth and performance and with current soil and/or water analyses. If any emerging trends have been observed over time, it should be possible to contact the laboratory for copies of previous years' analyses and to discuss the results.

The AWRI helpdesk can provide some assistance with interpretation of grapevine nutrient reports. Contact the helpdesk via helpdesk@awri.com.au or 08 8313 6600.

References

Reuter, D.J., Robinson J.B. (eds) 1986. Plant analysis: an interpretation manual. Melbourne : Inkata Press.

Weir, R.G., Cresswell, G.C. (eds) 1993. Plant nutrient disorders 1: temperate and subtropical fruit and nut crops. North Ryde: Inkata Press.

VINE TALK

We are nearly half way through the growing season and much of the hard work has been done. In spring, many areas experienced high pest and disease pressure, with downy mildew and Light Brown Apple Moth (LBAM) having been regularly sighted and talked about. Those vineyards that had strong crop protection strategies in-place are faring well.

This warmer weather is ideal for promoting insect movement. Combined with moisture, warmth stimulates insects to take flight, mate and settle in for a good feed.

Monitoring, recording, pheromone traps and local agronomist knowledge are all key to making timely decisions on insect control. What else is important is to understand the activity of a crop protection product against target pests at a given lifecycle stage. Some products are very specific in their activity and may not deliver good results when used outside of their timing guideline. For example the product PROCLAIM® works very well in controlling Lepidoptera pests such as LBAM when the timing coincides with targeting the eggs or very small larvae.

I've spoken with many growers who have made a concerted effort with their canopy management and implemented robust spray programs to lower the risk of powdery mildew infection. The coming months are looking to be a high risk for powdery mildew with lush canopy growth and high humidity levels within the canopy. Their efforts are sure to pay off.

Spray coverage, product choice, timing and rate are key in determining the success of protecting the vine and berries. Powdery mildew lesions can also be an entry point for botrytis, so keeping powdery mildew at bay is essential for effective botrytis management.

With powdery mildew resistance to some fungicide groups becoming more common, growers should review their spray program with their viticulturist to ensure rotation between Mode of Action groups.

When it comes to protection from botrytis, timing and product choice are critical in wet seasons such as this one. Many growers will hopefully have applied a quality botryticide at 80% capfall, as botrytis can devastate unprotected grape crops with yield losses, reduced quality and off flavours in the wine. The decision now is what to apply at E-L 29 stage to ensure protection of bunches through the main period of bunch fill. Ideally, chose a product that penetrates and protects the berries and has a good resistance management profile such as SWITCH®.

Growers worried about the presence of botrytis should follow these steps:

- Select 25 bunches with suspected symptoms
- Place them in a clean lightly-moistened bag
- Seal the bag and incubate at room temperature (20ºC)
- If botrytis is present, it will usually develop a greyish mould like growth within 1-3 days

If pressure from LBAM continues, it is worthwhile combining an insecticide with the botrytis spray at E-L 29 before bunch closure. LBAM in bunches after this stage are near impossible to control, so it is your last chance for this season. Remember to follow AWRI guidelines contained in the 'Dogbook' for these late sprays.

If you find botrytis is present, I suggest you seek expert advice.

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