



## GRAPE BERRY ANALYSIS

Mineral analysis of grape berries, sampled approximately two weeks before harvest relates to the composition and quality of wine. Wine quality and the fermentation characteristics of harvested grapes are influenced by the mineral composition of free run juice from grape berries.

The purpose of grape berry analysis is to gain another perspective on the overall nutrition of the vines and how the mineral profile may influence fermentation and subsequent wine quality. Grape growers have the opportunity to manage vine vigour and optimise grape yield without compromising fruit quality particularly through fertigation and strategic application of soluble high analysis fertilisers.

From 1996 to 2002 a programme was run to analyse pre-harvest grape juice from a selection of vineyards in the Hawkes Bay region. Varieties consistently tested were Cabernet Sauvignon, Chardonnay, Merlot and Sauvignon Blanc and results of the nutrient tests were compared against wine makers comments regarding the wine produced from the sampled blocks. The aim was to look for correlations between nutrient levels and specific quality related observations from winemakers.

The results of this monitoring programme were consistent with published information about the effect of ammonium-N ( $\text{NH}_4\text{-N}$ ) and free amino-N (FAN), potassium (K) and nitrogen to potassium ratio (N/K) on the fermentation characteristics of grape juice and the requirements to produce the best quality wine.

### Effects of nutrient levels on wine

Adequate nitrogen is required for good fermentation characteristics with ammonium-N utilised first by yeast followed by amino-N.

- Nitrogen excess is associated with reduced colour, increased acidity and reduced bouquet.
- Nitrogen at low levels as  $\text{NH}_4\text{-N}$  and FAN is associated with slow fermentation, risk of stuck fermentations, hydrogen sulphide evolution and reduced wine quality.
- Potassium excess neutralises (tartaric) acids producing a high pH wine. This effect is minimised where nitrogen levels are correspondingly high or by adding extra N during fermentation.
- Potassium at low levels may result in excessive acidity.

The levels of nitrogen and potassium reported in grape juice that produced the best quality wine were variable, however the N/K ratios were almost constant, indicating that where nitrogen levels are adequate for fermentation, the N/K ratio is the next most important indicator.

Other observations:

- Magnesium at low levels is associated with lack of bouquet, colour, sugars and green aggressive tannin flavours.
- Boron at low levels gives low sugar levels, lack of colour and unripe tannins.

### Effect of Nutrient levels on fruit quality

- Nitrogen at high levels from vines with high or excessive vigour is associated with low calcium levels and susceptibility to berry splitting and increased botrytis infection.
- Low potassium in vines is associated with lowered brix levels in the fruit.

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## Interpretation

The following are general guidelines associated with good quality fruit and wine. Ratios of nutrients are considered to be useful indicators of nutrient balance, particularly N/K.

	White grape juice (B1)	Red grape juice (B2)
	ppm	ppm
N	300 - 500	300 - 500
NH <sub>4</sub> -N	40 - 80	40 - 80
P	90 - 140	90 - 140
K	900 - 1300	900 - 1500
Ca	70 - 110	70 - 110
Mg	65 - 100	65 - 100
B	2.0 – 3.5	2.0 – 3.5
N/K	0.4 – 0.6	0.4 – 0.6
N/Ca	4 - 6	4 - 6
Ca/P	0.6 – 0.8	0.6 – 0.8
N/P	3.2 – 4.5	3.2 – 4.5

There will be interest from winemakers to monitor nutrient levels in grapes pre-harvest as a tool to predict some quality indicators and also to characterise grapes for premium wine production. Currently a determination for FAN is not available through Hill Laboratories however total nitrogen (N) minus ammonium-N (NH<sub>4</sub>-N) is an indicator of other forms of N in the free run juice.

## Sampling Method

Collect berries from vines that represent the grape crop to be harvested, avoiding vines growing at the ends of rows and adjacent to shelter or at the edges of the block(s). Where berries are of slightly variable maturity, the sample should represent this. Sample size should be a minimum of 500g berries and be taken as a composite sample from a minimum of 20 vines. Forward samples promptly by courier to the laboratory for analysis. Refrigerate samples if there is any delay between sample collection and dispatch of samples to the laboratory.

## References

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