



Grapevine nutrition 4: Potassium fertilisation

Current titles in this Grapevine nutrition VitiNote series include:

1. Nitrogen fertilisation
2. Phosphorus fertilisation
3. Petiole analysis
4. Potassium fertilisation
5. Soil acidification
6. Liming
7. Trace elements
8. Molybdenum

ROLE IN GRAPEVINES

An essential component of the vacuole of every plant cell, potassium (K) is also involved in protein synthesis, carbohydrate production, solute transport and maintenance of plant water status.

Heavy applications of potassium fertiliser can be directly related to high potassium levels in grape juice which can have a detrimental effect on red wine quality via high juice pH, and reduce colour and flavour. Therefore, potassium fertilisers should only be applied where tissue analysis indicates marginal or deficient petiole potassium concentrations.

NUTRIENT MANAGEMENT

Potassium is naturally abundant in most Australian soils. It may be found in low concentrations in sandy soils where it is readily leached and in clay soils where it may be fixed and rendered unavailable to the vines.

Potassium availability is influenced by soil moisture and temperature. Early in the season visual symptoms of 'spring fever' may be evident in vines when the soil is cold and wet. These conditions reduce available potassium to the vine when the demand for the nutrient is high to support active extension growth. As the soil dries and becomes warmer,

potassium availability increases to meet the needs of vines and symptoms will usually disappear.

Although petiole analysis at *flowering* may indicate a low potassium status that is evident early in the season, a follow-up sample should be taken 4–6 weeks *after flowering*, and/or close observation of the development of symptoms made. This will indicate true potassium deficiency or a temporary 'spring fever' deficiency.

If symptoms continue to be expressed on mid-shoot leaves after flowering, then application of a potassium-based fertiliser should be considered.

Estimates of the amount of potassium removed in fruit vary from 1.6 to 5kg of actual potassium per tonne of fruit.

APPLYING FERTILISERS

Consultation with your winery is always advisable when considering potassium fertiliser applications.

Applications of potassium fertiliser should be based on petiole analysis and the occurrence of visual symptoms of potassium deficiency on vines.

As high potassium concentrations in grape juice can have a negative impact on wine quality, the decision to fertilise on the basis of low concentrations of potassium in

petioles sampled at flowering should be taken only after potassium levels in the juice are taken into consideration.

Potassium-containing fertilisers

Potassium is available in sulphate, chloride and nitrate forms. Potassium nitrate is a very soluble form that can be used in fertigation, but is generally expensive. Muriate of potash (potassium chloride) is the cheapest form of potassium fertiliser but should not be used in situations that are at risk of salinity. Sulfate of potash (potassium sulfate) is generally more suitable but more expensive than potassium chloride.

Fertiliser application

Potassium can be applied either by broadcasting or banding to the soil surface, in a furrow, or via fertigation. Vines seem to use potassium applied by fertigation relatively efficiently.

TIMING APPLICATION FOR EFFICIENT UPTAKE

In most of the eastern states of Australia, broadcast or banded application made in autumn is the best time to apply potassium fertiliser to boost the reserves of potassium in the soil. Winter rains can move it into the rootzone and it is then available for uptake during the growing season. In Western Australia, fertiliser is more often applied in spring.

Top-up applications of potassium fertiliser via fertigation may be needed around veraison when the reserves of potassium in the vines begin to be drawn on by the ripening fruit.

Pre-planting and young vines

If testing indicates potassium is deficient in the soil of an area to be planted, especially if the soils are potassium-fixing, potassium sulfate can be deep ripped into the planting line. Otherwise, it is often applied as a side dressing to the vine rows or broadcast across the entire vineyard floor.

Young vines should not require maintenance application of potassium if levels were adequate at planting or if pre-planting fertiliser was applied. However, some maintenance applications may be required on light sandy soils. Use potassium nitrate as the fertigation nutrient at the nitrogen rate if potassium is required.

Mature vines

If vines exhibit symptoms of potassium deficiency and are planted in soils that are shown to be potassium fixing, heavy corrective dressings may be necessary. Use petiole and soil analysis and visual symptoms to determine if applications of potassium fertiliser are needed.

ENVIRONMENTAL AND SUSTAINABILITY ISSUES

Large quantities of potassium are taken out of the vineyard soil, but on the other hand many Australian soils have large reserves of potassium.

Monitoring is needed to ensure that wasteful applications of potassium are not made, and that reserves of potassium in vineyard soils are not depleted.

FURTHER INFORMATION

Product or service information is provided to inform the viticulture industry about available resources, and should not be interpreted as an endorsement.

This VitiNote has been prepared for growers who wish to apply potassium fertiliser. The decision to apply potassium may have been arrived at through visual observations of deficiency symptoms, or from petiole analyses. For petiole analyses see VitiNote *Petiole analysis*.

Further detail on potassium sources, nutrition, deficiency symptoms and management can be found in the *Grapevine Nutrition: Research to Practice™* training manual, Cooperative Research Centre for Viticulture, Adelaide 2005.

Useful references on these topics are:

- Robinson JB, (1997) Grapevine Nutrition, in Viticulture Vol 2 Practices, Eds Coombe BG & Dry PR, reprinted 2001, Winetitles, Adelaide, pp. 178-208.
- Nicholas P, (Ed.) (2004) Soil, irrigation and nutrition, Grape Production Series 2, SARDI, Adelaide.

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