POTASSIUM – HOW IMPORTANT IS IT TO YOUR VINES

Orchard management appears to be the primary focus of many growers and advisers to the kiwifruit industry as a means of improving fruit quality. Research has been done on canopy management, bud numbers, fruit thinning as well as rootstock selection on overall fruit quality and vine productivity. However, vine nutrition is inevitably overlooked as an important aspect of orchard management to improve kiwifruit quality. Existing research into vine nutrition has indicated that major gains can be made in fruit quality and yield by having a greater understanding of the uptake of nutrients by the vine, the best fertiliser sources to supply those nutrients and the rate and timing of application required to achieve the desired result.

Growers must document all fertiliser inputs into the vineyard and monitor the vine's performance in response to those fertilisers. Tissue and soil analysis programs should be an integral part of the vineyard manager's decision making on fertiliser inputs and selection. In many cases there may be environmental pressures to reduce application rates and or be more selective about the sources of nutrients being used. Timing of fertiliser applications will not only influence yield and canopy, but also the time taken to complete fermentation and the final quality of the fruit.

All elements are of equal importance in plant nutrition, however assessing vine requirements and the requirements of the winemaker for the wine style required are two very different aspects. There are many interactions and inter-relationships between elements, however the most important element has been noted as potassium.

Potassium deficiency

The first sign of potassium deficiency in the field is poor growth at bud break. On severely affected vines the leaves are small and pale yellow-green with a slight marginal chlorosis on the older leaves. As the deficiency becomes more pronounced, there is an upward curling of the margins of the older leaves. Later the margins of the affected leaves remain permanently curled, and the tissue between the minor veins is often ridged upwards. Also the light green chlorosis, which developed initially at the leaf margin, spreads between the veins towards the midrib leaving a zone of green tissue close to the major veins and at the base of the leaf.

However, the boundary between chlorotic and healthy tissue is much more diffuse than it is with deficiencies of other elements such as magnesium and manganese. Much of the chlorotic tissue quickly becomes necrotic, turning from light to dark brown as it dies giving the leaf a scorched appearance.

As the leaf scorch becomes more extensive, affected tissue becomes brittle and there is a tendency for it to break away at the leaf margin giving the leaf a tattered appearance. Severe potassium deficiency can cause premature defoliation of the vine, although the fruit will remain firmly attached (Hort Research Website).

Severe potassium deficiency of kiwifruit in New Zealand was first reported in 1983 in vines grown at Kumeu near Auckland[1]. Since the observation was made, an extensive survey of the major kiwifruit growing areas of New Zealand has shown potassium deficiency to be much more widespread than is generally appreciated[1]. Vines of all ages show signs of the deficiency but those just coming into production (4 to 6 years old) seem to be the worst affected. There also appears to be a relationship between potassium deficiency and the incidence of blossom rot (a bacterial infection of the flowers caused by *Pseudomonas viridiflava*[4]). For example, it has been found that incidence of blossom rot was much greater (36 per cent) on potassium deficient vines than on vines of higher potassium status (16 per cent).

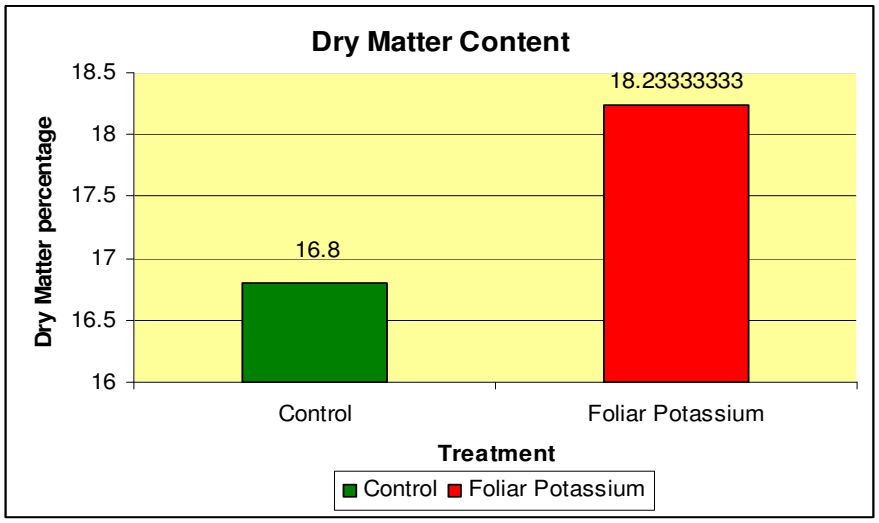
Potassium deficiency severely reduces fruit yield, both fruit numbers and fruit size being affected[2]. Inadequate applications of potassium fertilisers to compensate for potassium required in new cane growth,

the large quantity removed in fruit, and the small losses from the soil by leaching, probably account for the high incidence of this disorder in the field[2].

Potassium and Dry Matter – the correlation.

Dry matter levels are playing a significant part in the criteria for fruit payment. Incentive plans per tray have been awarded where dry matter levels are above 16, which will obtain fruit access into a market called 'Taste Japan'. It is a well-known factor also, that low dry matter levels can be an indicator to softening disorders in stored kiwifruit such as temperature breakdown as well as physiological soft patch.

Zespri Innovation submitted samples from a trial to be analysed for nutrient elemental content as well as dry matter levels where a foliar Potassium product (0-5-20) had been used to ascertain whether this product could contribute to improvements in dry matter of fruit.



The results indicated that foliar applications of Potassium had a significant effect on dry matter content in the fruit. The block which had received a balanced nutritional program carried 23.5 % greater yield at still relatively large sizes 31.9 (average). More importantly the yield attained has not negatively impacted on fruitlet Calcium levels which would typically decline in normal circumstances. Dry Matter levels stayed in the high 18 range on the balanced nutrient program. This has been attributed to the foliar applications of Potassium through the use of this 0-5-20 product.

Summary

The bulk of Potassium fertilisers are applied to the soil and the relationship between potassium and other major cations such as Magnesium, Calcium and Sodium have been solidly established. However the importance of Potassium has now been carried further into its direct effects on fruit quality such as fruit firmness, fruit size as well as dry matter content. The use of foliar Potassium as an adjunct to soil applied Potassium has shown major benefits in primarily dry matter content contribution in kiwifruit. The form of foliar Potassium used (0-5-20) gave major increases in dry matter content of fruit which in turn has been correlated to better quality fruit. Balanced nutrition is also critical as no one element can be observed on its own. Do not underestimate the importance of supplementary use of foliar Potassium throughout the growing season, especially towards harvest when the demand for this element is at its greatest.

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References

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