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**Post-harvest Management - Calcium and Nitrogen Nutrition**

The post-harvest period is a critical time in the year for the tree to set up for next year's growth and cropping.

Once the crop load is removed, the high draw off of photosynthates into the fruit is gone, so it is now possible for the tree to utilize its photosynthesize resource in building up carbohydrate reserves for next season and supply carbohydrates to the roots.

This increased supply of photosynthates to the root stimulates active root growth, leading to one of the main periods of root growth and with it active nutrient uptake from the soil.

Among nutrients taken up at this time of the season, the most important is probably calcium which is only able to enter the roots through the very fine, unlignified root tips. Calcium taken up in the post harvest root growth flush, and again when the second main growth flush occurs is the source of most of the calcium that enters the fruit in its first 6-8 weeks of growth next spring.

Post harvest is also a critical time for nitrogen uptake. Nitrogen taken up at this time is stored, mainly in the roots, to be mobilized next spring to fuel the spring growth flush. There is good experimental evidence to show that adequate stored nitrogen is critical for fruit set the following spring and the early growth flush.

For some crops, for example pears, there is trial data which shows the most effective nitrogen uptake occurs in late summer, early autumn within about a month of harvest.

Because of the importance of the post harvest, pre leaf fall period in setting up the tree for next season, it is critical that conditions are favourable for good root activity and adequate nutrition supply is present.

Soils need to be maintained in good moisture status, excessive weed growth suppressed, and any nitrogen shortfall corrected.

In both Nelson and East Coast districts, summer rainfall this year has been well above normal, so on free-draining, lighter soils we can expect leaching of soluble nutrients such as nitrogen to have been higher than normal.

Summer/early autumn leaf analysis can be used as a guide to tree nutrient status. Its value, of course, is rather dependant on the care taken with sampling to ensure that the sample is typical of the trees which are being checked. My experience is that something like 95% plus of all general leaf analysis I have seen in pip and stonefruit indicate that nutrient levels are either adequate or high. Where they are adequate, this suggests that the established fertilizer programme is doing a good job and if the
levels are high this suggests that either the soil is too fertile, or the fertilizer programme too generous.

In addition to leaf analysis, visual appearance of the tree and crop can also be a useful guide. This approach is useful in orchards which suffer from variable soil quality and texture. Trees low in nitrogen tend to develop early, high coloured fruit which may struggle to size well. Leaves may be smaller and paler, but without any interveinal or marginal yellowing patterns. Where nitrogen is deficient or low, leaf drop tends to be early and autumn colour development much brighter.

Trees with too much nitrogen suffer poor and late fruit colour development, and have large, lush, green leaves which tend to hang on well into the late autumn and winter.

Critical leaf levels for nitrogen vary a bit among varieties. Varieties particularly sensitive to high nitrogen such as Golden Delicious, Pink Lady and Fuji have optimum Nitrogen levels around 2.0 to 2.2%, and in the case of Fuji up to about 2.4% for cropping trees.

For less sensitive varieties such as Royal Gala, Braeburn, Granny Smith and Cox's Orange, there are indications that if Nitrogen leaf levels are under 2.4% a positive response to post-harvest Nitrogen application could be expected.

Even where nitrogen leaf levels are very low, it is not necessary to apply a lot of nitrogen. I saw a situation in Chile once where leaf nitrogen was 1.08%, roughly half the optimum level. Fruit set was poor, fruit about half normal size but brilliant red, leaves pale green and small, and vegetative growth weak and of match stick size in diameter. In this extremely deficient situation, application of around 60 kg Nitrogen per hectare restored growth and cropping to normal the next season.

For orchards where soil texture, depth and fertility is variable, targeted fertilizer application to the weaker parts of the orchard needs to be considered.

In areas where soil is particularly shallow, or sandy with very low organic matter, such as deep litter, poultry manure will build the soil up and lead to much better tree growth. However, a word of caution: some of these materials, particularly if the chicken manure content is high, may burn roots and trunk, so do not ladle them on too heavily and make sure they do not make direct contact with the tree trunk.