The time is right to optimise your citrus fertiliser plans

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Citrus trees have a high demand for nutrients, so it is essential that the right fertilisers are applied at the right growth stages to avoid nutrient deficiencies and maintain tree health and productivity.

Optimising citrus nutrition is more important than ever at the moment given the current strong fruit prices and export opportunities.

Developing a fertiliser plan

Now is a great time to develop an annual fertiliser program for citrus trees. Fertiliser programs are generally calculated annually and revisited at set growth stages during the season to make adjustments as required. The best fertiliser programs are based on an understanding of the orchard and its recent management, including previous yields, soil and plant tissue test results and target yields.

Every orchard is different, so growers and their advisers are encouraged to carefully monitor nitrogen, phosphorus, potassium, magnesium, zinc, manganese, iron and copper. It is only by monitoring what is happening with soil tests and leaf tissue tests that you can hope to keep nutrient levels in the optimum range. The Nutrient Advantage® laboratory is available for fast turnaround of quality soil and plant tissue test results.

Citrus fertiliser programs should aim to replace the nutrients removed in harvested fruit, provide for fruit growth and allow for environmental losses. Nutrient removal rates vary for the different citrus species and increase with fruit yield – particularly nitrogen and potassium.

Citrus needs more nitrogen than any other nutrient. Table 1 shows the amount of nutrients removed for different fruit yield levels. For example, a 50 t/ha crop of navel oranges could be expected to remove 150 kg/ha of nitrogen, while the same yield of mandarins would remove 190 kg/ha of nitrogen.

Table 1: Nutrient removal rates based on fruit yield (tonnes/ha)

		Navel orange				Mandarin				Valencia, lemon, grapefruit & tangelo			
	tonnes of fruit per ha	20	30	40	50	20	30	40	50	20	30	40	50
Nitrogen	Nutrients removed (kg/ha)	60	90	120	150	76	114	152	190	40	60	80	100
Phosphorous		14	21	28	35	14	21	28	35	14	21	28	35
Potassium		60	90	120	150	80	120	160	200	60	90	120	150
Calcium		32	48	64	80	32	48	64	80	32	48	64	80
Magnesium		6	9	12	15	6	9	12	15	5	7.5	10	12.5

Source: Department of Primary Industries and Regional Development WA (www.agric.wa.gov.au/citrus/citrus-nutrition)

Timing for fertiliser application

Timing is important for citrus fertiliser programs, as the trees require different nutrients at different stages. For example, as we enter spring, citrus trees will need nitrogen, phosphorus and potassium to support root and leaf growth and encourage fruit set. Table 2 is an example of the key nutrients required by crop growth stage.

Table 2: Nutrient application times as a percentage of annual application

	Nitrogen	Phosphorus	Potassium	Calcium
Pre-bloom to flowering	40-50%	50* or 100%	30-40%	70-80%
Cell division	25%	50%*	30-50%	
Cell expansion	25%		30%	20-30%

** If fertigation is used. Source: Department of Primary Industries and Regional Development WA (www.agric.wa.gov.au/citrus/citrus-nutrition)*

Budding to flowering and fruit set (August to October)

During budding, flowering and fruit set, the citrus tree needs nitrogen to maintain leaf growth and boost tree reserves for better fruit set. At this stage, 40-50% of the nitrogen fertiliser planned for the year needs to be applied. This is usually done in two applications, with the first made at bud swell and the second at spring flush.

This is the stage when phosphorus is applied to promote early root formation and growth. If using a granular phosphorus fertiliser, such as MAP, it can all be applied at this growth stage.

It is also when 30-40% of the annual potassium requirement is applied. Potassium is important for fruit quality, size, appearance, colour, soluble solids, acidity and vitamin contents.[1]

These three nutrients (nitrogen, phosphorus and potassium) can be applied together using blends or Nitrophoska® Special during September and October. In areas where leaching is common, smaller, more frequent applications of EASY N® can be made to reduce the potential for nitrogen leaching losses.

It is also important to monitor micronutrient levels with tissue tests in spring. Zinc is important to promote strong, uniform bud burst, fruit set, retention and sizing. Magnesium is involved in the export of carbohydrates from source to sink sites and has been shown to increase fruit weight through increased juice content. Boron has a role in cell wall structure and integrity, while molybdenum plays a role in nitrogen metabolism. Iron plays a role in respiration, photosynthesis and is a cofactor in many enzymes. Any deficiencies can be corrected with a foliar spray.

Early fruit growth (November to December)

By early fruit growth, the tree has been through a rapid period of vegetative growth and the fruit is set. At this point, more nitrogen should be applied – generally about 25% of the annual nitrogen requirement.

Potassium is needed after the fruit reaches 10 mm in size. Around 30-50% of the total annual potassium requirement can be applied at this time, with the rest added later in the fruit growth period.

Applying calcium can help to prevent fruit deformations such as creasing, cracking and splitting in the rind, which can downgrade the produce.

Tissue testing should be used to monitor the need for micro nutrients such as magnesium, manganese and zinc. Foliar sprays can be applied where required.

Fruit growth (January to April)

When the fruit is actively growing, demand for nitrogen, potassium and calcium is high. It is at this point that the last quarter of the annual nitrogen requirement can be applied. Nitrogen applied during this time will also help ensure adequate carbohydrate reserves for next season's flowering.

This is also a key time for potassium application, with up to 30% of the annual requirement needed after fruit drop stage in January or February.

Calcium continues to be important during this crop growth stage to protect crop quality.

For more information on fertiliser programs for citrus crops, feel free to contact me at conrad.leeks@incitecpivot.com.au or 0466 664 026.

References

[1] 'Role of potassium in fruit crops – a review' A. Ramesh Kumar, N. Kumar and M. Kavino (2006) Agric. Rev. 27 (4) : 284-291

Fruit size management guide, Citrus Australia (https://citrusaustralia.com.au/wp-content/uploads/Key-elements-of-nutrition-for-fruit-size.pdf)

https://www.agric.wa.gov.au/citrus/citrus-nutrition