

THE TIME IS RIGHT FOR 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 crop nutrition is important to maximise ROI from inputs and achieve quality fruit output.

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 adjust 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 from harvested fruit, provide for fruit growth and minimise environmental losses. Nutrient removal rates vary for the different citrus species and increase with fruit yield – particularly nitrogen and potassium. Citrus needs more nitrogen and potassium 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 application rates based on fruit yield (tonnes/ha)

Nutrients removed (kg/ha)	Tonnes per ha	Navel orange				Mandarin				Valencia, lemon, grapefruit & tangelo			
		20	30	40	50	20	30	40	50	20	30	40	50
Nitrogen		60	90	120	150	76	114	152	190	40	60	80	100
Phosphorus		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 (Kumar et al 2006).

To ensure a balanced nutrient supply, a combination of NPKS (nitrogen, phosphorus, and potassium) and trace elements should be applied during the months of September and October. In places where nitrogen leaching can be a prevalent issue, apply Easy N +eNpower, which offers a specialised formulation that minimises



nitrogen loss. eNpower is an effective ammonium stabiliser that inhibits the leaching process and slows down nitrification so the nitrogen will remain in the soil available to the plant.

It is also essential to monitor micronutrient levels with tissue tests in summer (January to February), particularly:

- Zinc – important to promote strong, uniform bud burst, fruit set, retention, and sizing.
- Magnesium – 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.

Consult the [Sampling Procedure - Plant Tissue.pdf](#) (nutrientadvantage.com.au) to get the best results from your citrus leaf samples.

Easy Liquids offer a convenient solution with their KEYPRO TRACE product, which consolidates all necessary trace elements into a single product. By using this product, you can ensure the continuous availability of vital micronutrients, keeping your trace elements in balance and optimising plant health.

Leaf testing results and insights from Nutrient Advantage

As previously stated, understanding citrus plant nutritional status during the growing season, is critical to managing and making informed decisions for your individual orchard scenario. Leaf samples taken in citrus orchards and tested at Nutrient Advantage Laboratory between January and March 2023 showed the following results:

- 44% samples low in N
- 10% Low in S
- 17% Low in Ca
- 07% Low in Mg
- 24% Low in Cu
- 68% Low in Zn
- 51% Low in Mn



Early fruit growth (November to December)

By early fruit growth, the tree has been through a rapid period of vegetative growth and the fruit are 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 soluble calcium can help to prevent fruit deformations such as creasing, cracking and splitting in the rind, which can downgrade the produce.

To effectively monitor the requirement for essential micronutrients like magnesium, manganese, and zinc, it is recommended to utilise tissue testing. With the new range of foliar products offer for Easy liquids, any micronutrient deficiencies can be corrected.

Fruit growth (January to April)

When the fruit is actively growing, the 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 the fruit drop stage in January or February.

During the crucial stage of fruit growth, ensuring the quality of citrus crops is essential. To provide the necessary nitrogen and calcium nutrients, Easy Liquids offers a variety of effective liquid solutions in their N Cal formulations. Calcium remains particularly important at this growth stage for protecting crop quality.

Interpretation of soil analysis in citrus

In June 2023, a soil test was conducted on a citrus farm located in the Waikerie region. The Navel crop was in its third year of growth.

Table 3. Soil Analysis Report

Soil texture	Sand	
pH (1:5)	9.3	Very strongly alkaline
pH (1:5 CaCl2)	8.6	Not optimal for Oranges
PBI	11	very low
Nitrate Nitrogen	5.3 mg/kg	Low
Phosphorus	12 mg/kg	Low
Potassium	0.15 mg/kg	Low
Sulphur	5 mg/kg	Low
Calcium	11 cmol(+)/kg	Adequate
Magnesium	1 cmol(+)/kg	Low
Zinc	0.59 mg/kg	Low
Copper	0.39 mg/kg	Adequate
Iron	2.7 mg/kg	Low
Manganese	0.8 mg/kg	Low
Boron	0.3 mg/kg	Low

The soil analysis revealed significant deficiencies in both micro and macronutrients, indicating a calcareous soil with a high pH level. Considering these findings, it is crucial to develop a comprehensive

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fertiliser plan that can not only improve yield but maximise the genetic potential of the crop while ensuring efficient nutrient application.

Before recommending a fertiliser program, it is crucial to determine the available amount of nutrients per hectare and understand nutrient rates based on yield.

Incorporating granule and liquid products into the fertiliser plan can address nutrient deficiencies effectively and provide the crop with the necessary nutrition to maximise yield and overall crop quality. As an example, Table 4 shows a fertiliser program using both granules and liquid products.

Table 4. Suggested products and key application timing

Suggested Product	Timing
Compound NPKS	August
Easy Liquids N-Cal (20-10-B)	September/October/November
Easy Liquids Key Pro Trace	August - September
Easy Liquids K Flow 0-7-36	August/September/October
Easy Liquids K FLOW 12	December - February
Easy Liquids Key Pro Trace	Post Harvest
Easy N+eNpower	Post Harvest

Note: Individual rates will be based on yield and soil test values. Talk to your agronomist before deciding on your program.

Further Information

For more information, please feel free to contact:

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Also consult the [Sampling Procedure - Plant Tissue.pdf](http://nutrientadvantage.com.au) (nutrientadvantage.com.au)

References

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