

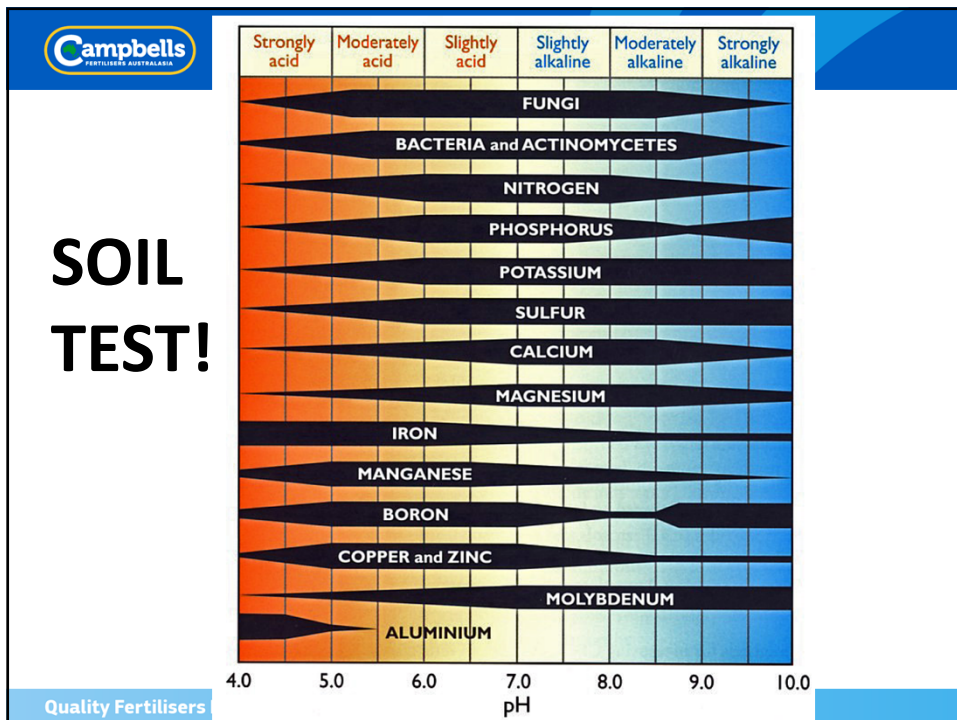



NSW DPI Citrus Roadshow
October, 2017

Citrus Nutrition.....
.....soil pH
.....and fertilisers

Bruce Scott
Plant Nutrition and Fertiliser Specialist

The background image shows a variety of fresh fruits including bananas, apples, grapes, and raspberries, along with a cauliflower and red bell peppers, set against a backdrop of a large glasshouse structure.





7 14.0067

N

Nitrogen

15 30.97376

P

Phosphorus

19 39.0983

K

Potassium

20 40.078

Ca

Calcium

12 24.305

Mg

Magnesium

16 32.066

S

Sulphur

Sampling time Late January to mid March (late summer)

Plant part and growth stage 5-7 months old spring flush leaves from non-fruiting shoots. Avoid growth which has made a second growth flush.


Nutrient	Deficient	Low	Normal	High	Excess
Nitrogen ¹ % (N)	< 2.2	2.2-2.39	2.4-2.69	2.7-3.0	> 3.0
Phosphorus % (P)	< 0.10	0.10-0.13	0.14-0.17	0.18-0.30	> 0.30
Potassium % (K)	< 0.4	0.4-0.69	0.7-1.30	1.31-2.0	> 2.0
Calcium % (Ca)	< 1.6	1.6-2.9	3.0-5.5	5.6-7.0	> 7.0
Magnesium % (Mg)	< 0.16	0.16-0.29	0.30-0.69	0.70-1.0	> 1.0
Sulphur % (S)	< 0.14	0.14-0.19	0.20-0.39	0.40-0.60	> 0.60
Sodium % (Na)			< 0.16	0.16-0.25	> 0.25
Chloride % (Cl)			< 0.3	0.3-0.6	> 0.6
Copper mg/kg (Cu)	< 3	3-5	6-15	16-20	> 100 ²
Zinc mg/kg (Zn)	< 16	16-24	25-100	100-200 ²	> 200 ²
Manganese mg/kg (Mn)	< 16	16-24	25-100	100-300 ²	> 300 ²
Iron ³ mg/kg (Fe)	< 36	36-59	60-120		
Boron mg/kg (B)	< 21	21-30	31-100	101-260	> 260

¹ The optimum for grapefruit is 2.0-2.2% N.

² Leaves sprayed with manganese, copper or zinc nutritional or fungicidal sprays will analyse high and results cannot be interpreted.

³ Leaf analysis is not a reliable guide to iron status. A low value may truly indicate iron deficiency but 'normal' or 'high' values can be found in deficient samples.

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26 55.847 **Fe** Iron

25 54.938 **Mn** Manganese

30 65.39 **Zn** Zinc

29 63.456 **Cu** Copper

5 10.811 **B** Boron

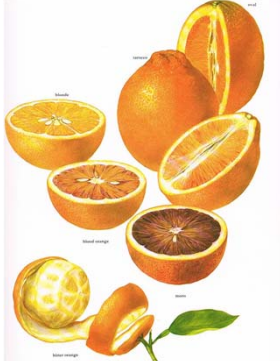
15 30.97376 **P** Phosphorus

42 95.94 **Mo** Molybdenum

micronutrients

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Nutrient Removal
kg/tonne

Potassium	1.6-2.6
Nitrogen	1.2-1.8
Calcium	0.5-1.0
Phosphorus	0.2-0.3
Magnesium	0.1-0.2

Dry matter = 13%


7 14.0067 N Nitrogen	19 39.0983 K Potassium	20 40.078 Ca Calcium	15 30.97376 P Phosphorus	12 24.305 Mg Magnesium
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Choosing the right inputs

7 14.0067 N Nitrogen	<p>Ammonium sources</p> <p>Urea</p> <p>Mixed nitrogen sources</p> <p>Nitrate sources</p>
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Nitrogen reactions

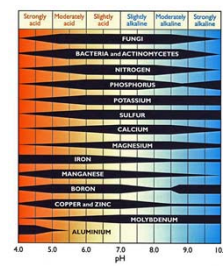
UREA

+

Urease Enzyme

→

NH₄⁺
(Ammonium)



$$2\text{NH}_4^+ + 3\text{O}_2 \rightarrow 2\text{NO}_2^- + 2\text{H}_2\text{O} + 4\text{H}^+$$

Ammonium + Oxygen
+ Nitrosomonas & Nitrosococcus

→

Nitrite
+ Water
+ Acid

$$2\text{NO}_2^- + \text{O}_2 \rightarrow 2\text{NO}_3^-$$

Nitrite + Oxygen
+ Nitrobacter

→

Nitrate

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Potassium

19 39.0983

K

Potassium

Nitrate

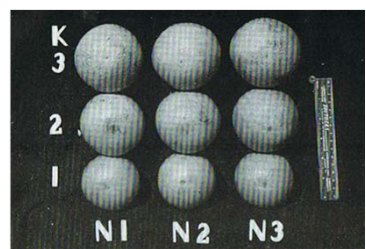
Sulphate

Thiosulphate

Chloride

Carbonate

Citrate




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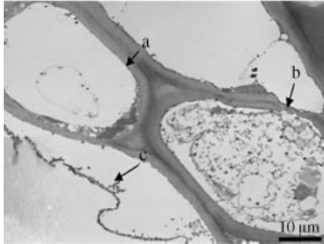
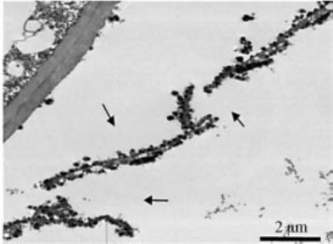
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Calcium

20 40.078
Ca
Calcium

Nitrate
Thiosulphate
Chloride



(A)  (B) 

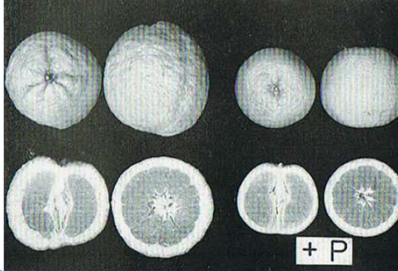
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Phosphorus

15 30.97376
P
Phosphorus

MAP
MKP
Ammonium polyphosphate
Superphosphate
DAP




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Magnesium

12	24.305	Nitrate Sulphate Thiosulphate
Mg		
Magnesium		




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- N 210 ppm
- K 235 ppm
- Ca 200 ppm
- P 31 ppm
- S 64 ppm
- Mg 48 ppm
- B 0.5 ppm
- Fe 1 to 5 ppm
- Mn 0.5 ppm
- Zn 0.05 ppm
- Cu 0.02 ppm
- Mo 0.01 ppm




19 39.0983
K
Potassium

7 14.0067
N
Nitrogen

20 40.078
Ca
Calcium

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Thiosulphate Sulphur

- Thiosulphates are considered mild reducing agents
- If a thiosulphate contacts an Fe^{+3} it will reduce it to Fe^{+2} or Mn^{+4} to Mn^{+2} or it can reduce them by acidification
- Sulphates will not reduce Fe or Mn
- Thiosulphates will convert to sulphates within about two to three weeks in the soil

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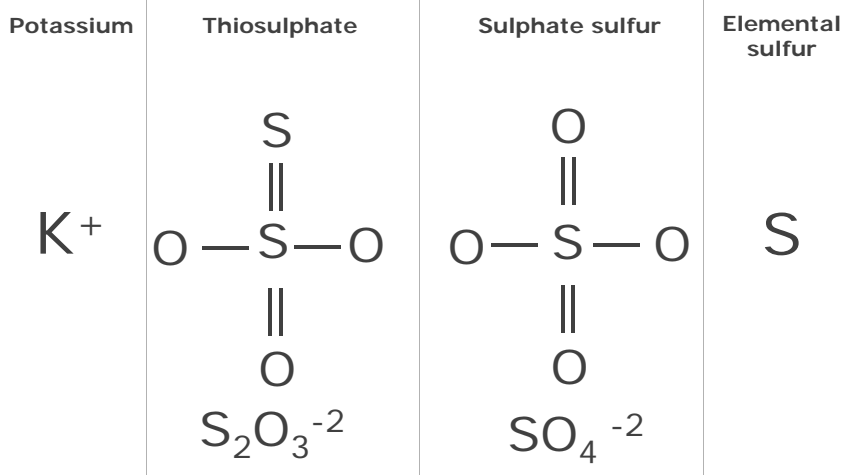
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Thiocal - Calcium Thiosulphate

- Chemical Formula - CaS_2O_3
- Clear Liquid
- 7.5% soluble Calcium
- 12.5% sulphur as thiosulphate
- 1.25 kg/l
- pH = 7.0

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Monitoring & Troubleshooting:



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