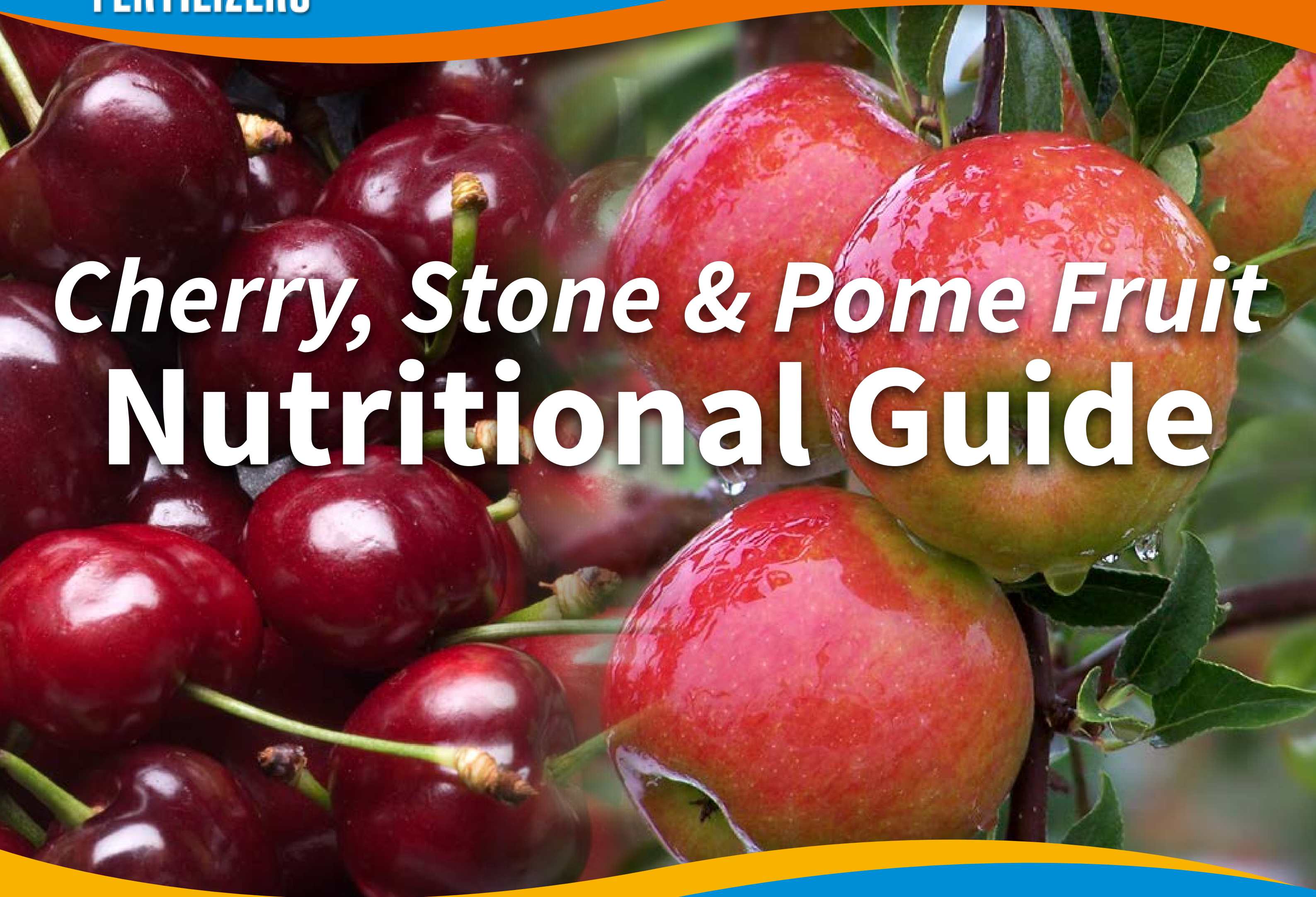
Quality Ingredients
Australian Made
Family Owned

Nutrient Solutions

Cherry, Stone & Pome Fruit
Nutritional Guide



SLTEC®'s range of quality fluid fertilizers and microbial stimulants are supported by our comprehensive field agronomy service.

www.sltec.com.au

Why Choose SLTEC® Fertilizers?

SLTEC® Fertilizers is a leading manufacturer of fluid Fertilizers, based in Northern Victoria.

Our Promise

Quality

SLTEC® Fertilizers is committed to supplying consistently high quality products.

Investment

SLTEC® Fertilizers will ensure that your fertilizer inputs maximise the return on your investment.

Service

SLTEC® Fertilizers will provide professional, logistical and agronomic support to ensure a sustainable relationship.

Read our quality assurance policy online at **sltec.com.au/quality**

Why use Fluid Fertilizer?

- Efficient and highly plant available
- Can deliver many nutrients with a single application
- Small and frequent applications reduce leaching and runoff
- Foliar and Fertigation options allow flexible application timing unlike relying on broadcast application
- Consistency of product and uniform application across the soil
- Nutrients infiltrate to the root zone where maximum uptake is achieved
- Foliar application particularly of trace elements avoids tie up in the soil
- Can be mixed with a range of farm chemicals
- Labour savings and improved workplace safety

SLTEC's Commitment to Quality

Can your fertilizer supplier give you this sort of quality assurance?

SLTEC is committed to delivering quality products and services. We continue to put a tremendous effort into ensuring that our products meet the tightest quality parameters.

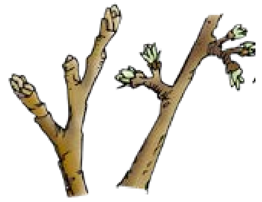
- We carefully select the ingredients we use in our formulations from suppliers all over the globe.
- We routinely seek independent laboratory testing to confirm the levels of all nutrients listed on our product labels. We also regularly test for heavy metals or other contamination.
- Our blends are developed by our formulation chemist, who has now developed over 400 different blends, some of which have been servicing very sensitive crops in hygienically clean glass house environments.
- We invest annually in formulation research and advanced chemistries for the fluid fertilizer and industrial water treatment sectors.
- Our team has specialized formulation software that aids the development of each blend, from basic chemistry building blocks into complex and sophisticated formulations for applications such as hydroponics, foliar fertilizer, fertigation, water treatment etc.
- Our batching and mixing systems are calibrated every 6 months by an external certifying body.
- Each batch must meet a variety of tests and quality specifications before being released for dispatch.
- Our labels state accurately the nutrient content of each blend and comply fully with state and federal legislation and the Fertilizer Australia Labelling Code of Practice.
- We retain samples of each and every blend made with a unique batch number, enabling traceability of batches.
- Our staff are qualified and thoroughly trained to ensure our products and services remain at the highest standards of excellence.

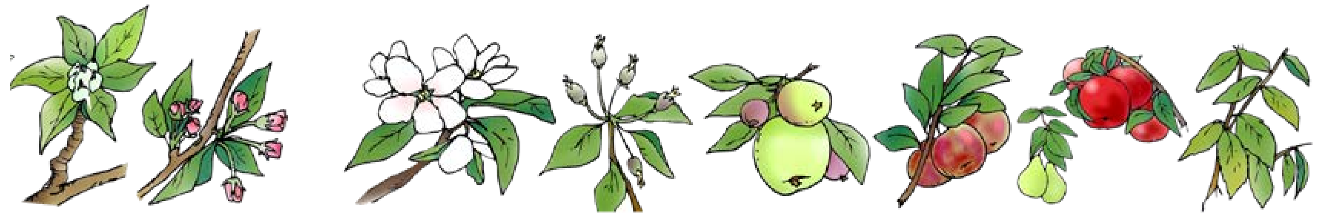
In summary, quality is an absolutely essential component of the culture and processes at SLTEC and we pride ourselves on it. Development, manufacture, storage, labelling and transport of our products is carried out in a manner that aims to provide our customers with the assurance that the products they receive are of the highest quality, ready to use and will deliver the outcomes desired.

Further information on our quality policy is available on our website.

Stone & Pome Growth Timelines

Pome Fruit





Period 1	Period 2	Period 3	Period 4 *	Period 5	Period 6
Dormancy Tree Reserves / Root Growth *June - August*	Pre Bloom to Flowering *September - October*	Flowering to Petal Fall *October*	Fruitlet Development - Fruit Set *November / December*	Maturity of Fruit and Seed *January / February / March*	Post Harvest *March /April / May*
		Stage I - Full Bloom to Fruit Set *October - November*	Stage II - Schuck fall to Pit / Stone Hardening *November - December*	Stage III - Rapid Fruit Growth, Bud Initiation	Post Harvest *January - April*

Cherry & Stone Fruit

Legend	
Fertigation	Foliar

Suggested application timings and methods - Please consult your agronomist for specific information regarding your situation.

Product Code	Product Name	Product Description	Period 1		Period 2		Period 3		Period 4		Period 5		Period 6	
SS9008	**SS 11:16:0**	Highly plant available phosphorus for root growth flush			Fertigation		Fertigation						Fertigation	
GG0042	**Pot Phosphate**	0-14-30 to drive plant metabolism and fruit growth							Fertigation	Foliar	Fertigation	Foliar		
GG0009	**Baseline Plus™**	Complete fertilizer (12-5-14) plus chelated trace elements and biostimulants suited for all season use				Foliar	Fertigation		Fertigation	Foliar	Fertigation		Fertigation	Foliar
SNPK0064	**FirmBright P™**	A high phosphorus and potassium product balanced with magnesium and designed for foliar application to enhance fruit fill and colour.								Foliar		Foliar		
SNPK0069	**PhosCal PLUS™**	A high phosphorus and calcium product to enhance firmness and colour when applied as a foliar spray								Foliar		Foliar		
SNPK0071	**K 300™**	A maximum analysis potassium acetate for safe and efficient foliar application								Foliar		Foliar		Foliar
GG0072	**Carbo K™**	Maximum potassium blend (43.8%) for foliar or fertigation									Fertigation		Fertigation	
GG0024	**Cal Mag & Boron™**	The perfect balance of nitrogen, calcium, magnesium and Boron for all situations				Foliar	Fertigation		Fertigation	Foliar	Fertigation	Foliar	Fertigation	
GG0180	**Spring Strength™** NEW	27.9% nitrogen, 7% calcium + trace elements					Fertigation		Fertigation				Fertigation	Foliar
GG0064	**Nitro QUAD 3™**	41% nitrogen in three forms with added biological stimulants for maximum uptake and soil retention.					Fertigation		Fertigation				Fertigation	Foliar
SNPK0051	**Cal 1750™**	Time proven foliar applied, buffered and softened calcium formulation.								Foliar		Foliar		
SNPK0074	**CellCAL PLUS™**	Formulated to improve calcium uptake and skin quality in both apples and cherries								Foliar		Foliar		
SNPK0053	**MoBo Complex™**	Boron Complex enhanced with 0.3% molybdenum to aid in nitrate and sugar metabolism				Foliar		Foliar		Foliar				Foliar
SNPK0057	**Nitro Mag™**	Address mid season and post harvest magnesium deficiency with this highly plant efficient, low use rate formulation.				Foliar			Fertigation	Foliar				Foliar
SNPK0046	**TE 8 PLUS™**	A multitrace solution to boost trace element levels post harvest and pre-bloom in spur leaves.				Foliar			Fertigation					Foliar
SG0015	**Bio Kelp Guardian™**	For frost / stress tolerance and recovery				Foliar		Foliar		Foliar				
SG0017	**BiologiCAL® PLUS**	Plant available calcium and biostimulants	Fertigation		Fertigation	Foliar	Fertigation		Fertigation	Foliar	Fertigation		Fertigation	
SG0039	**QuadSHOT®** NOW CERTIFIED ORGANIC	Late autumn/early spring applications stimulate soil biological activity, cycling and availability of plant nutrients.	Fertigation		Fertigation	Foliar			Fertigation	Foliar			Fertigation	Foliar

***Warning:** Care must be taken with foliar sprays - particularly trace elements during the cell division period from full bloom up to 8 weeks after bloom to avoid skin finish problems with top-fruit. Some varieties are sensitive to sulphate Sulphur burn. Some apricot varieties are particularly sensitive to foliar Zinc, Zinc nitrate or sulphate, outside of dormancy. Please consult your agronomist before fertilizer application .

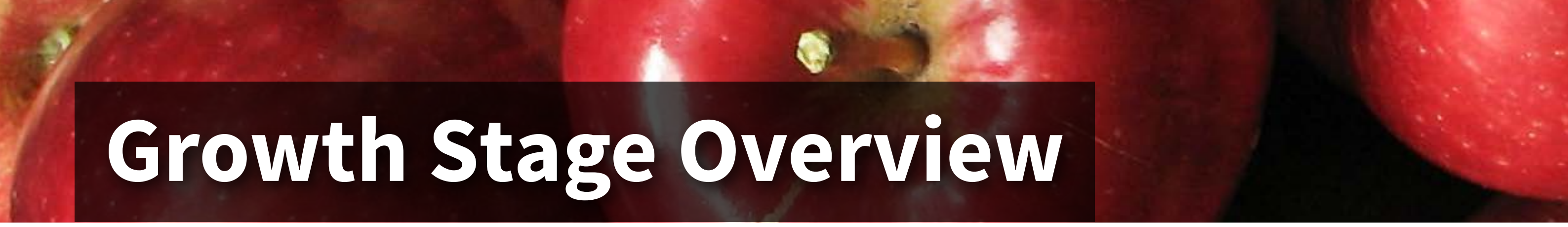
Product Technical Information

Product Technical Information

Product Code	Name	N% (w/v)	P% (w/v)	K% (w/v)	S% (w/v)	Ca% (w/v)	Specific Gravity (kg/L)	pH Range	Typical Application Rates	
									Fertigation	Foliar Use 200 to 2,000 L/ha water
SS9001	**SS 11:16:0™** N as NH_4 14.0%, P as PO_4 20.8%	14.0	20.8	-	-	-	1.29 - 1.30	6.0 - 7.0	20 - 100 L/ha	1 - 5 L/ha
GG0042	**Pot Phosphate** P as PO_4 13.8%	-	13.8	30.1	-	-	1.48 - 1.49	7.0 - 8.0	10 - 80 L/ha	1 - 10 L/ha
GG0009	**Baseline Plus™** N as NO_3 0.02%, N as Urea 11.7%, P as PO_4 4.9%, Mg 0.2%, Mn 0.01%, Zn 0.01%, Cu 0.005%, Mo 0.005%, B 0.02%, Fe 0.01%, Fulvic Acid 0.01%, Fish Emulsion 0.4%, Humic Acid 0.3%, Kelp 0.4%, Molasses 0.4%	11.7	4.9	13.6	2.0	0.01	1.29 - 1.32	8.0 - 9.0	10 - 80 L/ha	2 - 15 L/ha
SNPK0064	**FirmBright P™** P as PO_4 19.2%, Mg 6.1%	-	19.2	6.1	-	-	1.47 - 1.48	< 1.0	N/A	2 - 10 L/ha
GG0100	**PhosCal PLUS™** P as PO_4 15.0%	-	15.0	-	-	4.1	1.30 - 1.31	< 1.0	N/A	1 - 10 L/ha
GG0070	**K 220-Mag™** Mg 1.6%	-	-	21.6	-	-	1.27	6.5 - 7.5	10 - 80 L/ha	2 - 10 L/ha
GG0025	**High KS™** Potassium Thio Sulphate (KTS)	-	-	30.1	25.0	-	1.47 - 1.49	7.0 - 9.0	10 - 80 L/ha	N/A
GG0024	**Cal Mag & Boron™** N as NO_3 12.2%, Mg 3.4%, B 0.2%	12.2	-	-	-	12.1	1.47 - 1.50	2.0 - 3.0	10 - 100 L/ha	5 - 10 L/ha
GG0180	**Spring Strength™** N as NO_3 11.3, N as NH_4 5.5, N as urea 11.1, Mg 0.4%, Mn 0.2%, Zn 0.5%, Cu 0.1%, B 0.09%	27.9	-	-	-	7.0	1.40 - 1.41	3.0 - 4.0	10 - 60 L/ha	5 - 10 L/ha
GG0064	**Nitro QUAD 3™** N as NO_3 10.3%, N as NH_4 10.3%, N as Urea 20.6%, P as PO_4 0.1%, Fe 0.001%, Fulvic Acid 0.01%, Fish Emulsion 0.2%, Humic Acid 0.2%, Kelp 0.2%, Molasses 0.2%	41.1	0.1	0.1	-	-	1.30 - 1.32	6.0 - 7.0	10 - 80 L/ha	10 - 60 L/ha
SNPK0051	**Cal 1750™**	-	-	-	-	17.5	1.35 - 1.36	8.0 - 9.0	N/A	3 - 12 L/ha
SNPK0074	**CellCAL PLUS™** Cu 0.3%, B 0.1%	-	-	-	-	5.9	1.14 - 1.15	6.0 - 7.0	**Cherries** Apply as a series of 6 sprays over six weeks at 10 L/ha after bloom, to give the best responses to reduce cracking.	**Apples** Research suggests that up to 90% of the calcium uptake is accumulated from 6 weeks after full bloom. Apply 6 applications at 10 L/ha every week for six weeks.
SNPK0050	**Boron Complex™** N as amine 6%, B 15%	6.0	-	-	-	-	1.34 - 1.38	7.5 - 8.5	2 - 5 L/ha	1 - 3 L/ha
SNPK0057	**Nitro Mag™** N as NO_3 9.8%, Mg 8.8%	8.3	-	-	-	-	1.45 - 1.47	<2.0	12 - 25 L/ha	2 - 10 L/ha
SNPK0046	**TE 8 PLUS™** N as NO_3 2.6%, Mg 2.4%, Mn 3.1%, Zn 3.1%, Cu 0.5%, Mo 0.02%, B 0.2%, Fe 0.7%, Co 0.05%, Fulvic Acid 0.5%	2.6	-	0.1	4.2	-	1.28 - 1.29	1.0 - 2.0	10 - 25 L/ha	2 - 10 L/ha
SG0015	**Bio Kelp Guardian™** Kelp 22.4%	0.1	1.1	4.2	-	-	1.05 - 1.10	10.0 - 11.0	5 - 20 L/ha	2 - 10 L/ha
SG0017	**BiologiCAL® PLUS** N as NO_3 0.3%, P as PO_4 0.1%, Fulvic Acid 0.01%, Fish Emulsion 0.3%, Humic Acid 0.2%, Kelp 0.3%, Molasses 41.9%	0.3	0.1	2.0	1.8	6.3	1.27 - 1.31	6.0 - 7.0	20 - 60 L/ha	4 - 20 L/ha
SG0039	**QuadSHOT®** C 5.2%, Ca 0.2%, Fe 0.006%, Fulvic Acid 0.3%, Fish Emulsion 8.0%, Humic Acid 6.6%, Kelp 8.0%, Molasses 8.0%	0.3	0.1	3.4	0.2	0.2	1.15 - 1.16	10.0 - 11.0	20 - 60 L/ha	1 - 20 L/ha

Additional Products of Interest for Cherry, Stone & Pome Fruit Production

Product Code	Name	N% (w/v)	P% (w/v)	K% (w/v)	S% (w/v)	Ca% (w/v)	Specific Gravity (kg/L)	pH Range	Typical Application Rates	
									Fertigation	Foliar Use 200 to 2,000 L/ha water
GG0023	**Cal Nitrate & Boron™** N as NO_3 12.2%, B 0.2%	12.2	-	-	-	17.4	1.47 - 1.50	2.0 - 3.0	10 - 100 L/ha	5 - 10 L/ha
GGCB0143	**PM Nursery Blend™** N as NO_3 12.1%, N as NH_4 2.7%, N as urea 5.3%, Mg 0.8%, Zn 0.2%, Cu 0.1%, B 0.06%	20.0	-	-	-	12.0	1.44 - 1.55	2.0 - 6.0	10 - 100 L/ha	5 - 10 L/ha
GG0096	**CalAN + B™** N as NO_3 15.9%, N as NH_4 7.4%, B 0.02%	23.3	-	-	-	12.1	1.46 - 1.48	3.0 - 7.0	10 - 100 L/ha	5 - 10 L/ha
GG0062	**NitrologiCAL PLUS TE™** N as NO_3 9.1%, N as NH_4 8.9%, N as urea 17.9%, Mn 0.08%, Zn 0.2%, Cu 0.04%, B 0.02%, Fish Emulsion 0.04%, Humic Acid 0.03%, Kelp 0.04%, Molasses 5.5%, Fulvic Acid 0.001%	36.0	-	0.3	0.3	1.0	1.30 - 1.31	5.0 - 6.0	10 - 100 L/ha	10 - 60 L/ha
GG0069	**K 250-S™**	-	-	24.9	5.0	-	1.29 - 1.30	6.5 - 8.0	10 - 80 L/ha	2 - 5 L/ha
GG0068	**High KP™** P as PO_4 12.2%	-	12.2	36.5	-	-	1.55 - 1.57	12.0 - 13.0	10 - 80 L/ha	1 - 5 L/ha
GG0072	**Carbo K™**	-	-	43.9	-	-	1.54 - 1.55	13.0 - 14.0	10 - 80 L/ha	1 - 5 L/ha
SNPK0040	**Crop Booster PLUS™** N as NO_3 2.1% , N as NH_4 2.9%, P as PO_4 15.2%, Mg 0.2%, Mn 0.4%, Zn 0.4%, Cu 0.5%, Mo 0.01%, B 0.05%, Fulvic Acid 0.5%	5.0	15.2	2.1	-	4.0	1.30 - 1.32	<2.0	10 - 80 L/ha	2 - 10 L/ha
SNPK0058	**Nitro Mang™** N as NO_3 12.26%, Mn 23.95%	12.2	-	-	-	-	1.55 - 1.57	2.5 - 3.5	1 - 5 L/ha	500mL - 2 L/ha
SNPK0060	**Iron Chel™** N as NH_4 1.8%, Fe 6.0%	1.8	-	-	-	-	1.22 - 1.23	7.0 - 8.0	8 - 15 L/ha	1 - 3 L/ha
SNPK0036	**Z Chel™** N as NO_3 10.6%, N as NH_4 7.7%, N as urea 0.7%, Zn 6.6%	19.0	-	-	-	-	1.33 - 1.34	3.0 - 4.0	2 - 5 L/ha	400mL - 1.5 L/ha
SNPK0054	**Mo 250P™** P as PO_4 11%, Mo 25.0%, Na 11.8%	-	11.0	-	-	-	1.57 - 1.58	3.5 - 4.5	Up - 150 mL/ha	40 - 150 mL/ha
SG0016	**Humic K 26™** Mg 0.03%, Mn 0.001%, Zn 0.001%, Cu 0.001%, Fe 0.01%, Si 0.1%, Fulvic Acid 1%, Humic Acid 25%	0.1	-	6.0	0.1	0.03	1.10 - 1.12	10.0 - 11.0	2 - 20 L/ha	N/A
GG0175	**Baseline Phos Plus™** N as urea 11.7%, **P as phosphonic acid 4.7%**, Mg 0.2%, Mn 0.006%, Zn 0.01%, Cu 0.005%, Mo 0.005%, B 0.02%, Fe 0.01%, Fulvic Acid 0.01%, Fish Emulsion 0.4%, Humic Acid 0.3%, Kelp 0.4%, Molasses 0.4%	11.7	4.9	13.6	2.0	-	1.31 - 1.32	7.0 - 8.0	10 - 80 L/ha	2 - 15 L/ha



Growth Stage Overview

As part of SLTEC®'s Balanced Agronomy® program we aim to assist growers to better understand crop nutrient removal and at which growth stages their crops peak demand for nutrients occurs.

The percentages in the tables below provide a guide to the proportion of the overall macro nutrient demand and suggested timing of nutrient application for each growth stage based on available researched data at time of writing.

Period 1			
Dormancy **Tree Reserves / Root Growth** *June - August*			
Estimate of proportion of annual crop nutrient demand for each growth stage			
N	P	K	Ca
5%	10%	5%	5%

At this stage the tree is relying on stored reserves accumulated in the previous season after harvest. Recycling of nutrients is occurring from fallen fruit, leaves and prunings. Estimates of potassium recycling from rotting fruit and leaf material are in the order of 20 kg/ha potassium per year. Actual returns may be a lot higher in the order of 60 kg/ha but not immediately available. [37, 46]

- Phosphorus is very important for root establishment - hence pre-winter application.
- Aglime, dolomite and gypsum are all sources of calcium which are usually applied pre-winter or incorporated pre-plant to enable the fines of these products to begin to work into the profile over winter.
- Late dormant foliar zinc applications are often beneficial and absorbed through the bark.
- **Z PLUS™** provides an efficient way of providing zinc to trees at this time.
- **Liquid Lime 38™** is a highly flowable calcium carbonate suspension designed to deliver high purity, micronized particles to the soil to raise pH and improve soil structure. Through foliar application it provides an extremely efficient source of calcium to crops.

Period 2			
Pre Bloom to Flowering *September - October*			
Estimate of proportion of annual crop nutrient demand for each growth stage			
N	P	K	Ca
5%	10%	5%	5%

During this period the tree is remobilizing stored reserves to drive bud-break, bloom and early shoot (spur leaf) and fruit development. This re-enforces the importance of post-harvest applications of nutrients.

- Phosphorus demand is fairly constant over the season, there are peaks in demand during flowering and fruit cell division. Five to ten percent of annual phosphorus may be applied pre-bloom. As phosphorus is highly immobile on finer / heavier clay soils – single surface applications are inefficient. Incorporation of phosphorus at planting and fertigation of phosphorus just before and during bloom is regarded as more beneficial. [38, 42] **SS 11:16:0™** offers a suitable option for early fertigation of ammonium nitrogen and phosphorus during periods 2 and 3.
- Potassium and nitrogen are more mobile and in particular nitrogen is better applied in split applications.
- Potassium can be lost via leaching if too much is applied at once or if applied pre winter.
- To ensure strong flowering pre bloom foliar applications of nitrogen, phosphorus, potassium, calcium and magnesium can be beneficial. Boron is critical for good pollination and assists in calcium mobilization.
- **Cal Mag & Boron™** and **Crop Booster PLUS™** offer suitable foliar options pre-bloom to boost these key nutrients. Use **Boron Complex™** for targeted boron applications
- Pre-bloom magnesium, zinc, manganese and iron will improve photosynthesis and therefore promote strong spur leaf development. All these elements are provided in **TE 8 PLUS™**.
- Application of **Bio Kelp Guardian™** prior to bloom and after bloom or anticipated frost periods will assist in flower strength, fruit set and ability to resist and recover from stress.
- Dry winters and drought conditions pre-bloom can cause early flower abortion and poor fruit set. Be prepared to irrigate early in these circumstances.

Did you know?

Application timing needs to occur before the anticipated demand period - this may be at least two to three weeks with ground applied solid fertilizer.
Highest nitrogen demand usually occurs in fruit crops from bloom to end of shoot growth, with lower but steady demand continuing to harvest. Other nutrients have relatively constant demand from loom to harvest.
Amount of fertilizer applied per week as fertigation =
Total quantity of fertilizer per growth stage ÷ Number of weeks per growth stage

Growth Stages - We have divided cherry, stone and pome fruit growth into six periods as shown in the diagram below and over page.

Pome Fruit - The first half of Period 4 in pome fruit is a phase of rapid fruit growth resulting from rapid cell division following fruit set. This occurs over the four to six weeks after full bloom. This is the period in which apples and pears are initiating fruit buds for the following season. Fruit growth slows in pome fruit as shoot and canopy development takes place during summer in the latter half of Period 4 and early Period 5.

Period 3			
POME FRUIT: **Flowering to Petal Fall** *October*			
CHERRY & STONE FRUIT: **Stage I - Full Bloom to Fruit Set** *October - November*			
Estimate of proportion of annual crop nutrient demand for each growth stage			
N	P	K	Ca
20%	15%	20%	20%

There is a high demand for all nutrients during this period of rapid cell division, enlargement and spur leaf expansion. Nitrogen, calcium, magnesium, phosphorus and boron drive pollination, fruit cell division, cell wall strength and photosynthesis.

- Nitrogen re-mobilisation from storage is largely complete by the end of full bloom.
- It is not until leaves and new shoots are actually growing that there is active uptake of most soil nutrients. Fertilization should be timed to meet this demand.
- Ammonium nitrogen is a preferred source of ground applied nitrogen in early spring and is commonly applied 2 to 3 weeks before peak demand (post bloom) to allow soil conversion for uptake.
- As a general guide 20 - 40% of total nitrogen is commonly applied in spring for pome and stone fruit depending on the variety. (The largest proportion of the remainder is applied post harvest.) Late season or green apple varieties may require a second nitrogen application early summer on low vigour sites. Varieties such as Pink Lady and Fuji generally require less nitrogen to prevent problems with fruit colour.[43]
- Phosphorus is very important for cell division and seed set. Fertigation gives greater phosphorus and potassium mobility than broadcasting increasing the potential for timely application of these nutrients in the root zone.[40]
- Potassium demand rises steadily from full bloom.
- Adequate magnesium, manganese, sulphur, iron and zinc ensure quality leaf development.
- **Baseline Plus™** provides a balanced NPK approach for fertigation during periods 3 and 4.
- Apply 50% of the total calcium over Stages 1 - 2 in cherries and stone fruit.
- **Calcium Nitrate** and/or **BiologiCAL® PLUS** are suitable options to provide fertigated available calcium during period 3 and 4. Both products are non-acidifying. **BiologiCAL® PLUS** is a preferred choice when no additional nitrogen is required. It stimulates root zone microbial activity which in-turn enhances calcium uptake.
- **Cal Mag & Boron™** is a product of choice in low magnesium situations.

Period 4 *			
Fruitlet Development - Fruit Set / Fruit Thinning / Bud Initiation *November / December*			
Stage II - Schuck fall to Pit / Stone Hardening *November - December*			
Estimate of proportion of annual crop nutrient demand for each growth stage			
N	P	K	Ca
15%	15%	20%	25%

The demand for major nutrients (NPK) is maintained at this stage. In apples, nitrogen demand rises steadily from full bloom to about 45 days after full bloom where it then flattens and drops towards harvest. After apple fruit reaches approximately 30mm, fruit expansion slows and shoot growth increases. Monitor leaf nitrogen levels particularly in red / high color varieties and on vigorous sites.

- Soil uptake efficiency of nitrogen is greatest in spring (Oct - Nov) with rapid nitrogen uptake from the roots in sweet cherry beginning after full bloom and coinciding with onset of rapid shoot growth.[39, 41] Azarenko et al 2003 (OSU) - estimate that at this time uptake efficiency is at about 20% average CV to only 4.5% summer and 1.8% in autumn.
- The Australian Cherry Manual indicates up to 45% of annual nitrogen can be applied post flowering through to stage 2.
- In the latter half stage 2 cherry fruit growth slows but does not stop, while shoot growth is rapid. Since nitrogen uptake is rapid in both pome and stone fruit at this time excess nitrogen can result in reduced fruit quality and excessive growth (shading in lower part of tree[42] and should be avoided with the exception of young trees which are trying to fill canopy space.
- In apples, potassium demand rises again rapidly from 6 weeks after bloom until harvest. **K 300™** provides a highly efficient foliar potassium source balanced with magnesium.
- As a general rule apply 30 - 50% of annual potassium after fruit has reached 10mm in size in cherries.
- Like nitrogen, potassium will benefit from split applications.
- Up to 50% of the total calcium demand in apples is from full bloom to harvest, peaking at around six weeks after full bloom or towards the end of rapid cell division and seed development. After T stage (apple fruit approx. 40mm) it becomes increasingly difficult to get foliar calcium into apples. **Cal 1750™** is a softened and buffered foliar calcium, time proven in pome fruit to assist in improving fruit calcium levels.
- Calcium and phosphorus status needs to be maintained during pit / stone hardening in summer fruits. **PhosCAL PLUS™** provides a high analysis foliar option for supply of calcium and phosphorus during rapid cell division.
- Actual phosphorus requirements are low but constant - rising toward harvest.
- A top-up of magnesium and zinc may be beneficial at this stage for leaf quality. Magnesium and boron can improve fruit set and minimize drop.
- Soil applied fertilizers are usually readily accessed during this period, however periods of cool weather may reduce soil derived nutrient uptake. Foliar applications are often beneficial under these conditions.
- Regulated deficit irrigation has been practised in apples and pears late period 4 (mid season) to assist in vigour control and to conserve water but is generally not recommended.

Stone Fruit - Within Periods 3 to 5 there are three well recognized main stages of growth rate in cherry tissue.[43] These growth stages are also reflected in other stone fruit.

Stage I and Stage III are phases of rapid fruit growth and Stage II is a slower stage that correlates with pit hardening. Stage I is a period of rapid cell division and Stage III is a period of cell enlargement.

Fruit Size - In most tree fruit crops, fruit size at harvest is a result of the number of cell divisions that occur post fertilization. The length of the cell division phase is important in determining fruit size and is influenced by temperature, crop load and genetics[43].

Early season varieties generally have a shorter cell division period. Firmer fruit is a function of cell numbers (density) - hence many early season cherries are softer.

Period 5

POME FRUIT	**Maturity of Fruit and Seed** *January / February / March*		
CHERRY & STONE FRUIT	**Stage III - Rapid Fruit Growth, Bud Initiation**		
Estimate of proportion of annual crop nutrient demand for each growth stage			
N	P	K	Ca
5%	15%	30%	25%

Although nitrogen demand usually peaks in mid summer, nitrogen application needs to moderate running up to harvest to maintain fruit quality and to avoid tree vigour problems. Large single applications of nitrogen should be avoided.

- During stage III cherries undergo cell enlargement and rapid sugar accumulation.
- 2 to 4 weeks before harvest most pome and stone fruits size rapidly - avoid water stress during this period.
- Australian Cherry Manual 2011[42] suggests only apply 5 - 10% annual nitrogen in this period depending on crop load.
- Monitor N : K : Ca ratios. Potassium drives yield and the ratio of potassium to nitrogen needs to increase to assist in fruit weight, colour and sugar development (shelf life) but without upsetting the calcium balance to maintain fruit firmness and prevent fruit disorders such as bitter pit in Apples.
- Apricots have a particularly high potassium demand (up to 3 kg/t fruit removed).[9,10,11]
- As a general guide short or early season fresh market stone fruit varieties or sites that are vigorous may have all their nitrogen requirement applied post harvest. [49] *Please note however that canning peaches are often supplied more nitrogen and less potassium mid season than fresh market varieties.*
- Phosphorus is important again for cell enlargement and fruit colour (anthocyanin pigment formation). **FirmBright P™** provides high levels of soluble phosphorus and potassium to assist in early sugar and colour development.
- Both boron and copper are important at this time to assist in calcium uptake into cell walls and to reduce the incidence of splitting.
- **Crop Booster PLUS™** provides phosphorus, calcium and potassium as well as a range of trace essential for colour development and sizing in fruit. Apply to red varieties 2 - 3 weeks before anticipated harvest.
- **BiologiCAL® PLUS™** is the perfect partner for a low Nitrogen plant available Calcium source for fertigation running up to harvest.
- Look to low nitrogen forms of potassium such as **High KS™**, **High KP™** and **Carbo K™**.

Period 6

Post Harvest to Leaf fall - Continuation of Fruit Bud Development / Accumulation of Nutrient Reserves for Next Spring *January - May (depending on variety)*			
Estimate of proportion of annual crop nutrient demand for each growth stage			
N	P	K	Ca
50%	35%	20%	20%

Build the trees nitrogen and potassium reserves for next season. Post harvest applications have the greatest positive contribution to tree and crop performance the following season.

- Total nitrogen removal in fruit alone per hectare for a 75 t/ha crop of apples is estimated at 45 kg/ha. **Nitro QUAD 3™** provides a high efficiency nitrogen source balanced with microbial stimulants
- It is well established that late summer post harvest nitrogen applications provide the main source of nitrogen reserves to support tree function and early growth until post bloom. Once growth has stopped (terminal buds set) as much as 50% of the trees fertilizer needs may be applied through ground and foliar methods depending on the variety and the length of its growing season. [38, 42]
- **NitrologiCAL PLUS TE™** provides three forms of nitrogen, plant and microbial stimulants and the added value of calcium and trace elements for post harvest fertigation to build tree reserves.
- Fertilizer applications to the soil immediately after harvest are more effective than later post harvest applications. Care should be taken with excessive nitrate applications which can promote excessive growth post harvest and prevent a tree from setting terminal buds and shutting down properly before winter.
- Recent research has proven that stone fruit trees do respond to post harvest urea applications with a positive effect on stored carbohydrate in buds, cold hardiness and increased spur leaf size in spring. [44]
- Applying phosphorus and calcium at this time provides for strong bud development and also promotes good root growth going into winter. Up to 50% of the annual phosphorus requirements can be applied post harvest depending on the soil type, with the balance applied monthly or at the intervals indicated in the timeline above.
- Apply 20% to 30% of the annual potassium required at this growth stage to assist with bud strength for early spring to fruit set. This will also assist in maintaining the balance of salts and water in plant cells to cope with frost and other stress.
- A 75 t/ha crop of apples may remove in fruit alone approx. 100 kg/ha of potassium.
- Key foliar trace elements to apply now are Magnesium and Boron with nutrients translocating from leaves to buds and wood for storage. **TE 8 PLUS™**, **Nitro Mag™** and **Boron Complex™** are effective options for application with Lo-Bi Urea.
- Ensure that soil moisture is adequate so that trees are still active when applying foliars.

Improve Fruit Firmness and Skin Strength

FERTILIZERS

CellCAL PLUS™

Product Code: SNPK0074

CellCAL PLUS has been formulated with the support of industry leaders to improve calcium uptake the skin quality in;

- Apples
- Table grapes
- Almonds
- Citrus
- Cherries

The three nutrients in CellCAL PLUS (calcium, copper & boron) work in a symbiotic relationship assisting in the overall health and strength of the cell walls within the fruit which produces fruit firmness and skin strength.

Both boron and copper are important during rapid fruit growth in cherries to assist in calcium uptake into cell walls and to reduce the occurrence of splitting.

Please also consider using CellCAL PLUS in combination with either;

PhosCAL PLUS™

Designed to enhance firmness and colour in pome and stone fruit.

15.0% Phosphorus, 4.1% Calcium

Apply at 5 - 10 L/ha at 7 - 10 day intervals from early fruit set. For colour enhancement in Apples apply 2 - 3 sprays beginning at early pigment development and running up to 2-3 weeks before anticipated harvest.

FirmBright P™

Designed to drive rapid cell growth sugar production and colour.

19.2% Phosphorus, 6.1% Potassium, 6.1% Magnesium

Suggested application rates for Apples and Stone fruit are 5 - 10 L/ha for two to four sprays from early fruit set at 7 to 14 day intervals.

Both are compatible with CellCAL PLUS with a minimum of 500L of water

Guaranteed Analysis

Calcium (Ca)	5.9%
Copper (Cu)	0.25%
Boron (B)	0.1%
Specific Gravity	1.13 - 1.14 kg/L
pH	6.0 - 7.0

Typical Application Rates

Foliar

5 to 10 L/ha

Horticulture use 200 to 2,000 L/ha water

For crop specific rates, please contact your SLTEC® representative

Contact:

T: 1800 768 224

E: enquiries@sltec.com.au

www.sltec.com.au

At last! A complete fluid nutrient solution

FERTILIZERS

Baseline Plus™

Product Code: GG0009

Baseline Plus has a complete and balanced NPK analysis suitable for fertigation and foliar application across a wide range of crops. The analysis is perfect for plant establishment and maintained growth where a N : K ratio near 1 : 1 or a mid-season nutrient boost is required.

Benefits of Baseline Plus

- Chelated trace elements for rapid plant uptake and to drive the NPK metabolism.
- Contains SLTEC's QuadSHOT® - The ingredients stimulate soil biological activity; improving the cycling and availability of plant nutrients, plant uptake efficencies and soil fertility and health.
- Baseline Plus has a high analysis compared to other liquid products and provides economic and efficient supply of nutrients and the capacity to reduce rates compared to common prilled complete fertilizers on the market.
- Efficencies can be made with Baseline Plus in fertigation applications by placing the nutrients at the root mass where they will be taken up by the plant; reducing loss or waste of nutrients.

Also available with phosphonic acid – Baseline Phos Plus™
Baseline Plus™ with the additional benefits of phosphonic acid. The addition of phosphonic acid gives 125g of phosphonic acid per 1 L or 1.25 kg per 10 L application.

Guaranteed Analysis

Nitrogen (N)	11.8%
Phosphorus (P)	4.8%
Potassium (K)	13.6%
Sulphur (S)	2.0%
Carbon (C)	0.3%
Magnesium (Mg)	0.2%
Manganese (Mn)	0.006%
Zinc (Zn)	0.01%
Copper (Cu)	0.005%
Molybdenum (Mo)	0.005%
Boron (B)	0.02%
Iron (Fe)	0.01%
Fulvic Acid	0.01%
Humic Acid	0.3%
Fish Emulsion	0.4%
Kelp	0.4%
Molasses	0.4%
Specific Gravity	1.29 - 1.32 kg/L
pH	7.5 - 8.5

Typical Application Rates

Foliar:

2 to 15 L/ha

Horticulture use 200 to 2,000 L/ha water

Broadacre use at least 100 L/ha water

Fertigation:

10 to 80 L/ha

Contact:
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Crop Nutritional Information

The building blocks – carbon, hydrogen and oxygen are generally not considered by the grower as limiting unless in a controlled environment such as a glasshouse or experimental situation. In considering fruit tree nutrition we will generally concentrate on 6 macro -nutrients and 6 micro-nutrients that have the most economic importance to the producer. The nutrients that we invest in to maximize yield, quality and profit do not work in isolation, but in many complex chemical interactions that together convert light energy into valuable food sources for life.

Macro Elements

Nitrogen (N)

Nitro QUAD 3™

Nitrogen is actively absorbed by plants through roots in two main forms, nitrate (NO_3^-) and ammonium (NH_4^+). Pome and stone fruit principally utilise NO_3^-. In field crops it is generally understood that NH_4^+ is absorbed and utilised primarily by young plants, whereas NO_3^- is the principal form utilised during the main growth period. Conversion of ammonium to the nitrate form occurs in the soil and during this process losses are expected as other microorganisms return nitrogen to organic forms as part of their metabolism. Nitrogen may be converted to volatile forms and lost to the air or nitrates may be leached below the root zone or into the water table in extreme cases of over watering. Nitrification inhibitors are becoming more popular to extend the life of applied ammonium or urea fertilizers.

It is critical to understand how to monitor and manage nitrogen as excess nitrogen is often a key factor in uncontrolled growth and poor quality produce.

Nitrogen availability can be enhanced and losses can be reduced by minimizing tillage, increasing organic matter and by promoting better soil biology. As soil organic matter increases so does the level of organically stabilised nitrogen.

In the plant the NO_3^- ion is reduced to NH_4^+ by the nitrate reductase enzyme and subsequently converted to the amine form (NH_2^-) which is then utilised to form amino acids, proteins, nucleic acids (DNA, RNA), hormones and enzymes. Amino acids and NO_3 are the main forms in which nitrogen is transported throughout the plant. As with all nutrients, interactions with other nutrients within the plant can influence nitrogen status. Potassium, phosphorus and sulphur are directly involved with nitrogen in organic acid, enzyme and protein synthesis. Copper, iron and molybdenum can all influence nitrate reduction to NH_2^- and thus nitrogen assimilation. Nitrogen along with magnesium, manganese, zinc and sulphur are all involved in the production of chlorophyll.

Soil nitrate and plant sap nitrate tests have a quick turn-around and can give a good indication of current Nitrogen status at the time of testing.

Phosphorus (P)

FirmBright P™, SS 11:16:0™ & PhosCal PLUS™

Phosphorus uptake by plants is active and occurs as either the monovalent ($H_2PO_4^-$) or divalent (HPO_4^{2-}) phosphate ions. Phosphate uptake is dependent on pH and declines quickly with increasing pH. Plant uptake of phosphorus is increased in the presence of *Mycorrhiza sp* in many crops.

This element is a structural component of plant proteins, phospholipids, co-enzymes, sugar phosphates, nucleotides, nucleic acids (DNA, RNA) and is well known for its function in energy storage and transport through ATP and ADP compounds. While phosphate is relatively mobile within the plant, it is transported in the xylem upwards, or in a downwards direction in the phloem. This means, young leaves can be supplied with phosphate that has originated from the roots or the older leaves.

Because phosphorus is very important in plant metabolism the highest percentages of phosphorus occur in the parts of the plant that are growing rapidly, such as the shoot and root tips, flowers and maturing fruits and seeds. Plants therefore have a fairly constant demand for phosphorus. Root growth and subsequently phosphorus uptake is reduced during cool and wet soil conditions in spring and this can lead to reduced flower viability. In these conditions trees can benefit from small amounts of phosphorus applied to the root zone in early spring and at planting.

Greater available nitrogen, particularly ammonium nitrogen is known to enhance phosphorus uptake by plants. Phosphorus has low mobility and is not easily leached from the soil profile. The total amount required will not only be governed by the crop and the target yield, but by the CEC, clay mineralogy, pH and levels of calcium, aluminium and iron all of which influence the level of fixation into unavailable forms. Excessive phosphorus applications or high soil phosphorus levels can impact negatively on the crops ability to access zinc and iron resulting in deficiency symptoms of these micronutrients.

Reactive rock phosphate, Guano or other low solubility mineral phosphates are more effective in acidic soils ($pH < 5.5$) therefore in heavier orchard soils with good pH – smaller – regular applications of soluble phosphorus may be more beneficial. Addition of organic matter, humates and improvements in soil biology are keys to unlock soil nutrition and in particular fixed phosphorus.

Potassium (K)

High KP™, K 300™ and Carbo K™

Potassium Is required in surprisingly large amounts for normal growth and development but it does not form a stable structural part of the plant. It can be taken up by plants both actively and passively and uptake is strongly influenced by transpiration rate. It is very mobile throughout the plant and it's mainly directed towards the growing point, the apical meristem.

Potassium has been found to be a cofactor for more than 60 enzymes that are involved in cell division and extension, synthesis and transport of carbohydrates (starch) and proteins, reduction of nitrates, production of high energy phosphate (ATP), lipid metabolism and photosynthesis.

Potassium is also essential in the processes of water uptake, movement and transpiration rate and is a controlling factor for the opening and closing of stomata. Cell pH and anion balance are controlled by potassium and it is essential in the formation of starches and sugars. Potassium effects the thickness and stability of cell walls, which affect plant vigour, rigidity and fruit fullness. This means potassium has a major influence on; fruit quality, shelf life, disease and pest resistance, and frost tolerance. It is important to maintain the ratios of K : Ca : Mg. Although potassium demand rises as fruits ripen and sugars accumulate, an excess amount of potassium can induce deficiency of magnesium or calcium and result in potential fruit disorders.

Because potassium is easily leached in lighter soils regular maintenance applications are normally required. Some soil types such as the red-earths readily fix potassium depending on the clay fraction that they contain.

Sulphur (S)

High KS™, High AS™

Sulphur can be taken up as sulphur dioxide (SO_2) by the aerial parts of plants but it is mostly absorbed by the roots as the divalent sulphate anion (SO_4^{2-}). Sulphur is highly mobile within the plant, and mainly moves in the xylem, in an upwards direction.

Sulphur is a component of ferridoxin which is essential to the production of chlorophyll and thus photosynthesis. Sulphur is a structural component of amino acids (cysteine and methionine) and therefore plant proteins as well as sulpho-lipids, hormones and vitamins such as thiamine and biotin. The sulfhydryl group – SH is essential for the action of certain enzymes and co-enzymes in the respiratory function of the plant.

Sulphur is important for seed production, Nitrogen fixation in legumes and the distinct odour and flavour of brassicas, onions and garlic. During the vegetative stages, it is actively involved in growth, resilience to stress and disease resistance.

Sulphur uptake through the roots, under certain conditions, may inhibit phosphate and nitrate.

Sulphur is easily leached and as such it is common to see low sulphur in soil analysis, particularly on coarse or sandy loam soils and in low pH soils. Adding organic matter and animal manures can help to improve sulphur levels.

Calcium (Ca)

BiologiCAL® PLUS, Cal Nitrate and Boron™, CellCAL PLUS™

Calcium does not move readily in the plant and uptake is passive, dependent on the transpiration stream (xylem) to enter the plant through young root tips. Due to the poor mobility of calcium within the plant, and it being stored and not relocatable from the older leaves, plants require a constant, accessible supply of calcium. During water stress, calcium deficiency can occur in fruit and vegetables as the transpiring leaves command a greater sink for the calcium. Excessive nitrogen fertilization or poor application timing can result in vegetative growth and subsequent calcium disorders in fruit and vegetables.

The major roles of calcium are in the permeability of cell membranes and cell wall stabilisation in the form of calcium pectate which cements adjacent cell walls together. It is also involved in cell division and extension, formation of the cell nucleus (mitosis), starch metabolism as an activator of enzymes such as alpha – amylase, cation / anion balance, cell pH and osmoregulation. Calcium binds to organic acids and salts that may otherwise be toxic to cells. Calcium is necessary for new cells especially in new roots, root hair development and the apical meristem. Good calcium levels aid in stress and drought tolerance. Low calcium can result in leaky cell membranes resulting in a loss of integrity and production efficiency. As fruit growers we understand that calcium is therefore critical to plant vigour, pollen germination, seed formation and of course firmness of fruit (shelf life).

A high proportion of exchangeable Ca^{2+} ions is usually associated with a better structured soil. When exchangeable Sodium is replaced with calcium in a sodic soil, the calcium improves aggregate stability. The soil Ca : Mg ratio is particularly important in determining physical properties of the soil and hence the availability of other nutrient cations.

Magnesium (Mg)

Cal Mag & Boron™, Nitro Mag™

Magnesium like calcium is absorbed in a passive manner. The competitive effects between other cations such as; Ca^{2+}, K^+, NH_4^+, occasionally result in poor uptake and can lead to deficiencies. Magnesium is relatively mobile within the plant and is transported in both the xylem and the phloem.

Magnesium is a structural component of chlorophyll where it occupies a central position in the molecule hence the importance of this for photosynthesis and green leaves. It is a co-factor activating many enzymes involved in carbohydrate metabolism (phosphate transfer), nucleic acid synthesis and energy metabolism reactions. It activates formation of polypeptide chains from amino acids and the production of sugars, oils and fats. Magnesium is also involved in regulating cell pH through cation – anion balance and regulates the uptake of other elements while acting as carrier for them.

Magnesium deficiency has been associated with premature drop of fruit at harvest and recently magnesium deficiency is becoming more evident in orchards, particularly when high rates of potash are used. The Ca : Mg ratio is important in determining soil structure.

Micro Elements

Manganese (Mn)

Nitro Mang™ and TE 8 PLUS™

Manganese is relatively immobile within the plant and is transported to the apical meristem via the xylem. Manganese is known as a co-factor in respiration (tricarboxylic acid cycle) and nitrogen metabolism (metallo-proteins) in roles which are also activated by magnesium. Manganese is directly involved in photosynthesis where it functions in chloroplasts as part of electron transfer (oxidation / reduction) reactions splitting water to liberate oxygen (energy catalyst). It is a component of several enzyme systems (fatty acid synthesis and nucleic acid formation) that also require iron, zinc and copper and phosphorus. Manganese accelerates germination and seedling growth. Manganese deficiency is not uncommon in fruit growing areas particularly when soils are cool and wet and soil pH is over 7.0. In contrast Manganese toxicity can occur on coarse-textured soils when the soil is very acid (pH below 5.0). The symptoms known as "measles" are raised pimples on the bark underlain by dark brown spots. Elevated manganese can cause antagonism of zinc and other trace elements.

Zinc (Zn)

Z PLUS™, Z Chel™, TE 8 PLUS™

Zinc is actively taken up by the plant. This takes place in greater amounts than Copper and less than Manganese. Zinc absorption is greatly reduced in low temperatures and by inhibition from other elements. Copper and Phosphorus are strong competitors for the same carrier sites, while, elevated Magnesium, Iron, and Manganese can all depress the uptake of Zinc. The pronounced effect of Zinc deficiency on growth, especially internode length, is a consequence of it's importance in the synthesis of tryptophan – a precursor to the auxin indole acetic acid (IAA) which is essential for the normal enlargement of cells in stems and in seed development. Zinc is essential in the production of other essential enzymes that function in electron transfer during protein synthesis and degradation. Along with Potassium it has a regulatory role in the uptake and transportation of water within the plant. Zinc is also required for chlorophyll production and nucleotide synthesis. Zinc deficiencies can occur in both acid, leached soils or in calcareous, high pH soils. Classic Zinc deficiency symptoms in fruit trees include short internodes, small narrow leaves ("little leaf and rosetting"), and interveinal chlorosis.

Copper (Cu)

TE 8 PLUS™, Copper Chel™

Copper is actively taken up by plants and is able to displace other ions from root exchange sites. It is largely absorbed as the cupric or cuprous ions. It is mobile within the plant and yet its movement is governed by uptake and availability. Meaning, if availability is poor, and uptake is low, copper movement is restricted, even if the reproductive parts are requiring it. Copper is an integral component of chloroplasts and hence is involved in photosynthesis where it undergoes alternate oxidation and reduction as an electron carrier (plastocyanin) and as part of certain enzyme systems essential for respiration, energy and growth. Copper is vitally important for root metabolism, cell wall and pollen formation and fertilization.

Classic acute copper deficiency in fruit trees involves cessation of terminal growth and die-back of tips with blackening and curling ("rats tail") and is not uncommon in young orchards planted in sandy soils, soils high in organic matter or high pH or with elevated iron, manganese or zinc.

Boron (B)

Boron Complex™ and MoBo Complex™

Boron is only required by plants in very small amounts. It seems to be both passive and active in its uptake mechanism as the negatively charged borate ion. Similarly with calcium, boron is quite immobile within the plant and only seems to move in the xylem towards the growing points. Boron has some association with auxins and with molybdenum in the synthesis and movement of sugars and is involved in the production of carbohydrates and nitrate reduction. Boron is directly related to cell division and calcium assimilation. It is also extremely necessary for the germination and viability of pollen, flowering and fruiting, seed quality and yield.

Without boron the plant struggles to utilise essential nutrients like calcium, magnesium, nitrogen, and phosphorus, with a subsequent reduction in new tissue development. Death of terminal buds, poor fruit set and fruit breakdown disorders such as internal cork are often associated with boron deficiency. Deficiencies are found in acid soils, heavily weathered and coarsely textured soils. Boron is easily leached below the root zone.

Iron (Fe)

Fe PLUS™, TE 8 PLUS™

Iron uptake seems to be controlled by metabolic processes. It appears that it is mainly absorbed through the root tips. It is inhibited by the uptake of other cations such as; manganese, copper, magnesium, potassium and zinc. Excess soil phosphorus is often associated with Iron 'lock-up'. Due to Iron immobility within the plant, young plant tissue requires a constant supply. The main function of Iron within plants is in the production of chlorophyll and it is indispensable as a catalyst during oxidation /reduction reactions that involve oxygen and electron transport to release energy from sugars and starches. Lime-induced chlorosis may occur as the soil pH rises over 7, or in heavily-limed soils when Iron becomes unavailable to plants. Iron deficiency causes interveinal chlorosis of new terminal leaves. As the condition becomes more severe, the whole leaf becomes pale yellow.

Molybdenum (Mo)

Mo 250P™ and MoBo Complex™

Uptake is similar to that of iron. It generally occurs in soil as the molybdate oxyanion. Molybdenum uptake appears to be influenced by metabolic processes. Molybdenum is involved in two major enzymes; nitrate reductase and nitrogenase, and as such is also involved in nitrogen fixation by legumes along with iron and cobalt. Molybdenum uptake is inhibited by high copper and especially manganese and aluminum in acid pH soils and highly weathered soils. Deficiency has been noted in fruit trees as yellow / orange spotting on leaves and premature leaf fall – the latter most likely associated with poor Nitrogen assimilation.

Soil Health

Inputs that Stimulate Soil Biology

Kelp

Bio Kelp (22% Kelp)

Kelp extracts contain amino acids such as glycine and plant hormones including auxins, betaines and cytokinins which in combination stimulate plant growth. They should not be regarded as fertilizers as the nutrient levels are typically too low to have any direct value. Kelp extracts do have strong effects on soil microbes and in particular stimulate the activity of photosynthetic bacteria and actinomycetes which can help provide protection against soil-borne pathogens.

Fish Emulsion

Fish Emulsion (100% Fish Emulsion)

Fish Emulsions are a source of readily available organic nitrogen and can be especially useful when this is needed to improve the C : N ratio in the soil. They are also beneficial in stimulating growth and activity of many micro-organisms. The net effect is an increase in the potential for nitrogen cycling and also a somewhat reduced requirement for nitrogen inputs to some crops and pasture. Lower application rates (2 L/ha) appear to stimulate fungi and cellulose utilisers that do not respond well to high Nitrogen. Higher rates (10 L/ha) appear to promote photosynthetic bacteria and actinomycetes and suppress lactic acid bacteria.

Humate

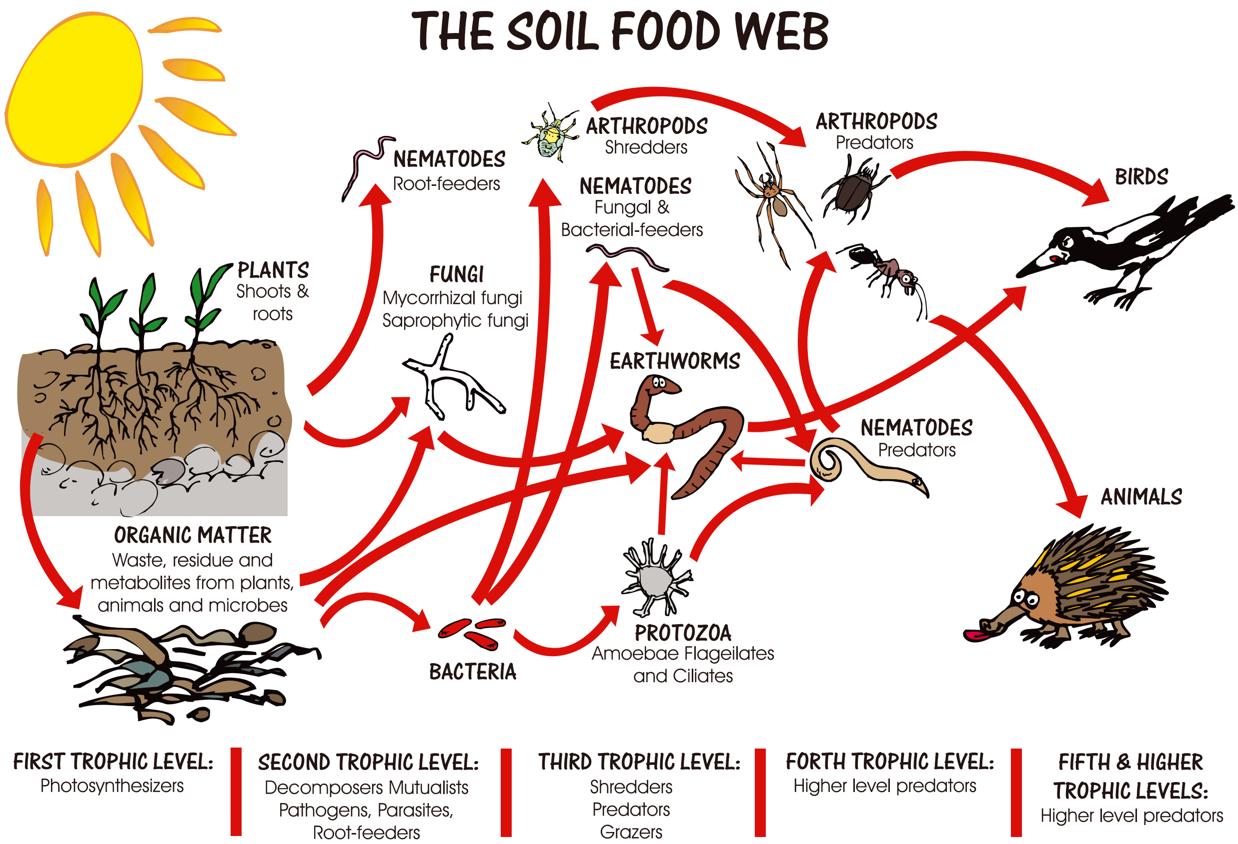
Humic K 26 (25% Humic Acid)

Humates are soil conditioners with high carbon content. They are useful materials where adjustment of the C : N ratio is required. Humates are also important in releasing bound nutrients into plant available forms and helping to improve soil structure at relatively low application rates. These materials produce significant biological effects with a strong suppression of lactic acid bacteria and stimulation of fungi, especially cellulose utilisers, which as the name suggests are important in the breakdown of cellulose and certain other resistant materials, thus increasing the formation of humus and helping to improve soil structure.

Molasses

Molasses (100% Molasses)

Molasses provides a readily metabolisable carbon and energy source that can be utilised by most organisms. Low rates (2 L/ha) can be effective in stimulating most groups of microbes and in particular fermenters like lactic acid bacteria and yeasts. However, being quickly utilised, it will provide only a short-term benefit unless other actions have been taken to improve the soil environment.



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Highly Available, Activated Calcium + Organic Boost

FERTILIZERS

BiologiCAL® PLUS

Product Code: SG0017

Plants require calcium in relatively large amounts for many functions including cell division & strength, root system and leaf development. Calcium is also an essential element required for healthy soils, influencing both the physical, chemical and biological aspects.

Benefits of BiologiCAL® PLUS

- Aids in maintaining a high pH to control club root
- Improves nitrogen efficiency; compatible with a wide range of nitrogen-based products.
- Helps to displace sodium and magnesium in difficult soils
- Improves soil structure and friability
- Improving moisture penetration/infiltration
- A unique form of activated calcium that stimulates plant uptake
- Built-in soil and plant stimulants to enhance soil fertility and plant health
- Assists in the reduction of soil nematodes that inhibit root growth and plant productivity.
- Provides plant available calcium without extra nitrogen
- Improves plant resistance to disease and overall resilience
- Improves cell wall strength, plant durability and stress tolerance.

Guaranteed Analysis

Calcium (Ca)	6.3%
Nitrogen (N)	0.3%
Phosphorus (P)	0.1%
Potassium (K)	2.0%
Sulphur (S)	1.8%
Molasses	41.9%
Carbon (C)	20.0%
Fish Emulsion	0.3%
Kelp	0.3%
Humic Acid	0.2%
Specific Gravity	1.27 - 1.30 kg/L
pH	8.0 - 10.0

BiologiCAL® PLUS TE

All the Benefits of BiologiCAL® PLUS with an additional 5 trace Elements; Zn 0.6%, Mn 0.3%, Cu 0.15%, Mo 0.005% & B 0.05%

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Australian Organic Registered Farm Input
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SL TEC FERTILIZERS

Four Key Plant & Soil Microbial Stimulants

Now Organically Certified

QuadSHOT®

Product Code: SG0039

QuadSHOT® contains a carefully selected range of organic additives and biological stimulants. These ingredients stimulate soil biological activity, thereby improving the cycling and availability of plant nutrients and soil fertility and health. Together with management practices that enhance organic matter and soil structure development, this product assists in mobilizing available nutrients and improving plant uptake efficiencies.

Humic acid – increases nutrient holding capacity of the soil
Kelp – enhances plant and root growth development
Fish Emulsion – stimulates nitrogen cycling
Molasses -promotes beneficial soil biology
Each of these stimulants are also available as individual products

Benefits of QuadSHOT®

- Improves saline and sodic soils
- Improves the moisture holding capacity of soils
- Enhances nutrient cycling and availability
- QuadSHOT® can be used to soften a range of foliar fertilizers, allowing higher use rates without the potential for phytotoxic burn - e.g. Nitro QUAD 3™ and UAS QUAD 3™
- QuadSHOT® is designed to aid in the soils mineralisation and nutrient availability. It also increases the plants uptake efficiency of essential minerals.
- Improves overall soil health and vitality.

Guaranteed Analysis

Fish Emulsion	**8.0%**
Kelp	**8.0%**
Molasses	**8.0%**
Humic Acid	**6.6%**
Fulvic Acid	0.3%
Nitrogen (N)	0.3%
Phosphorus (P)	0.1%
Potassium (K)	3.4%
Sulphur (S)	0.2%
Carbon (C)	5.2%
Calcium (Ca)	0.2%
Iron (Fe)	0.006%
Specific Gravity	1.15 - 1.16 kg/L
pH	10.0 - 11.0

Typical Application Rates

Foliar
1 to 5 L/ha
Broadacre use at least 100 L/ha water
Horticulture use 200 to 2,000 L/ha water

Fertigation
20 to 60 L/ha through sprinkler, traveller or drip systems

Pop-Up, At Planting, Directed Soil Spray
Banded with Seed: 4 to 7 L/ha
Banded to the Side: 5 to 15 L/ha
- with 10 to 100 L/ha of water

20 - 60 L/ha as a directed soil spray, prior to planting or banded under canopy, with 200 - 800 L/ha water

Dipping Rates

Tree Age	**Young**	**Established**
Fertigation	40 L/ha	80 L/ha
Pre-Plant Dip	10 - 30 L/ha (Per 100L Water)	

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Tissue & Soil Analysis

Tissue analysis for top fruit is the best method of determining current nutrient needs. There are well established standards for leaf analysis in Pome and Stone fruit and tissue samples can accurately reflect the uptake of nutrients by the crop. Soil analysis should however be used in conjunction with leaf analysis to establish key factors that influence nutrient availability such as pH, EC, CEC and to understand background levels of nutrients and to assess trends and interactions that may be influencing tissue levels so that these can be corrected.

There is growing use of early season fruitlet analysis using either whole fruit - fresh weight or sap analysis, to determine if a crop contains appropriate levels of nutrients and to allow nutrient adjustments to be made during the growing season. Caution needs to be taken interpreting and comparing the results from these two methods as the databases of appropriate tissue ranges are being established. Sap analysis can be quite variable but is useful as an indicator of uptake of recently applied fertilizer and of mobile elements such as Nitrogen and Potassium.

In order to enable rigor and consistency in your soil and tissue data, ensure that you sample at the same time (growth period) from year to year and use an accredited lab (ASPAC / NATA) and try not to alter laboratories.

It can also be highly beneficial to sample from the same sites / trees within a block each season.

Most importantly - the levels of essential nutrients in the plant, fruit or soil should not be considered without an understanding of the characteristics of the soil or growing media such as structure, soil water, organic matter, soil biology and other factors that influence nutrient availability such as the growing conditions at the time, soil management, tree age, rootstock and previous fertilizer applications.

Desirable Tissue Levels of Essential Nutrients

Mid shoot leaves from current season growth - sampled midsummer.

	Apple	Cherry	Peach	Pear
Nutrient %				
Nitrogen	2.0 - 2.4	2.2 - 2.6	3.0 - 3.5	2.3 - 2.7
Phosphorus	0.15 - 0.2	0.14 - 0.25	0.14 - 0.25	0.14 - 0.2
Potassium	1.2 - 1.5	1.6 - 3.0	2.0 - 3.0	1.2 - 2.0
Calcium	1.1 - 2.0	1.4 - 2.4	1.8 - 2.7	1.5 - 2.2
Magnesium	0.2 - 0.25	0.3 - 0.8	0.3 - 0.8	0.25 - 0.4
Sulphur	0.2 - 0.4	0.17 - 0.30	0.2 - 0.4	0.17 - 0.26
Sodium	< 0.02	< 0.02	< 0.02	< 0.02
Nutrient ppm				
Iron	60 - 200	100 - 250	100 - 250	60 - 200
Manganese	50 - 100	40 - 160	40 - 160	60 - 120
Zinc	20 - 50	20 - 50	20 - 50	20 - 50
Copper	6 - 20	5 - 16	5 - 16	9 - 20
Boron	21 - 40	20 - 60	20 - 60	20 - 40
Molybdenum	0.1 - 0.4	-	0.07 - 0.25	-

Approx. recommended Soil parameters for fruit production Southern Australia

pH (1:5 water)	6.0 - 6.5
ECse (dS/m)	< 1.5
Organic Carbon (%)	2.0 - 3.0
Nitrate Nitrogen (mg/kg)	15.0 - 30.0
Phosphorus (mg/kg)	20.0 - 40.0
Sulphur (mg/kg)	8.0 - 20.0
Potassium (meq/100g)	0.3 - 0.75
Calcium (meq/100g)	5.0 - 15.0
Magnesium (meq/100g)	1.2 - 2.0
Sodium (meq/100g)	< 1.0
Aluminium (meq/100g)	< 1.1
Chloride (mg/kg)	< 180.0
Copper (mg/kg)	0.5 - 6.0
Zinc (mg/kg)	2.5 - 10.0
Manganese (mg/kg)	5.0 - 50.0
Iron (mg/kg)	> 20.0
Boron (mg/kg)	1.0 - 3.0
Molybdenum (mg/kg)	0.5 - 1.0

(Guide only - dependent on crop and soil situation) (Extraction :N - CaCl; P (Olsen); K, Ca, Mg, Na - ammonium acetate; Cu, Zn, Mn, Fe - DTPA; B - hot water)

Approx. Conversions meq/100g to ppm

Element	Ca (Calcium)	Mg (Magnesium)	K (Potassium)	Na (Sodium)	Al (Aluminium)	H (Hydrogen)
Multiply by	200	120	390	320	90	10

AquaLIME 38™
(Flowable Lime)

Product Code: SG0037

AquaLIME 38™ is a highly flowable calcium carbonate suspension designed to deliver high purity, micronized particles to the soil to raise pH and improve soil structure. Through foliar application, it provides an extremely efficient source of calcium to crops.

AquaLIME 38™ utilizes a highly advanced industrial process to hold the micronized particles in suspension, thereby improving the dispersion of the product when applied to the soil or foliage.

AquaLIME 38™ is an extremely concentrated and reactive form of calcium carbonate (or "lime"). It is produced by a specialised milling process where the high purity raw material is ground to 1 micron in size. The product's extreme fineness delivers an impressive surface area of 13 m^2/g, significantly enhancing its reactivity within the soil compared to all other forms of calcium carbonate.

AquaLIME 38™ has a superior Neutralising Value (NV) of 99 (pure calcium carbonate at NV 100 is the benchmark) compared to other fluid lime sources on the Australian market. However, this is only part of the story - because of the fineness of AquaLIME 38, its effective Neutralising Value is considered to be 99 because every particle is 100% reactive in the soil.

Also, it is far more effective in higher pH soils. A coarse aglime will struggle to lift soil pH above 6 because the logarithmic response of the pH scale means the soil environment isn't acidic enough to react and dissolve coarser lime particles. AquaLIME 38™ can further assist in pH adjustment.

"The high-grade material in AquaLIME 38™ means responses are extremely fast in the drip zone – in Thailand on red tropical soil, for example, the pH increased from 4.6 to 5.7 in three weeks after an application of 32 L/ha!"

Why Use AquaLIME 38™?

- Highly uniform - extremely fine particle size (1 micron)
- Highly reactive - high purity calcium carbonate
- Neutralizing Value of 99
- Flowable for easy pumping
- Can be applied to soil as a broadcast or banded application or via irrigation systems
- Can be applied to crops as a foliar calcium treatment

Chemical Analysis;

Calcium (Ca):	38% w/v
Carbonate (CO_3):	57.7% w/v
Carbon (C):	11.6 % w/v
pH:	9 - 10
Specific Gravity:	1.60 kg/L
Neutralising Value:	99

Application Rates (Soil)

Soil Type/Textural Class	L per ha AquaLIME 38™ (per 0.1 pH improvement)
Sands / Loamy Sands	30 - 40
Sandy / Silty Loams	50 - 70
Sandy Clay Loams	70 - 85
Light to Medium Clays	85 - 90
Heavy Clays	90 +

Application Rates (Foliar)

Foliar Applications

Crop Type	Growth Stage						
Apples	**Pink Bud**	**Flowering**	**Fruit Set**	**Fruit Development**		**Ripening**	**Total**
	5 – 10 L/ha with >1500 L/ha Water	No application during this period	5 – 10 L/ha with >1500 L/ha Water	5 – 10 L/ha with >1500 L/ha Water		5 – 10 L/ha with >1500 L/ha Water	25 - 50 L/ha
Cherry	**Pre-Flowering**	**Fruit Development**	**Ripening**	**Post Harvest**			**Total**
	5 – 10 L/ha with >1500 L/ha Water	5 – 10 L/ha with >1500 L/ha Water	5 – 10 L/ha with >1500 L/ha Water	5 – 10 L/ha with >1500 L/ha Water			20 - 40 L/ha
Tomatoes	**Vegetative**	**Flowering**	**Fruit Set**	**Fruit Development**	**Ripening**	**Harvest**	**Total**
	5 – 10 L/ha with >1000 L/ha Water Or fertigate with irrigation system at the same rate	No application during this period	5 – 10 L/ha with >1000 L/ha Water Or fertigate with irrigation system at the same rate	5 – 10 L/ha with >1000 L/ha Water Or fertigate with irrigation system at the same rate	5 – 10 L/ha with >1000 L/ha Water Or fertigate with irrigation system at the same rate	5 – 10 L/ha with >1000 L/ha Water Or fertigate with irrigation system at the same rate	30 - 60 L/ha

Soil Banded or Broadcast Applications

Crop Type	Growth Stage	
Potato	**Tuber Initiation to Canopy Closure**	
	200 – 500 L/ha with 400 to 800 L/ha Water	
Carrot	**3-4 Leaf Stage**	**7-8 Leaf Stage**
	100-200 L/ha with 400 to 800 L/ha Water	100-200 L/ha with 400 to 800 L/ha Water

Nutrient Efficiency versus Soil pH

Element	pH 4.5	pH 5.0	pH 5.5	pH 6.0	pH 6.5
Nitrogen (N)	30%	43%	77%	89%	100%
Phosphorus (P)	23%	31%	48%	52%	100%
Potassium (K)	33%	52%	77%	100%	100%

pH, Soil Acidity, Lime & Gypsum

Applying lime to a soil reduces its acidity by raising the pH. It also supplies calcium. Increasing soil acidity affects plant nutrient availability, reduces the activity of beneficial bacteria that decompose organic matter and heavy metals such as aluminium and iron become more soluble, tieing up phosphorus into forms unavailable to plants, and may build up to toxic levels.

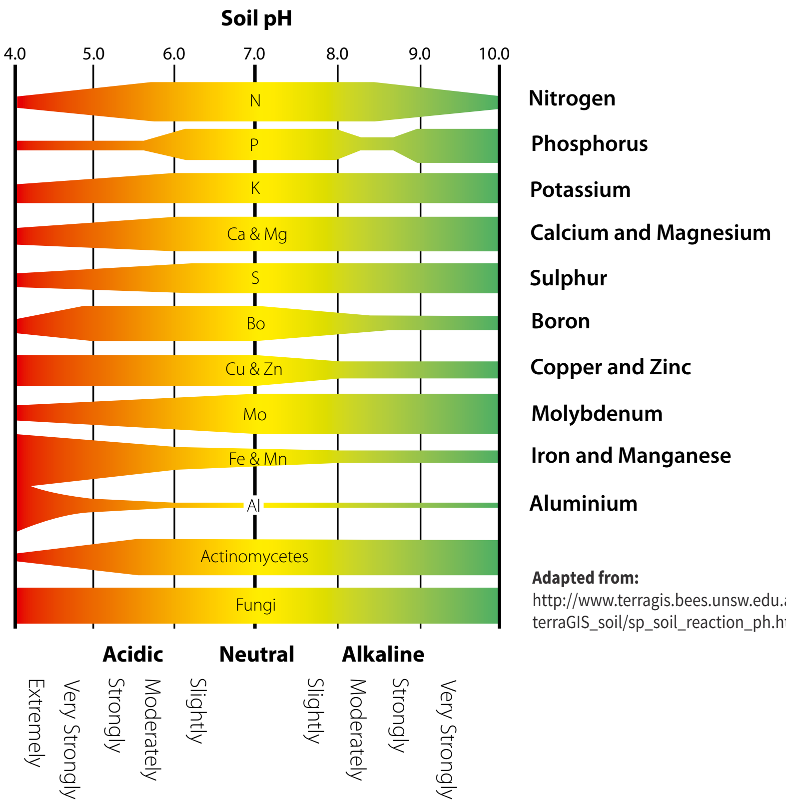
Soil should always be sampled before establishing a new planting. If lime and/or gypsum are required, incorporate it during soil preparation. It is often useful to dig a pit and to sample the subsoil to understand any potential limitations to tree growth further down the profile.

A soil sample every 3 years taken from the same locations within a block is recommended to monitor nutrient levels and to check that the pH remains satisfactory. This allows time for program changes to take effect. If lime is required apply in the Autumn.

The preferred pH before establishing a new vineyard is generally 5.5 to 6.8 depending on the soil type. Sandy or lighter soils tend to require pH toward the higher end. As a rule of thumb - apply lime to established vineyards when the pH falls below 5.5.

Use dolomitic lime (high in magnesium) on soils that are low in magnesium.

Gypsum is usually recommended on sodic and magnesic soils when pH is high and exchangeable calcium is low. High magnesium soils are often massive and hard setting (when exchangeable magnesium is greater than 15%). High sodium soils tend to be dispersive when wet and form a crust when dry (when exchangeable Sodium is greater than 5%).



Adapted from:
http://www.terragis.bees.unsw.edu.au/terraGIS_soil/sp_soil_reaction_ph.html

Proposed soil pH ranges for various fruit trees

Optimum pH Range	
Apple	5.5 - 7.0
Apricot	6.0 - 7.0
Cherry	6.0 - 7.5
Peach	6.0 - 7.5
Pear	6.0 - 7.5

Desirable Soil Exchangeable Cation Balance

Element	Balance (%)
Calcium	60 - 70
Magnesium	12 - 15
Potassium	3 - 5
ESP	< 5
Hydrogen	< 20
Ca : Mg ratio	2 - 4

Typical Cation Exchange Values for Various Soil Textures

(preferred level >10 meq/100g)

Texture	Typical CEC
Sand	< 5 meq / 100g
Sandy Loam	5 - 10 meq / 100g
Clay Loam	10 - 25 meq / 100g
Light Clay	25 - 30 meq / 100g
Medium Clay	30 - 35 meq / 100g
Heavy Clay	> 35 meq / 100g

(Based on Clay content only - eg: a high organic matter clay may have a CEC over 50 meq/100g)

Understand Nutrient Removal

Crop nutrient budgeting is critical to improve production efficiency and to reduce environmental impacts. As part of SLTEC®'s Balanced Agronomy® program we aim to assist growers to better understand crop nutrient removal and at which growth stages their crops peak demand for nutrients occurs.

Apple and Pear Nutrient Removal	Macro Element Nutrient Removal (kg/t)						Trace Element Nutrient Removal (g/t)					
Fruit Only Removal Guide	**N**	**P**	**K**	**S**	**Ca**	**Mg**	**Zn**	**Fe**	**Cu**	**Mn**	**B**	**Mo**
Apple/Pear	0.3 - 0.9	0.15	1.0 - 1.6	0.05	0.2	0.1	1.4	9	1.2	3.4	2	0.004
Nutrients Removed (based on 50 t / ha Crop Yield)	30	7.5	65	2.5	10	5	70	450	60	170	100	0.2

Peach and Cherry Nutrient Removal	Macro Element Nutrient Removal (kg/t)						Trace Element Nutrient Removal (g/t)					
Fruit Only Removal Guide	**N**	**P**	**K**	**S**	**Ca**	**Mg**	**Zn**	**Fe**	**Cu**	**Mn**	**B**	**Mo**
Peach / Cherry	1.2 - 1.8	0.2	1.7 - 2.5	0.1	0.15	0.15	1.5	9	0.4	1	3	0.05
Nutrients Removed (based on 20 t / ha Crop Yield)	30	4	42	2	3	3	30	180	8	20	60	1

Replacement values per hectare are usually in the order of 2 to 3 times greater after taking into account tree canopy / root growth, losses and returns in prunings / fallen leaves, nutrient tie up, mineralization and leeching losses, depending on soil type, background nutrient status and growing environment. ***Please consult your agronomist for specific information regarding your situation.***

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