



**FERTILIZERS**

**Quality Ingredients  
Australian Made  
Family Owned**

*Nutrient Solutions*

# **Wine Grape Nutritional Guide**

***Crop nutrient budgeting is critical to improve production efficiency and to reduce environmental impacts. SLTEC®'s range of quality fluid fertilizers and soil and plant stimulants are supported by our comprehensive field agronomy service to help you achieve your production goals.***

***[sltec.com.au](http://sltec.com.au)***



# Why Choose SLTEC® Fertilizers?

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

## Our Promise

### Quality

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

### Investment

SLTEC® Fertilizers will ensure that your fertiliser 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](http://sltec.com.au/quality)

### Why use Fluid Fertiliser?

- 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® in Viticulture

## SLTEC® History in Viticulture

SLTEC® has been working with the viticultural industry for more than 10 years, The SLTEC® agronomy team has significant experience in the industry including a viticulturist on staff. This experience has led to the development of a number of industry leading products including **Baseline Plus™** and **Vine Recharge™**.

SLTEC® is committed to a focus on innovation, service, return on investment to the client and ease of use.

### This commitment has led to us;

- Developing an extensive range of liquid fertilizer solutions for application in the viticultural industry.
- Custom blending to meet our client's specific varietal needs, soil conditions and other environmental factors.
- Investing in our own freight and a range of fertilizer storage systems ranging from 10,000 L to 32,000 L & support in selecting the correct injection pump.
- A range of convenient pack sizes 10L, 20L , 220L 100L & Bulk
- Providing strong infield viticultural agronomic support.
- The ongoing creation of an extensive compatibility database with SLTEC® products and a range of industry agricultural chemicals.
- Committing to building our relationship with the viticultural community focusing on giving clients the confidence and reliance they need to ensure the best return on their investment.

## Better crops with fluid fertilizer in the Clare Valley



Dick Bryksy from Kirribilly Viticulture, Clare SA.

I manage 600 hectares which are spread over 14 separate sites, all in the Clare Valley.

Thanks to SLTEC®'s great service I was able to get all the fertilizer out in good time while the vines were in full leaf to maximise the benefits. They remained in full leaf and look so much healthier than some of the neighbours! Not bragging.

I also picked record tonnes this year from nearly all sites, while others in Clare picked just above their normal average. I am certain that SLTEC® Fertilizers have played a major role, along with other viticultural techniques I have used, in keeping my yields up in very difficult seasons like those experienced over the last few years. SLTEC® are very professional to deal with and their products are very price competitive while not compromising on quality.

## Vine Recharge™ in action



Barney Toohey at Kennedy Vineyard –  
27 hectares Heathcote region

'For the past two years we have been using Vine Recharge™ at post-harvest and have been very impressed with the even bud-burst across the vineyard and the early spring growth the following year. This has in turn lead to more even yields across the vineyard while maintaining our quality.'

**Read additional testimonials online,  
visit - [sltec.com.au/testimonials](https://sltec.com.au/testimonials)**

# SLTEC® Commitment to Quality

## Can your fertiliser 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 fertiliser 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 fertiliser, 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.**

# At Last! A Complete Fluid Nutrient Solution



## Baseline Plus<sup>TM</sup>

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 efficiencies 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.
- Efficiencies 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.

### Guaranteed Analysis (w/v)

Nitrogen (N)	11.7%
N as urea	11.7%
Phosphorus (P)	4.9%
P as PO <sub>4</sub>	4.9%
Potassium (K)	13.6%
Sulphur (S)	2.0%
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	1.304 kg/L
pH Range	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







**Legend**



Fertigation



Foliar




		EL 1	EL 4 - 18		EL 19-26	EL 27-33	EL 34 - 40	EL 40-47
		Dormancy Lime, Dolomite or Gypsum applications based on soil test results	Budburst to the Start of Flowering		Flowering Period (Petiole Sampling)	End of Flowering to Veraison	Veraison to Harvest	Post Harvest to Leaf Fall
Product Code	Name	Key SLTEC® Vineyard products - see page 6 for technical details			Suggested application timings and methods			
SG0037	AquaLIME 38™							
SG0017	BiologiCAL® PLUS	No Nitrogen form of plant available calcium with stimulants						 
SG0039	QuadSHOT® 	Promote even budburst with a blend of 4 root zone biostimulants					 	 
SG0015	Bio Kelp Guardian™	3 to 4 L/ha every 10 to 12 days or 48 hours before or after frost event to aid recovery						
GG0072	Carbo K™	High analysis potassium with antifungal properties						 
GG0009	Baseline Plus™	12-5-14 plus an additional 8 nutrients & 5 biostimulants				 		 
GG0022	Calcium Nitrate™	Also available with boron, zinc, magnesium and manganese						 
SNPK0040	Crop Booster PLUS™	15% phosphorus plus 9 other nutrients to maintain even growth						 
GG0180	Spring Strength™	Spring Strength - ensure your canes are strong						
SS9001	SS 11:16:0™	Highly plant available phosphorus for root growth flush						
SNPK0061	Nitro Combi TE™	A blend of 8 micro nutrients, high in zinc, iron, boron and molybdenum						
GG0095	Vine Recharge™	All in one post harvest nutrient solution						
SNPK0046	TE 8 PLUS™	8 micronutrients to ensure balanced vine growth						
-	Nitro Trace Range	Refer to Page 7 for Product Details	Range of high analysis nitrate trace elements					
-	Complex Trace Range		Range of high analysis complex trace elements					

Table 1 - Nutrient Removal Estimates

	Nutrient Removal kg/t of Fruit	Tonnes of fruit removed per ha	Total Nutrients Removed kg/ha	Bud Burst to Start of Flowering	
				% Crop Demand	kg/ha
N	1.5	10	15	14%	2.1
P	0.4	10	4	16%	0.6
K	3	10	30	15%	4.5
Ca	0.4	10	4	10%	0.4
Mg	0.1	10	1	10%	0.1

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 leaching losses, depending on soil type, background nutrient status and growing environment.

Wine Grape Crop demand adapted from Conradie (1980) and Conradie (1981).

Flowing Period		End of Flowering to Veraison		Veraison to Harvest		Post Harvest to Leaf Fall	
% Crop Demand	kg/ha	% Crop Demand	kg/ha	% Crop Demand	kg/ha	% Crop Demand	kg/ha
14%	2.1	38%	5.7	-	-	34%	5.1
16%	0.6	40%	1.6	-	-	28%	1.1
11%	3.3	50%	15.0	9%	2.7	15%	4.5
14%	0.6	46%	1.8	8%	0.3	22%	0.9
12%	0.1	43%	0.4	13%	0.1	22%	0.2

Nutrient removal figures in kg/ t are world wide averages from SLTEC® database.

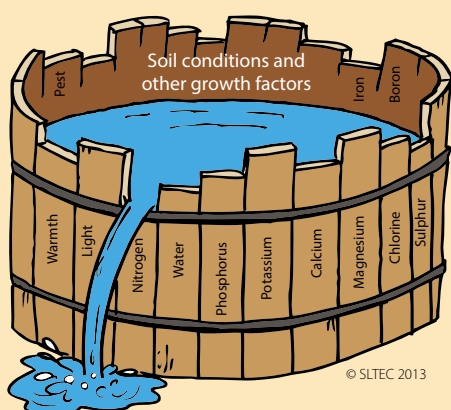
# Product Technical Information

Product Code	Name	N% (w/v)	P% (w/v)	K% (w/v)	S% (w/v)	Ca% (w/v)	Biological Stimulation	Chelating Agent	Specific Gravity (kg/L)	pH Range	Typical Application Rates	
											Fertigation	Foliar Use 200 to 2,000 L/ha water
SG0037	<b>AquaLIME 38™</b>	-	-	-	-	38.0	-	-	1.601	9.0 - 10.0	50 - 200 L/ha depending on soil pH	N/A
SG0017	<b>BiologiCAL PLUS™</b> N as NO <sub>3</sub> 0.3%, P as PO <sub>4</sub> 0.1%, B 0.1%, C 12.5%, Fulvic Acid 0.009%, Fish Emulsion 0.3%, Humic Acid 0.2%, Kelp 0.3%, Molasses 41.8%	0.3	0.1	2.0	1.8	6.5	Y	Y	1.280	8.0 - 10.0	20 - 60 L/ha	4 - 20 L/ha
SG0039	<b>QuadSHOT™</b> Fe 0.005%, C 3.6%, Fulvic Acid 0.3%, Fish Emulsion 8.0%, Humic Acid 6.6%, Kelp 8.0%, Molasses 8.0%	0.3	-	3.5	-	0.2	Y	Y	1.154	10.0 - 11.0	20 - 60 L/ha	1 - 20 L/ha
SG0015	<b>Bio Kelp Guardian™</b> Kelp 26.0% - Frost Protection	0.1	2.9	9.2	0.5	-	Y	Y	1.160	9.4 - 9.8	5 - 20 L/ha	2 - 10 L/ha
GG0072	<b>Carbo K™</b> C 6.7%	-	-	43.8	-	-	-		1.545	13.0 - 14.9	10 - 80 L/ha	1 - 5 L/ha
GG0009	<b>Baseline Plus™</b> N as urea 11.7%, P as PO <sub>4</sub> 4.9%, Mg 0.2%, Mn 0.006%, Zn 0.01%, Cu 0.005%, Mo 0.005%, B 0.02%, Fe 0.01%, C 0.3%, 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	-	Y	Y	1.304	7.5 - 8.5	10 - 80 L/ha	2 - 15 L/ha
GG0022	<b>Calcium Nitrate™</b> N as NO <sub>3</sub> 13.0%	13.0	-	-	-	18.5	-	-	1.480	5.0 - 7.0	10 - 100 L/ha	5 - 10 L/ha
SNPK0040	<b>Crop Booster PLUS™</b> N as NH <sub>4</sub> 2.9%, N as NO <sub>3</sub> 2.1%, P as PO <sub>4</sub> 15.0%, Mg 0.2%, Mn 0.4%, Zn 0.4%, Cu 0.5%, Mo 0.008%, B 0.05%, Fulvic Acid 0.5%	5.0	15.0	2.1	-	4.0	Y	Y	1.319	< 2.0	10 - 20 L/ha	2 - 10 L/ha
GG0180	<b>Spring Strength™</b> N as NH <sub>4</sub> 5.5%, N as NO <sub>3</sub> 11.3%, N as urea 11.1%, Mg 0.4%, Mn 0.2%, Zn 0.5%, Cu 0.1%, B 0.09%	27.9	-	-	-	7.0	-	-	1.399	3.0 - 4.0	10 - 60 L/ha	5 - 10 L/ha
SS9001	<b>SS 11:16:0™</b> N as NH <sub>4</sub> 11.3%, P as PO <sub>4</sub> 16.0%	11.3	16.0	-	-	-	-	Y	1.297	6.0 - 7.0	20 - 100 L/ha	2 - 10 L/ha
SNPK0061	<b>Nitro Combi TE™</b> N as NO <sub>3</sub> 1.7%, Mg 0.7%, Mn 1.6%, Zn 2.2%, Cu 0.3%, Mo 0.03%, B 0.8%, Fe 2.2%, Fulvic Acid 0.5%	1.7	-	0.1	2.4	-	Y	Y	1.260	2.0 - 3.0	2 - 20 L/ha	1 - 4 L/ha
GG0095	<b>Vine Recharge™</b> N as NH <sub>4</sub> 1.7%, N as NO <sub>3</sub> 4.9%, P as PO <sub>4</sub> 1.4%, Mg 0.3%	6.6	1.4	5.8	-	1.3	-	-	1.197	< 1.0	10 - 200 L/ha	1 - 5 L/ha
SNPK0046	<b>TE 8 PLUS™</b> N as NO <sub>3</sub> 2.6%, Mg 2.4%, Mn 3.2%, Zn 3.2%, Cu 0.5%, Mo 0.02%, B 0.2%, Fe 0.7%, Fulvic Acid 0.5%	2.6	-	0.1	4.2	-	Y	Y	1.295	1.0 - 2.0	10 - 25 L/ha	2 - 10 L/ha





Product Code	Name	N% (w/v)	P% (w/v)	K% (w/v)	S% (w/v)	Ca% (w/v)	Biological Stimulation	Chelating Agent	Specific Gravity (kg/L)	pH Range	Typical Application Rates	
											Fertigation	Foliar Use 200 to 2,000 L/ha water
Complex Trace Range												
SNPK0050	Boron Complex™ B 14.7%, N as amine 6.0%	6.0	-	-	-	-	-	-	1.379	7.5 - 8.5	2 - 5 L/ha	1 - 3 L/ha
SNPK0017	Copper Complex™ Cu 6.7%	-	-	-	3.4	-	-	-	1.162	2.0 - 3.0	5 - 10 L/ha	1 - 3 L/ha
SNPK0086	Mag Complex™ Mg 5.0%	-	-	-	6.6	-	-	-	1.225	3.0 - 7.0	5 - 50 L/ha	2 - 15 L/ha
SNPK0016	Manganese Complex™ Mn 17.7%	-	-	-	10.6	-	-	-	1.439	2.0 - 3.0	5 - 10 L/ha	1 - 7 L/ha
SNPK0055	Moly Complex™ Mo 23.7%	-	-	-	-	-	-	-	1.398	7.0 - 8.0	75 - 250 mL/ha	40 - 150 mL/ha
SNPK0008	Zinc Complex™ Zn 16.4%	-	-	-	8.1	-	-	Y	1.375	2.0 - 3.0	5 - 10 L/ha	1 - 3 L/ha
Nitro Trace Range												
SNPK0056	Nitro Cop™ N as NO <sub>3</sub> 10.0%, Cu 22.7%	10.0	-	-	-	-	-	-	1.505	1.0 - 2.0	0.5 - 3 L/ha	100 - 300 mL/ha
SNPK0057	Nitro Mag™ N as NO <sub>3</sub> 9.8%, Mg 8.8%	9.8	-	-	-	-	-	-	1.360	2.0 - 4.0	12 - 25 L/ha	2 - 10 L/ha
SNPK0058	Nitro Mang™ N as NO <sub>3</sub> 12.2%, Mn 23.9%	12.2	-	-	-	-	-	-	1.560	1.0 - 2.0	1 - 5 L/ha	0.5 - 2 L/ha
SNPK0059	Nitro Z™ N as NO <sub>3</sub> 8.3%, Z 19.3%	8.3	-	-	-	-	-	-	1.428	2.0 - 3.0	1 - 4 L/ha	0.5 - 1 L/ha



## The Law of the Minimum

States that plant growth is determined by the scarcest, “limiting” nutrient; if even one of the many required nutrients is deficient, the plant will not grow and produce at its optimum.

Conventional fertiliser programs focus on macro nutrients such as nitrogen, phosphorus and potassium (NPK), and occasionally sulphur. However, plants require a total of sixteen nutrient elements for optimal growth, with each required in different amounts. Therefore if one of the essential trace elements – zinc, copper, boron, manganese, molybdenum, etc – is deficient from the soil, the plant will not perform at its optimum capacity and yield, and reproduction and immune function will diminish.

At SLTEC® we have developed a range of trace elements that respond to the nutrient needs of your crops. Specific consideration is given to high plant availability and physical compatibility with a range of other fertilisers.





# A Multitrace Solution to Maximize Crop Potential

## TE 8 PLUS™

Product Code: SNPK0046

A foliar multi-trace element blend activated with fulvic acid (0.5%) to maximise uptake at lower rates than standard trace blends across a wide range of crops.

### Benefits of TE 8 PLUS™

- A focus on magnesium, manganese, zinc and copper – the key drivers of photosynthesis and healthy leaves and plants; resulting in reduced disease pressure.
- Additional nitrogen to promote plant response and rapid plant uptake.
- Molybdenum and boron to enhance assimilation and transport in the plant.
- Fully soluble nutrients in plant available forms.
- Fulvic acid provides an efficient chelating agent with only small amounts required to benefit plant permeability to a range of nutrients.
- TE 8 PLUS™ is physically compatible with a wide range of herbicides, insecticides and fungicides. Please contact SLTEC® for more information.
- TE 8 PLUS™ will help ensure you utilise all your fertilizer inputs as the trace elements work in synergy with your macro applications.

TE 8 PLUS™ is versatile across a range of crops from broadacre cereals and vegetables to pre-bloom and post harvest application in vineyards and orchards where it is often combined with SLTEC® Nitro QUAD 3™ or Lo Biuret Urea to improve bud nutrient levels to drive early spring growth.

### Guaranteed Analysis (w/v)

Nitrogen (N)	2.6%
N as nitrate	2.6%
Potassium (K)	0.1%
Sulphur (S)	4.2%
Magnesium (Mg)	2.4%
Manganese (Mn)	3.2%
Zinc (Zn)	3.2%
Copper (Cu)	0.5%
Molybdenum (Mo)	0.02%
Boron (B)	0.2%
Iron (Fe)	0.7%
Fulvic Acid	0.5%
Specific Gravity	1.295 kg/L
pH Range	1.0 - 2.0

### Typical Application Rates

#### Foliar

2 - 10 L/ha

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

#### Fertigation

10 - 25 L/ha



# Maximise Your Crop's Yield Potential



## Nitro Combi TE™

Product Code: SNPK0061

High analysis trace element blend activated with fulvic acid to maximise uptake, ideal for foliar and fertigation applications to aid flowering, drive vegetative growth and fruit or nut fill.

### Benefits of Nitro Combi TE™

- A focus on zinc, copper, magnesium, manganese and iron - key trace elements associated with photosynthesis, enzyme activity and metabolism.
- Boron and zinc have been shown to have a synergistic effect when combined and applied together; promoting strong reproductive and vegetative growth.
- High boron to aid pollen tube elongation during pollination and fruit set.
- Fully soluble nutrients in plant available forms.
- Fulvic acid provides an efficient complexing agent with only minimal amounts required to improve plant tissue permeability for a range of nutrients.

Nitro Combi TE™ is versatile across a range of horticultural crops. Use pre-bloom to improve bud nutrient levels, during the season to drive vegetative growth or post-harvest to ensure adequate nutrition in storage tissues ready for the following season.

### Guaranteed Analysis (w/v)

Nitrogen (N)	1.7%
N as nitrate	1.7%
Potassium (K)	0.1%
Sulphur (S)	2.4%
Magnesium (Mg)	0.7%
Manganese (Mn)	1.6%
Zinc (Zn)	2.2%
Copper (Cu)	0.3%
Molybdenum (Mo)	0.03%
Boron (B)	0.8%
Iron (Fe)	2.2%
Fulvic Acid	0.5%
Specific Gravity	1.260 kg/L
pH Range	2.0 - 3.0

### Typical Application Rates

#### Foliar

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

#### Fertigation

2 to 15 L/ha





# Nutrient Budgeting

## Understanding Crop Nutrient Removal

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.

Mean nutrient concentration in harvested product (kg/t fresh weight)

N	P	K	S	Ca	Mg
1.02	0.26	3.1	0.11	0.46	0.14

B.P. Holzapfel & M.T. Treeby (pers. comm) Shiraz grapes

Estimated Total Nutrient Elements Removed from the soil by Grapevines (kg / ha / year)

N	P	K	S	Ca	Mg	Fe	Zn	Mn	Cu	B	Cl	Mo
100	18	85	15	115	20	650	150	120	88	115	235	0.6

White Reisling at 4800 vines per ha, yielding 13 t/ha - Christiansen et al 1978 - from Bennett - Nutrient Deficiencies and toxicities of crop plants - 1993

*Please consult your agronomist for specific information regarding your situation.*

## Suggested Optimum Nutrient Levels in Petioles

Grapevine Petiole Analysis Standards Sampled at Flowering

Nutrient	Deficient	Marginal	Adequate	High	Toxic
<b>Nitrogen (%)</b>			0.8 - 1.1		
<b>NO<sub>3</sub> - N (mg/kg)</b>	< 340	340 - 499	500 - 1200	> 1200	
<b>Phosphorus (%)</b>	< 0.2	0.2 - 0.24	0.25 - 0.50	> 0.50	
<b>Potassium (%)</b>	< 1.0	1.0 - 1.7	1.8 - 3.0		
<b>Calcium (%)</b>			1.2 - 1.5		
<b>Magnesium (%)</b>	< 0.3	0.3 - 0.39	> 0.4		
<b>Sodium (%)</b>					> 0.5
<b>Chloride (%)</b>					> 1.0 - 1.5
<b>Iron (mg/kg)</b>			> 30		
<b>Copper (mg/kg)</b>	< 3.0	3.5 - 5.0	6.0 - 11		
<b>Zinc (mg/kg)</b>	< 15	16 - 25	> 26		
<b>Manganese (mg/</b>	< 20	20 - 29	30 - 60		> 500
<b>Boron (mg/kg)</b>	< 25	26 - 34	35 - 70	71 - 100	> 100

From Robinson et al. (1997)

### Plant tissue analysis

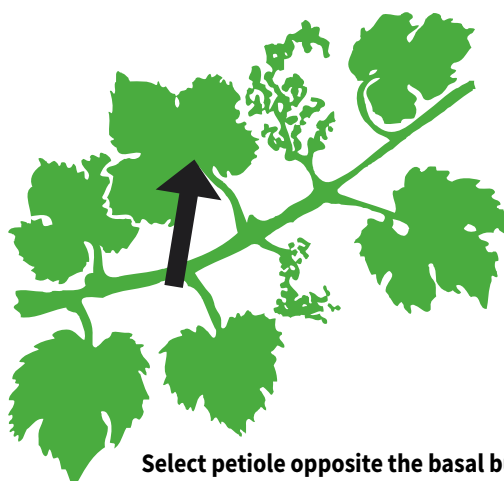
Plant tissue analysis provides an estimate of vine nutrient status which can reflect uptake from the soil. This makes plant tissue analysis a useful tool to quantify the nutrient status of vines, verify any suspected deficiencies/toxicities in the vines and for problem diagnosis.

### The timing of sampling for tissue analysis

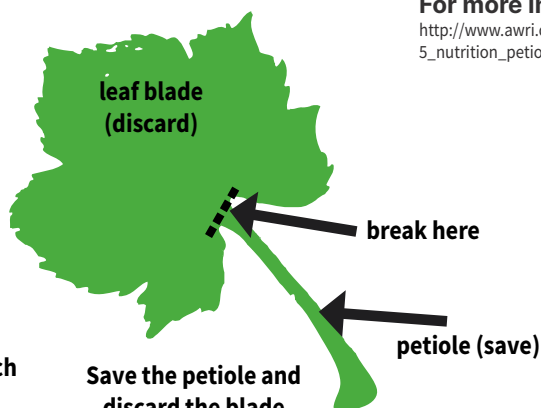
Samples for grapevine tissue analysis are usually taken on an annual basis because vines can generally integrate the nutrient supply for the whole season. A well defined phenological growth stage provides a means of standardising sampling time. Samples for petiole tissue analysis are usually taken at 80% flowering. For sampling later in the season, standards also exist for leaf blades sampled at veraison.

**For more information see -**

[http://www.awri.com.au/wp-content/uploads/5\\_nutrition\\_petiole\\_analysis.pdf](http://www.awri.com.au/wp-content/uploads/5_nutrition_petiole_analysis.pdf)



Select petiole opposite the basal bunch during flowering (50% cap fall)



Save the petiole and discard the blade

# Protect Your Crop Against Frost



## Bio Kelp Guardian™

Product Code: SG0015

Bio Kelp Guardian™ is a blend of liquid seaweed, electrolytes, phosphorus and potassium which can assist in increasing resistance to frost and recovery from the associated stress in grapevines.

In typical situations, Bio Kelp Guardian™ may improve frost tolerance by as much as 1 to 3°C provided shoots are less than 10cm and up to 1°C at later stages of growth.

### Additional benefits from liquid seaweed, include;

- An increase in chlorophyll production
- Increased nutrient uptake
- Increased tree vigour
- Increased ability to deal with water stress.

*These four benefits are thought to arise by a combined action of plant growth regulators, auxins, betaines and cytokinins.*

Bio Kelp Guardian™ contains additional nutrients such as added potassium and phosphorus which have additional beneficial effects on plant water regulation and metabolism.

Bio Kelp Guardian™ can also be used, with care, to reduce heat stress. It should be remembered that no strategy is 100% guaranteed to eliminate frost damage.

### Guaranteed Analysis (w/v)

Nitrogen (N)	0.1%
Phosphorus (P)	2.9%
Potassium (K)	9.2%
Sulphur (S)	0.5%
Kelp	26.0%
Specific Gravity	1.160 kg/L
pH Range	9.4 - 9.8

### Typical Application Rates

#### Foliar

2 - 10 L/ha

#### Fertigation

If applied from bud burst to 10cm shoots, 3 to 4 L/ha every 10 - 12 days.

If shoots are great than 10cm, 3 to 4 L/ha every 8 - 10 days or at least 48 hours before a frost event.





# Soil Health

## Inputs that Assist to Stimulate Soil Biology

### Kelp Extracts - Bio Kelp Range, QuadSHOT®

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 fertilisers 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 activity of photosynthetic bacteria and actinomycetes which can help provide protection against soil-borne pathogens.

### Fish Emulsions - Fish Emulsion, QuadSHOT®

Fish emulsions are a source of readily available organic bitrogen and can be especially useful when this is needed to improve the carbon-bitrogen 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 bitrogen cycling and so also a somewhat reduced requirement for bitrogen 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 bitrogen. Higher rates (10 L/ha) appear to promote photosynthetic bacteria and actinomycetes and suppress lactic acid bacteria.

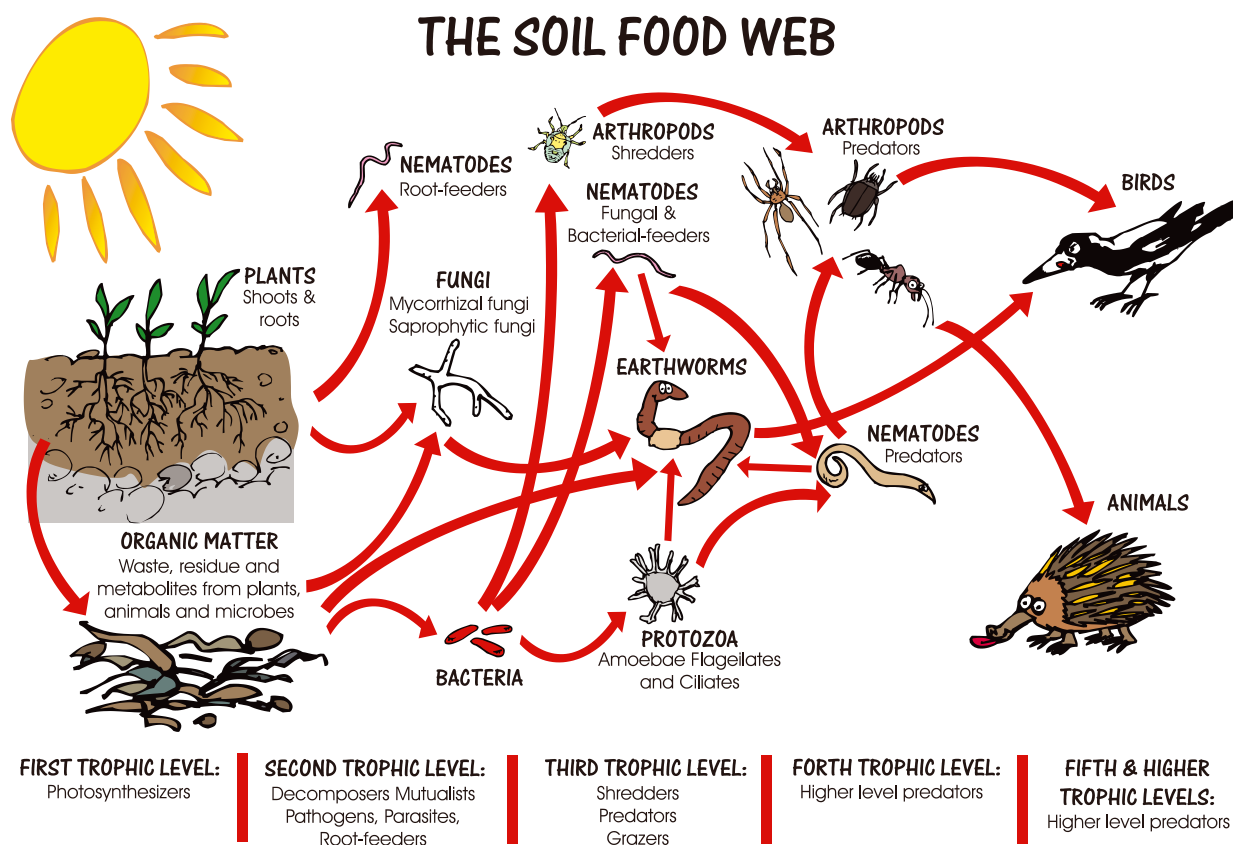
### Humates - Humic K 26™, QuadSHOT®

Humates are soil conditioners with high carbon content. They are useful materials where adjustment of the carbon-nitrogen 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 - BiologiCAL® PLUS, QuadSHOT®

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.

Adapted from - Mikhail, E - "Understanding & Achieving Optimum Soil Balance - The Mikhail System" - 2009



## 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 mobilising available nutrients and improving plant uptake efficiencies.

**Humic acid** – increases the 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 fertilisers, 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 plant's uptake efficiency of essential minerals.
- Improves overall soil health and vitality.

### Guaranteed Analysis (w/v)

<b>Fish Emulsion</b>	<b>8.0%</b>
<b>Kelp</b>	<b>8.0%</b>
<b>Molasses</b>	<b>8.0%</b>
<b>Humic Acid</b>	<b>6.6%</b>
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	1.154 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 100 L Water)	







# All-in-One Post Harvest Fertigation Solution

# Vine Recharge™

Product Code: GG0095

Approximately 30% of the annual nitrogen and phosphorus, 20% of the calcium and magnesium and 15% of the potassium requirements come from stored reserves taken up after harvest.

Vine Recharge™ is specifically formulated by SLTEC®'s research and development team for grape vine post-harvest fertigation applications. Vine Recharge™ is a blend of five nutrients in the ratios the vine requires; providing the convenience of all your major nutrient requirements in one blend.

The following table displays the required application rate of Vine Recharge™ in relation to the amount of t/ha of crop removed.

Simply apply Vine Recharge™ at 8 L/ha for every 1 t/ha of crop that you have removed to supply the required nutrients.

t/ha	1	5	10	15	20
L/ha	8	40	80	120	160

## Guaranteed Analysis (w/v)

Nitrogen (N)	6.6%
N as nitrate	4.9%
N as ammonium	1.7%
Phosphorus (P)	1.4%
P as PO <sub>4</sub>	1.4%
Potassium (K)	5.8%
Calcium (Ca)	1.3%
Magnesium (Mg)	0.3%
Specific Gravity	1.197 kg/L
pH Range	< 1.0

## Typical Application Rates

### Fertigation:

10 to 200 L/ha

## Crop Removal & Demand

	Nutrient Removal kg/t fruit	Tonnes of fruit removed / ha	Total Nutrients Removed kg/ha	Post Harvest to Leaf Fall	
				% Crop Demand	kg/ha
<b>Nitrogen</b>	1.5	10	15	34%	5.1
<b>Phosphorus</b>	0.4	10	4	28%	1.1
<b>Potassium</b>	3.0	10	30	15%	4.5
<b>Calcium</b>	0.4	10	4	22%	0.9
<b>Magnesium</b>	0.1	10	1	22%	0.2

Wine Grape Crop demand adapted from Conradie (1980) and Conradie (1981).  
Nutrient removal figures in kg/ t are world wide averages from SLTEC® database.



**Barney Toohey at Kennedy Vineyard**  
27 hectares - Heathcote region

*'For the past two years we have been using Vine Recharge™ post-harvest and have been impressed with the even bud-burst across the vineyard and the early spring growth the next year. This has led to more even yields across the vineyard while maintaining quality.'*



# Post Harvest

***Nutrient and carbohydrate reserves for grape vines are essential for vine health and performance for the following year.***

***Post-harvest nutrient application increases the stored nutrient status of vines, reducing potential deficiencies from bud break up to the end of flowering.***

## **Irrigation**

It is imperative that vines receive adequate water post-harvest to maximize their carbohydrate storage and nutrient uptake for the following season.

It is critical that remaining irrigations are carefully managed to maintain a functional canopy for three to four weeks after harvest.

It is important that both topsoil and subsoil moisture is maintained over the winter period as dormant plants still use water.

Remember to ensure soils don't become too dry as roots and soil biology will be negatively affected, leading to reduced nutrient uptake in spring. To improve soil biology and subsequent nutrient cycling over the dormant period please consider QuadSHOT® - providing a valuable blend of microbial food sources and root zone stimulants.

## **Nitrogen (N)**

Nitrogen applications post-harvest play a large role in the available nitrogen for the coming season; safeguarding a strong and even bud burst and aiding in the early spring flush of growth.

## **Phosphorus (P)**

Phosphorus is critical for root development and has a direct effect on yield and quality. The application of phosphorus increases the beneficial translocation of other nutrients, such as magnesium from the roots to the shoots.

## **Potassium (K)**

Potassium is involved in the active translocation of sugars from the leaf to the fruit and therefore plays an important role in fruit quality, size and yield. Potassium is also involved in the osmotic potential of cells as well as the turgor of the guard cells that open and close stomata. Good potassium levels in early spring can help to safe-guard buds and new growth from frost damage.

## **Calcium (Ca)**

Calcium is a key component of cell walls, maintaining membrane structure and nutrient uptake. It has a significant role in fruit quality, colour and aroma.

Using BiologiCAL PLUS®, a plant-available calcium source containing microbial stimulants already in solution, will increase calcium levels in the soil under the dripper where the majority of the root structure lies.

## **Magnesium (Mg)**

Magnesium is an essential component of chlorophyll and is needed for many processes including the transfer of energy, protein synthesis and cell structure.

After harvest, vines accumulate a significant amount of magnesium, which is then stored in the roots, shoots and woody components of the trunk. Magnesium accumulation continues until leaf fall with most being stored in the roots and leaves.





# 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, tying 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 magnesian 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%).

## 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

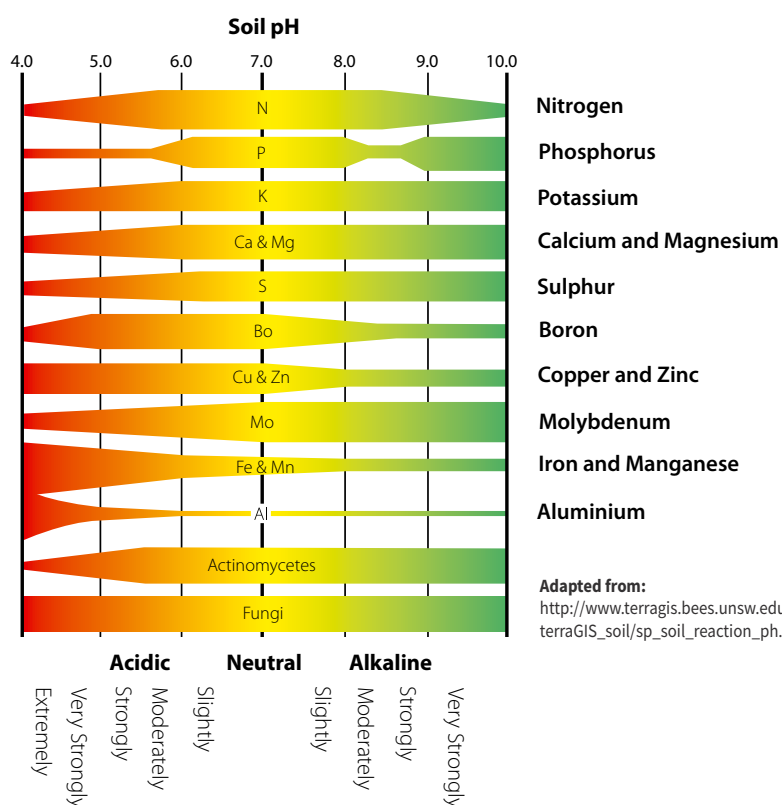
(preferred level >10 meq/100g)

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)

## Recommended Soil pH Level for Vineyards

Optimum pH Range	
Upper	6.8 to 7.5
Optimum	6.0 to 6.5
Lower	5.5 to 5.8



Adapted from:  
[http://www.terragis.bees.unsw.edu.au/terraGIS\\_soil/sp\\_soil\\_reaction\\_ph.html](http://www.terragis.bees.unsw.edu.au/terraGIS_soil/sp_soil_reaction_ph.html)

# Highly Available, Activated Calcium + Organic Boost



# 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 clubroot
- 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 (w/v)

Calcium (Ca)	6.5%
Nitrogen (N)	0.3%
Phosphorus (P)	0.1%
Potassium (K)	2.0%
Sulphur (S)	1.8%
Molasses	41.8%
Carbon (C)	12.5%
Boron (B)	0.1%
Fish Emulsion	0.3%
Kelp	0.3%
Humic Acid	0.2%
Specific Gravity	1.281 kg/L
pH (*can vary)	8.0 - 10.0*

## Typical Application Rates

### Foliar:

Broadacre: 1 to 40 L/ha  
with at least 100 L/ha  
Horticulture: 1 to 20 L/ha  
with 200 - 2,000 L/ha

### Fertigation:

20 to 60 L/ha

### 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 to 60 L/ha as a directed soil spray,  
prior to planting with 50 to 100 L/ha water







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