# A REVIEW

# ORCHID NUTRITION & FERTILISERS

March 2024

Peter Young

# HOW DO NATIVE SPECIES GET NUTRIENTS?

- Thunder storms – lightning with rain → Nitrogen
- Sweat from trees – 'Guttation' → soil minerals
- Symbiotic fungi – Mycorrhiza in root coating (Velamen)
- Decomposing plant material → organic Nitrogen
- Rock weathering releasing minerals - lithophytes
- Gaseous absorption – mostly cloud forests → Nitrogen
- Others – monkeys, bird nests etc

Thunderstorm + Lightning combines Nitrogen Gas + Oxygen ⟶ Nitrogen Oxide

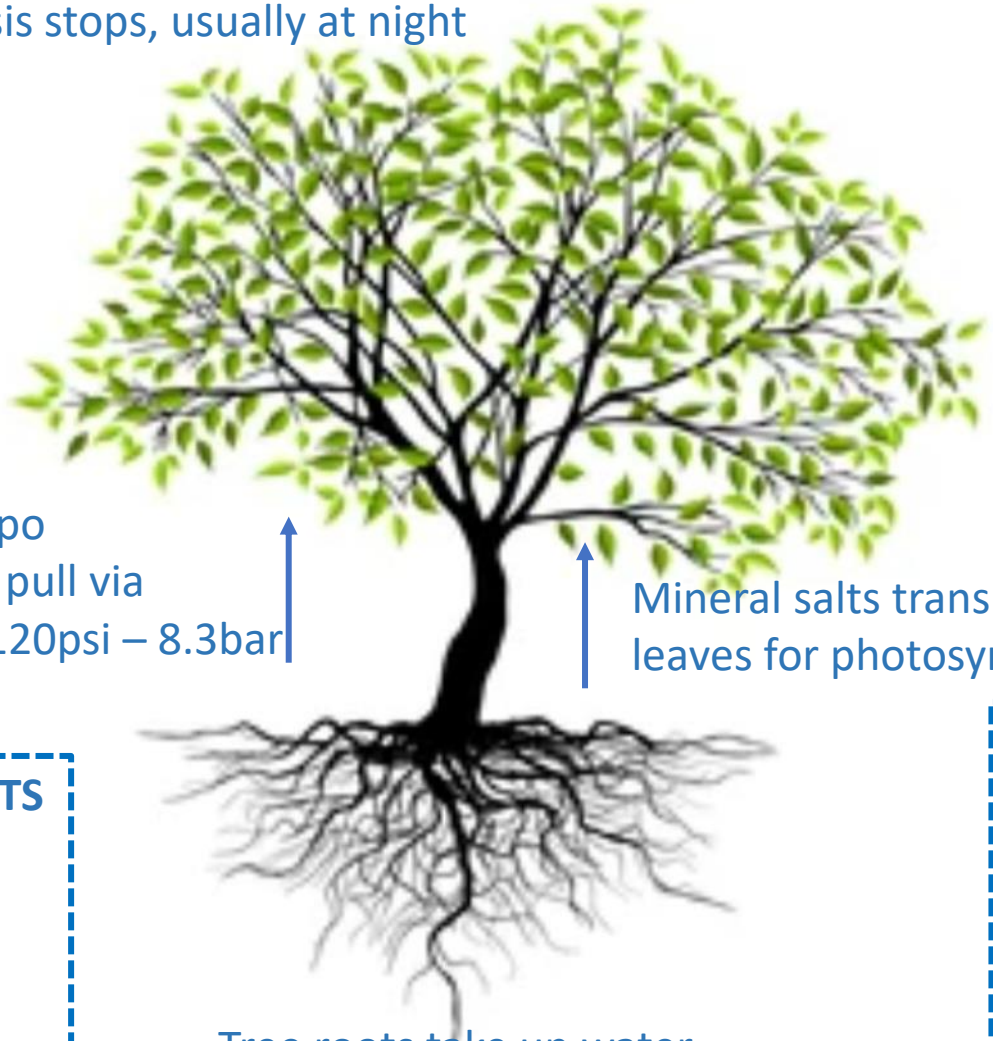
Nitrogen Oxide + Rain ($H_2O$) ⟶ Nitrate ($NO_3$)

The World's agriculture, grasslands and forests rely on natural Nitrogen fertiliser

**PLANT GUTTATION:**

The action of plant leaves sweating out mineral salts in sap droplets via specialist porous openings called Hydathodes.

This allows trees to remove excess water as required and occurs mostly when photosynthesis stops, usually at night



**WIND** ⟷

**HUMIDITY** ↕

Upwards evapo transpiration pull via xylem up to 120psi – 8.3bar

**WIND** ⟷

**HUMIDITY** ↕

Mineral salts transported to leaves for photosynthesis

Tree roots take up water & essential soil nutrients

**MACRO NUTRIENTS**

| | |
|---|---|
| N | Nitrogen |
| P | Phosphorus |
| K | Potassium |
| Ca | Calcium |
| Mg | Magnesium |
| S | Sulphur |

**MICRO NUTRIENTS**
(trace elements)

| | |
|---|---|
| Fe | Iron |
| Mn | Manganese |
| Cu | Copper |
| Zn | Zinc |
| Mo | Molybdenum |
| B | Boron |

**What does the water of guttation contain?**

Guttation is the loss of water in solution form through hydathodes. The water lost in guttation is **a dilute solution of mineral salts**.

https://www.toppr.com › question

Water of guttation is - Toppr

MORE RESULTS

**What is the primary substance excreted from the plant via guttation?**

The water carrying dissolved minerals that travels upward through the xylem vessels is called the **xylem sap**. Therefore, the primary substance excreted from a plant via guttation is the xylem sap.

https://www.nagwa.com › explainers

Lesson Explainer: Excretion in Plants - Nagwa

MORE RESULTS

**What does guttation in plants result**

Wikipedia

Guttation - Wikipedia

Visit

# WHAT CAN WE LEARN FROM NATURE?

- **Little but often, in particular Nitrogen**
- **Importance of air movement & ventilation**
- **Roots dry out between rainfall/fertilising events**
- **Species growth & flowering linked to weather patterns**
- **Species only found where all factors line up**
- **Orchids can re-hydrate during high humidity conditions**
- **Some need light/wind/exposure/dry season**
- **Others need shade, wind protection/regular moisture**

# ‘MAJOR’ ELEMENTS & ROLE

## Demand influenced by light & exposure (air movement)

**N – Nitrogen**

- Determines demand of all other nutrients
- $NO_3$ Nitrate via leaves; $NH_4$ Ammonium via roots

**P – Phosphorus**

- Strong roots, stem extension, flower colour, size and numbers

**K - Potassium**

- Strength of whole plant including roots, flower brightness & quality, competes with Calcium & Boron uptake

**Ca – Calcium**

- Disease prevention, leaf & flower shape & durability, stem extension, tolerance to weather extremes

**Mg – Magnesium**

- Sunscreen in plant & maintains high chlorophyll, competes against Calcium & Potassium

**S – Sulphur**

- Maintains high chlorophyll and helps plant use Nitrogen & P, aids cold hardiness

# ‘TRACE ELEMENTS’ & ROLE
## Demand influenced by ‘major’ nutrient levels

**Fe – Iron**
- Important to maintain chlorophyll in emerging new growth

**Mn – Manganese**
- Disrupted by over use of Lime/Dolomite etc. or if water & media is +pH7

**Cu – Copper**
- Important for maintaining upright growth & strong roots

**Zn – Zinc**
- Maintains strong growth & full size leaves

**Mo – Molybdenum**
- Helps Nitrogen uptake in cold weather, strong pollen

**B – Boron**
- Important in Calcium uptake & movement – critical for pollination & seed development

Pure gypsum contains 23.3% calcium (Ca) and 18.6% sulfur (S). Gypsum is moderately soluble in water (2.5 g per L) or approximately 200 times greater than lime ($CaCO_3$). This makes the calcium in gypsum more mobile than the calcium in lime and allows it to more easily move through the soil profile.

| **Compound** | **Formula** | **Solubility (kg/100L) @ 20$^{O}$ C** |
|---|---|---|
| Calcium Carbonate (Lime) | $CaCO_3$ | 0.0013 |
| Calcium Oxide (Burnt or Quick Lime) | CaO | 0.13 (at 25 deg C) |
| Calcium Hydroxide (Slaked or Hydrated Lime) | $Ca(OH)_2$ | 0.17 |
| Calcium Sulfate (Gypsum) | $CaSO_4.2H_2O$ | 0.26 |
| Monocalcium Phosphate (Superphosphate) | $Ca(H_2PO_4)_2.H_2O$ | 1.8 |
| Calcium Chloride | $CaCl_2.6H_2O$ | 75 |
| Calcium Nitrate | Ca(NO3)2.4H2O | 129 |

# NITRATE NITROGEN ($NO_3$) & ORCHIDS

- Raises media pH
- Mostly absorbed by leaves
- Absorbed by root tips only
- Comes from thunderstorms
- Guttation from trees sweating
- Nitrifying bacteria in potting mix
- Fertiliser – check label

# AMMONIUM NITROGEN ($NH_4$) & ORCHIDS

- Lowers media pH
- Mostly absorbed by all roots
- None in thunderstorm rain
- Guttation from trees sweating
- Decomposing organic matter – organic
- Orchid mycorrhiza in roots
- Urea in fertiliser – check label

1:45 69%

10:49 69%

(PDF) Phalaenopsis ...
researchgate.net

ResearchGate Join for free Login

Article PDF Available

# Phalaenopsis can absorb urea directly through their roots

June 2008 · Plant and Soil 319(1):95-100
DOI:10.1007/s11104-008-9852-5

**Authors:**

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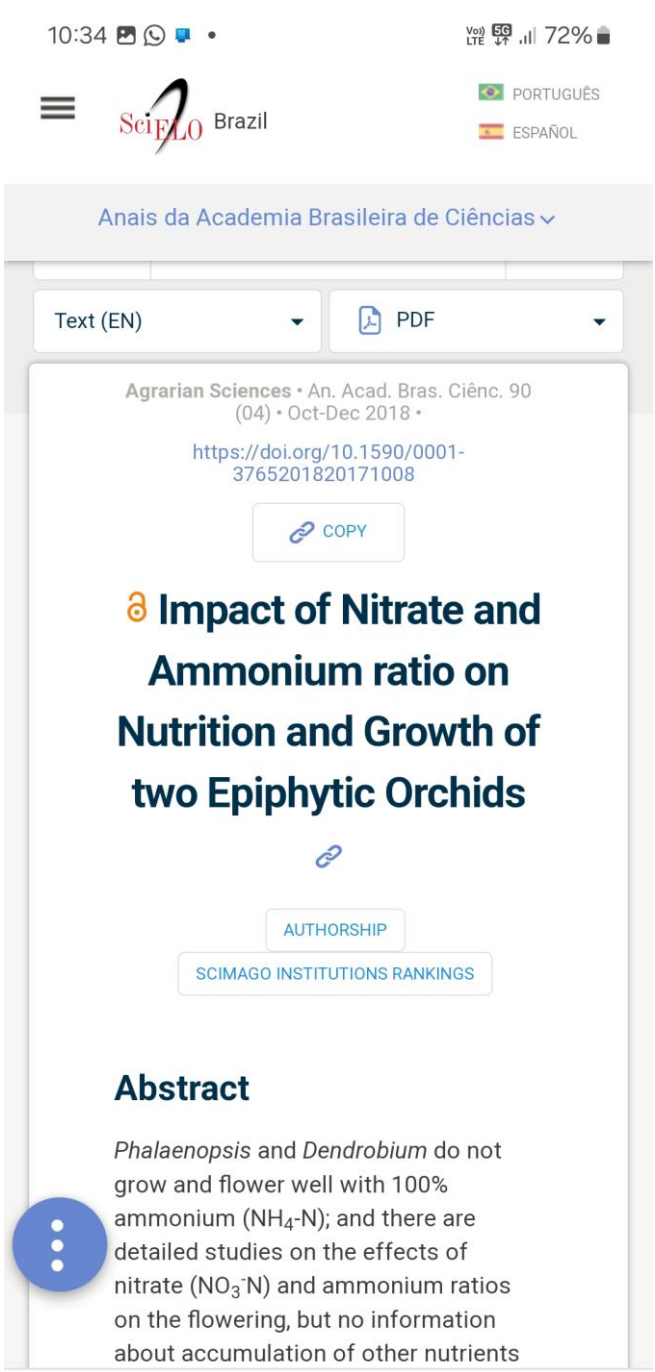


**50% Nitrate**

**&**

**50% Ammonium**

**Benefits growth**

Plant Diversity
Volume 40, Issue 4, August 2018, Pages 196-208

# Physiological diversity of orchids

Shibao Zhang [a 1], Yingjie Yang [a b 1], Jiawei Li [a b], Jiao Qin [a], Wei Zhang [a], Wei Huang [a], Hong Hu [a]



https://doi.org/10.1016/j.pld.2018.06.003
Get rights and content



## Abstract

# Nitrogen in fertilizers and the truth about Urea

**painterart**
15 years ago

Sorry for being late on the discussion about fertilizer. It is all a matter of finding time. the one thing I want to dispel is that urea is not good for plants or orchids contrary to often what is written about it. I posted a similar post to this one years ago on this forum, but information gets lost especially when there is a lot of misinformation.

Almost all published studies done on fertilizers and plant nutrients have been done on crop plants. I do think though that much of this is transferable to orchids.

Most orchids can absorb nitrogen directly in the forms of cationic ammonium ion (NH4+), the anion nitrate (NO3-), and urea. The nitrogen in the ammonium ion (NH4+) is available immediately to the plant for the production of amino acids and

1:52 32° • 75%
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plants. I do think though that much of this is transferable to orchids.

Most orchids can absorb nitrogen directly in the forms of cationic ammonium ion (NH4+), the anion nitrate (NO3-), and urea. The nitrogen in the ammonium ion (NH4+) is available immediately to the plant for the production of amino acids and other compounds. Nitrate nitrogen (NO3-) on the other hand has to be reduced in order to be used by plants.

Nitrate nitrogen is more "time released" then urea. Ureas nitrogen availability is more the middle ground between nitrate and ammonium. Urea hydrolyses into ammonium (NH4+) and C02. This breakdown of urea can take place in the surrounding soil, bark or coir and in the roots and leaves of orchids. The urease enzyme breaks down the urea in leaves and roots. Urea is readily absorbed by roots and leaves and can be used in foliar feeding. While urea is broken down in a growing medium and the resulting ammonium nitrogen is absorbed by the orchid, it is not necessary as orchid can directly absorb urea and break it down within the orchid. Contrary to older orchid book statements urea does not take a year to break down, and can be used by orchids directly.

New Phytologist Foundation

New Phytologist / Volume 213, Issue 1 / p. 10-12

Commentary | Free Access

# Nitrogen transport in the orchid mycorrhizal symbiosis – further evidence for a mutualistic association

John D. W. Dearnaley, Duncan D. Cameron

First published: 28 November 2016
https://doi.org/10.1111/nph.14357
Citations: 46

This article is a Commentary on Fochi *et al.*, **213:** 365–379.



## Abstract

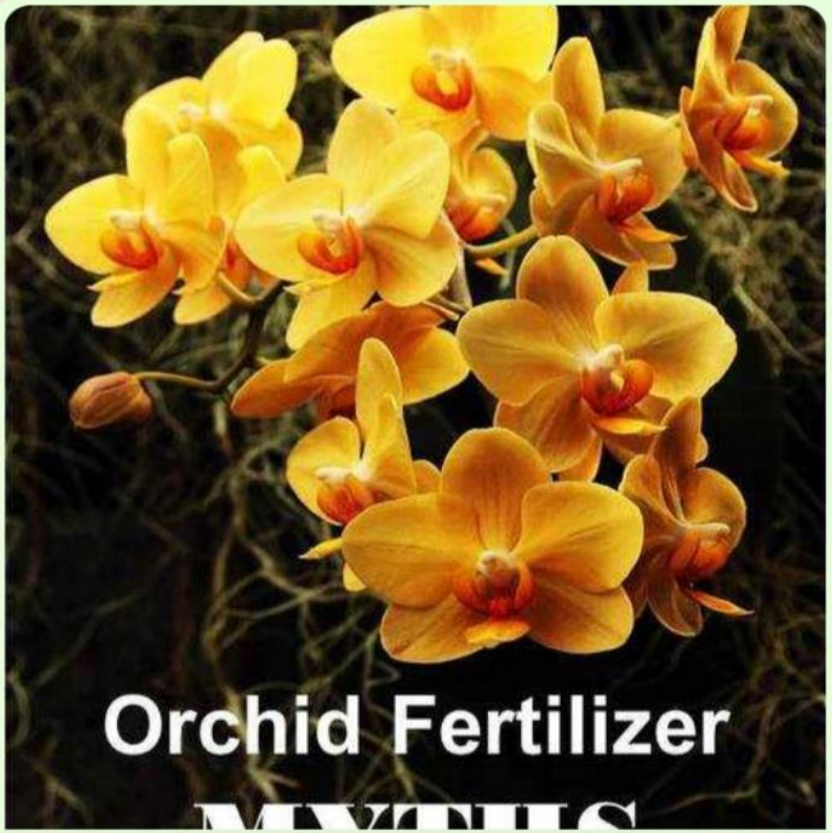
This article is a Commentary on Fochi *et al.*, **213:** 365–379.

## Introduction

# GROWER ATTITUDES TOWARDS NUTRIENTS & FERTILISERS

## OPINIONS & ATTITUDES ALL OVER THE PLACE AS FOLLOWS:

- Doesn't matter what fertiliser you use?
- The plant only takes what it needs?
- Rest goes down the drain?
- Plenty of Calcium & Magnesium in water?
- Water pH doesn't really matter?
- Don't use Urea based fertiliser?
- Only use Nitrates – Nitrate vs Urea?




**Orchid Fertilizer Myths - Grow More Flowers**

There is a lot of information floating aro...

www.gardenmyths.com

https://www.gardenmyths.com/orchid-fertilizer-myths/#There_is_No_Such_Thing_as_Orchid_Fertilizer

10:16 am ✓✓


# EQUAL NITRATE & AMMONIUM

# HIGH P
# NO Ca

USA

$N\text{-}P_2O_5\text{-}K_2O$

AUSTRALIA

(N-P-K)

# 10-30-20+TE (10-12.9-16.6+TE)

# Blossom Booster

**(FOR CONTINUOUS LIQUID FEED PROGRAMS)**

Rev 05/19

Product Number 77160A

## GUARANTEED ANALYSIS

Total nitrogen (N) ..... 10%
5.00% ammoniacal nitrogen
5.00% nitrate nitrogen
Available phosphate ($P_2O_5$) (=12.9% P) ..... 30%
Soluble potash ($K_2O$) (= 16.6% K) ..... 20%
Magnesium (Mg), ..... 2.0300%
2.0300% water soluble magnesium (Mg)
Iron (Fe) ..... 0.0500%
0.0500% chelated iron (Fe)
Molybdenum (Mo) ..... 0.001%

Derived from: ammonium nitrate, monopotassium phosphate, magnesium sulfate, boric acid, iron EDTA, manganese EDTA, zinc EDTA, copper EDTA, ammonium molybdate

Potential Acidity: 347 lb. Calcium carbonate equivalent per ton.

*Information regarding the contents and levels of metals in this product is available on the internet at: http://www.aapfco.org/metals.html*

**!!WARNING STATEMENTS!!**

*Do not swallow. The dust from this product may act as an irritant. Avoid inhalation and contact with the eyes and skin.*

*Excessive use of molybdenum (Mo) can be harmful to stock. Plant levels of Mo can be high for 4 weeks after application. It is advisable to keep stock off treated areas for this period. Molybdenum application may induce copper deficiency in grazing animals. This is most likely to occur on sandy soils low in copper. Check rate and frequency of molybdenum use with appropriate authorities.*

## SUGGESTED FEEDING CONCENTRATIONS PPM NITROGEN

Jack's Professional® recommends these feed rates for the following crops. Remember to also consider plant stage, pot size, leaching fraction and environmental conditions when applying suggested rates. The quality of your water source will also affect overall feed rates, frequency and other additions in order to achieve optimum growth.

| | **Constant Liquid Feed** (CLF) | **Periodic** (Every 7-10 days) |
|---|---|---|
| **Plugs/Salt Sensitive** | 50-125 | 175-225 |
| **Woody Ornamentals** | 50-100 | 200-375 |
| **Bedding Plants** | 100-150 | 200-250 |
| **General Foliage** | 100-200 | 250-300 |
| **Cut Flowers** | 175-225 | 300-450 |
| **Garden/Landscape** | 200-300 | 400-750 |
| **Heavy Feeders** *Geranium, Mum, Lily, Poinsettia, Vegetable* | 200-300 | 350-400 |
| **Light Feeders** *NG impatiens, Fuscia, Begonia, Fern, Orchid, Native perennial* | 75-150 | 200-250 |

## MIXING INSTRUCTIONS

This chart displays the amount of dry fertilizer (grams) to add to each litre of water to make a concentrated solution. Please check your injector setting before use.

| *Desired N feed rate* | *Injector Setting* **1:15** | **1:100** | **1:200** | **E.C. value** *(mmhos)* |
|---|---|---|---|---|
| **50 ppm** | 1.0 | 6.75 | 13.5 | .49 |
| **100 ppm** | 2.0 | 13.5 | 27.0 | .98 |
| **200 ppm** | 4.0 | 27.0 | 54.0 | 1.96 |

*Limit of Solubility = 600 grams per litre*

***Important Notes:***
E.C. value is the best method to determine fertilizer strength.
Fertilizer appearance may vary in color due to variation in raw material

**Small Volume Application**
Ornamentals: 1-2g/L (applied to foliage & soil) every 7-10 days or as required.

Distributed in Australia by:
**Fernland Agencies Pty Ltd**

0+TE (10-12.9-16.6+TE) 77160A


**AMMONIUM**
**(no Nitrate)**
**+**
**SULPHATES**

**WITH**
**Ca & Mg**

## SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

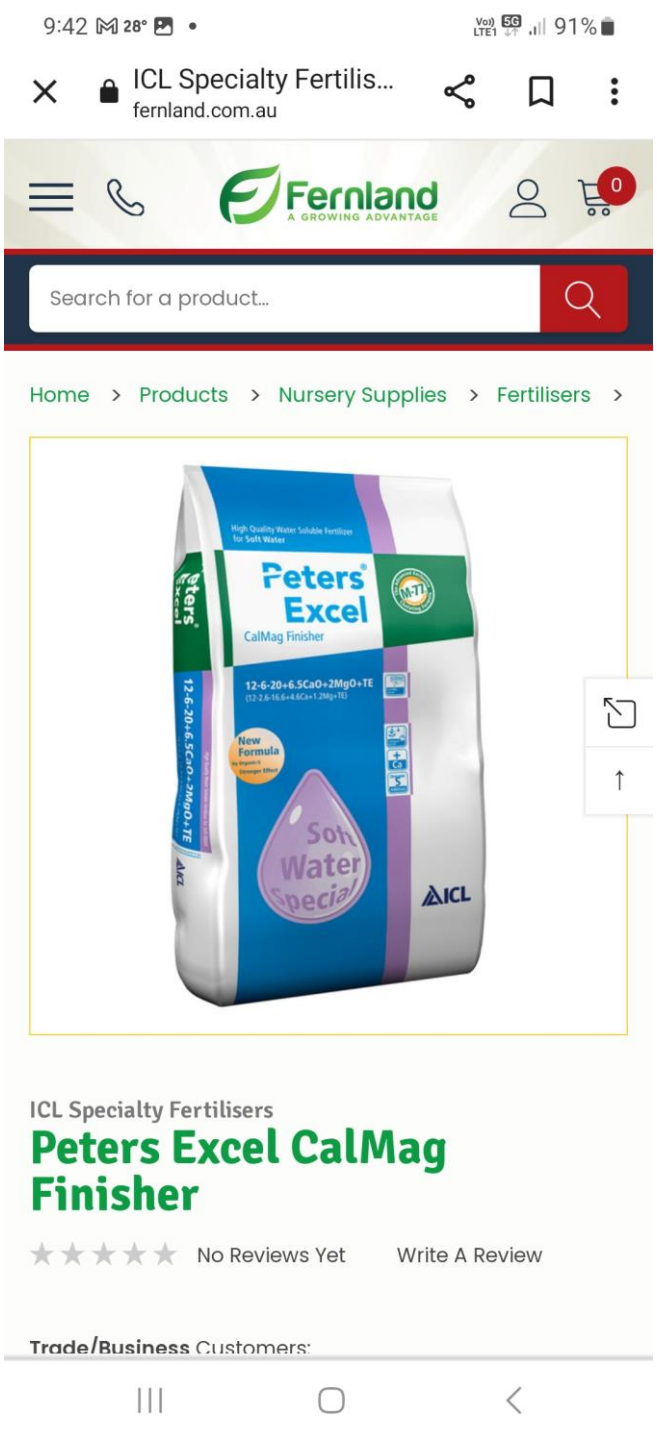
### Substances

See section below for composition of Mixtures

### Mixtures

| CAS No | %[weight] | Name |
|---|---|---|
| Not Available | >40 | chicken manure |
| Not Available | <5 | seaweed |
| 7783-20-2 | <20 | ammonium sulfate |
| 7778-80-5 | <25 | potassium sulfate |
| 7783-28-0 | <11 | diammonium phosphate |
| Not Available | <3 | rock phosphate |
| 7758-98-7 | <1 | copper sulfate |
| 10101-68-5 | <1 | manganese sulfate, hydrate |
| 7487-88-9 | <3 | magnesium sulfate, anhydrous |
| 7720-78-7 | <2 | ferrous sulfate anhydrous |
| 7631-95-0 | <1 | sodium molybdate |
| 1303-96-4 | <1 | sodium borate, decahydrate |
| 7733-02-0 | <1 | zinc sulfate |

## SECTION 4 FIRST AID MEASURES




# NITRATE ONLY

# HIGH Ca, Mg & K


Peters Excel

# CalMag Finisher

13-2.2-16.6+5Ca+1.2Mg+TE

Peters Excel CalMag Finisher is often used as a follow-up fertilizer to Peters Excel CalMag Grower 15-5-15. Its high potassium formula leads to a more compact growth. This Peters Excel product is a 'single-tank mix' solution providing plants with all the necessary nutrients from a single tank.

## Advantages

- Especially developed for use in soft water, unique in its effects.
- Healthy growth as a result of continuous supply of calcium and magnesium.
- Reliable system thanks to selected composition of raw materials and chelated trace elements.
- High level of chelated trace elements ensures perfect color and growth.
- Maximum availability and absorbability because of M-77 chelating complex.
- Single-tank-mix concept: all nutrient elements in a single storage tank, including calcium.

## Directions for use

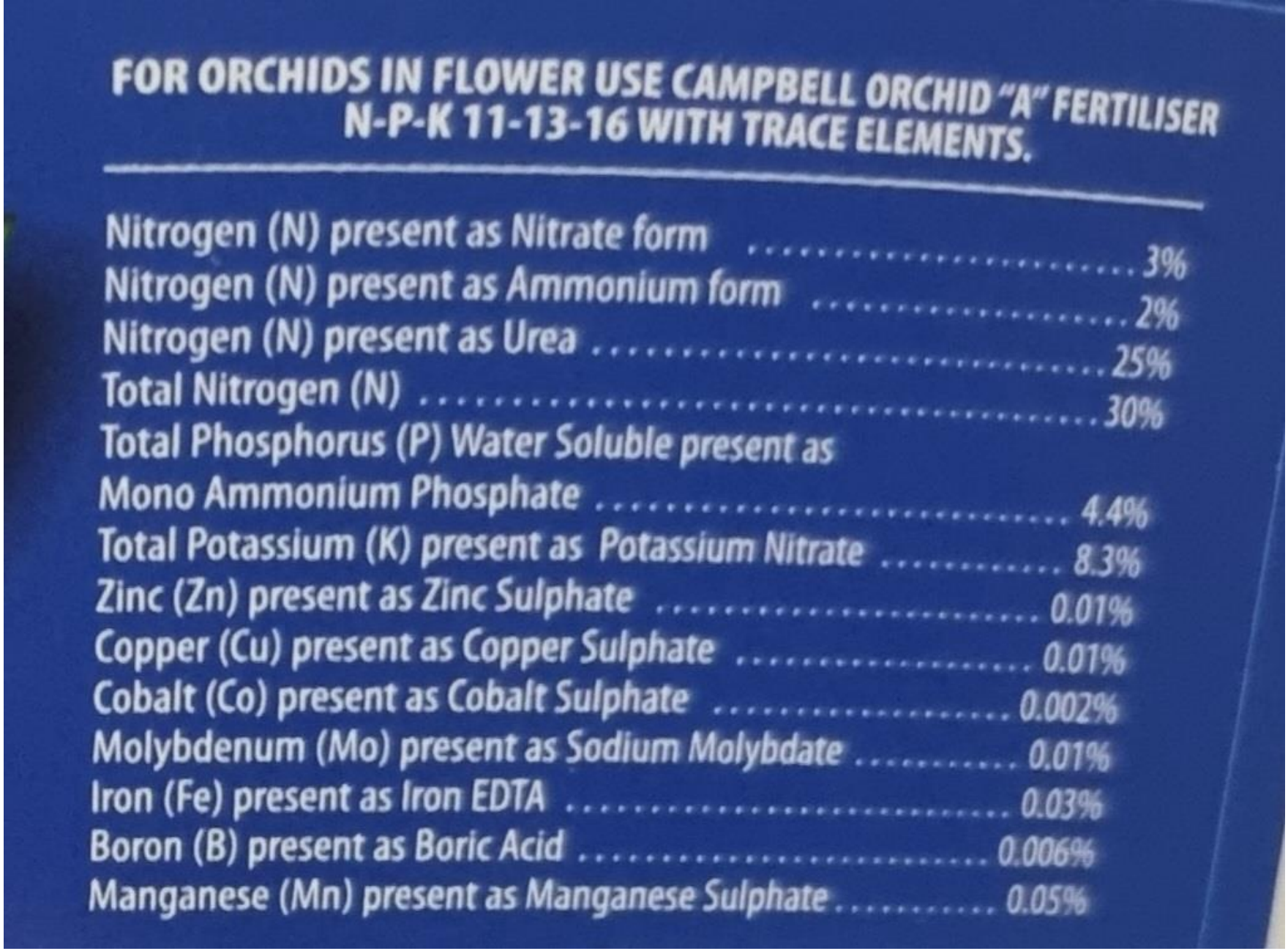
The product can be mixed with calcium nitrate in the same tank (50:50%).

To ensure that this product dissolves completely, prepare the stock solution 1-2 hours before use, stir well or use warm water. Please contact your ICL Specialty Fertilizers advisor for a specific crop recommendation. Do not mix Peters Excel with any other NPK or phosphate containing fertilizer, except phosphoric acid.

Store under dry conditions. Partly used or damaged bags should be closed well.

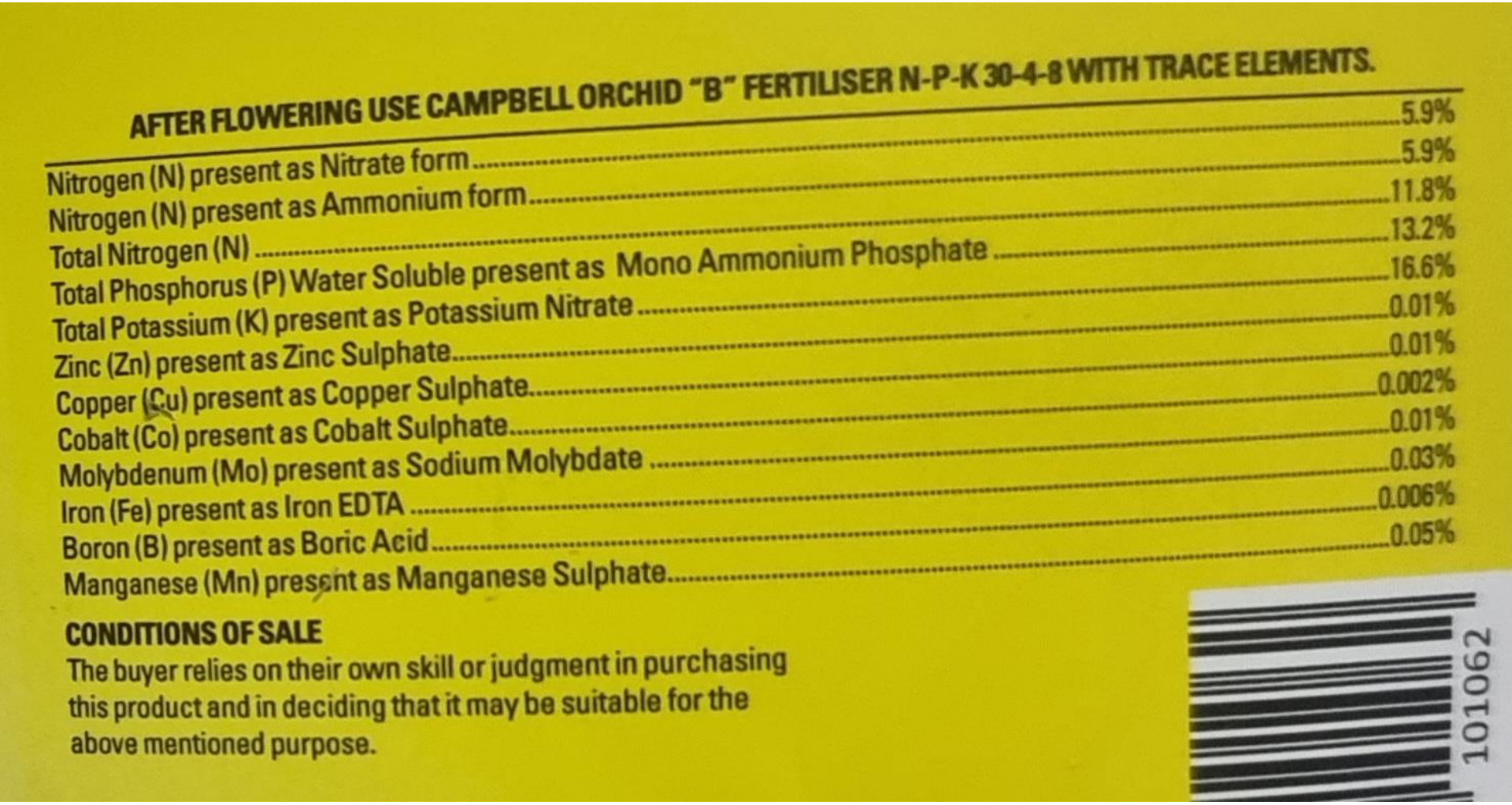
| elemental | |
|---|---|
| Nitrogen Total (N) | 13% |
| Nitrate nitrogen (N03-N) | 11.0% |
| Urea nitrogen (Ur-N) | 2.0% |
| Phosphorus (P) | 2.2% |
| Water soluble | 2.2% |
| Potassium (K) | 16.6% |
| Water soluble | 16.6% |
| Magnesium (Mg) | 1.2% |
| Water soluble | 1.2% |
| Calcium (Ca) | 5.0% |
| Water soluble | 5.0% |
| Iron (Fe) | 0.12% |
| Water soluble | 0.12% |
| Chelated by DTPA | 0.12% |
| Manganese (Mn) | 0.06% |
| Water soluble | 0.06% |
| Chelated by EDTA | 0.06% |
| Boron (B) | 0.02% |
| Water soluble | 0.02% |
| Copper (Cu) | 0.015% |
| Water soluble | 0.015% |
| Chelated by EDTA | 0.015% |
| Molybdenum (Mo) | 0.010% |
| Water soluble | 0.010% |
| Zinc (Zn) | 0.015% |
| Water soluble | 0.015% |
| Chelated by EDTA | 0.015% |

**NO SULPHUR**


FOR ORCHIDS IN FLOWER USE CAMPBELL ORCHID "A" FERTILISER
N-P-K 11-13-16 WITH TRACE ELEMENTS.
Nitrogen (N) present as Nitrate form ..... 3%
Nitrogen (N) present as Ammonium form ..... 2%
Nitrogen (N) present as Urea ..... 25%
Total Nitrogen (N) ..... 30%
Total Phosphorus (P) Water Soluble present as
Mono Ammonium Phosphate ..... 4.4%
Total Potassium (K) present as Potassium Nitrate ..... 8.3%
Zinc (Zn) present as Zinc Sulphate ..... 0.01%
Copper (Cu) present as Copper Sulphate ..... 0.01%
Cobalt (Co) present as Cobalt Sulphate ..... 0.002%
Molybdenum (Mo) present as Sodium Molybdate ..... 0.01%
Iron (Fe) present as Iron EDTA ..... 0.03%
Boron (B) present as Boric Acid ..... 0.006%
Manganese (Mn) present as Manganese Sulphate ..... 0.05%

**NO Ca or Mg**

# EQUAL NITRATE & AMMONIUM



**AFTER FLOWERING USE CAMPBELL ORCHID "B" FERTILISER N-P-K 30-4-8 WITH TRACE ELEMENTS.**

| | |
|---|---|
| Nitrogen (N) present as Nitrate form | 5.9% |
| Nitrogen (N) present as Ammonium form | 5.9% |
| Total Nitrogen (N) | 11.8% |
| Total Phosphorus (P) Water Soluble present as Mono Ammonium Phosphate | 13.2% |
| Total Potassium (K) present as Potassium Nitrate | 16.6% |
| Zinc (Zn) present as Zinc Sulphate | 0.01% |
| Copper (Cu) present as Copper Sulphate | 0.01% |
| Cobalt (Co) present as Cobalt Sulphate | 0.002% |
| Molybdenum (Mo) present as Sodium Molybdate | 0.01% |
| Iron (Fe) present as Iron EDTA | 0.03% |
| Boron (B) present as Boric Acid | 0.006% |
| Manganese (Mn) present as Manganese Sulphate | 0.05% |

**CONDITIONS OF SALE**

The buyer relies on their own skill or judgment in purchasing this product and in deciding that it may be suitable for the above mentioned purpose.

101062

# NO Ca or Mg


**AMMONIUM**

**+**

**NITRATE**

**SULPHATE BASED**

**NO Ca**

# SULPHATE BASED

| NITROGEN(% W/W) | | | PHOSPHORUS (P) | POTASSIUM (K) | | | |
|---|---|---|---|---|---|---|---|
| Nitrate-N | Urea-N | TOTAL-N | TOTAL(% W/W) | Nitrate-K | Phos.-K | Sulph.-K | TOTAL-K |
| 3.0 | 12.0 | 15.0 | 2.0 | 9.1 | 4.1 | 11.8 | 25.0 |

| TRACE ELEMENTS (% W/W) | | | | | | | |
|---|---|---|---|---|---|---|---|
| S | Mg | Fe | Mn | Zn | Cu | B | Mo |
| 2.80 | 0.06 | 0.05 | 0.24 | 0.03 | 0.02 | 0.02 | 0.0014 |

Added Vitamin B1 and Amino acid to enhance nutrient uptake

Nitrogen to Phosphorus (N:P) ratio 7.5:1

# AMMONIUM & NITRATE

# NO Ca


# SOME Ca & GOOD Mg


Kalek
Naturally!
ORGANIC
SUPER
GROWTH
Fertilizer Pellets
ALL PURPOSE FERTILIZER for the Entire Garden
Contains: Biologically Active Composted Poultry Manure, Blood & Bone
Zeolite, Rock Phosphate, Natural Gypsum, Sulphate of Potash
Worm Castings, Rock Minerals, Fish Meal & Seaweed Extract
Masses of Flowers
Lush Lawns
Bountiful Fruit
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DYNAMIC
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PLANT FOOD
organically
enriches
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10 to 16kg
CAUTION
15kg
Releases nutrien
slowly & gently


## Osmocote Exact Standard 12 - 14 months

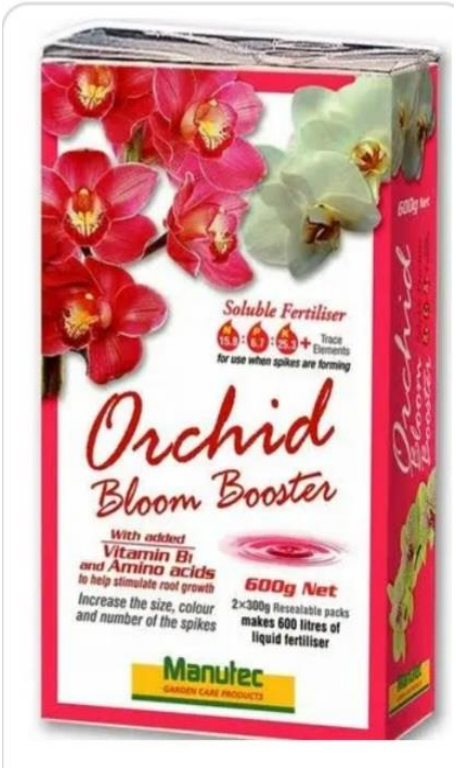
15 - 3.9 - 9.1 + 1.2Mg + TE Controlled Release Fertiliser

**Controlled Release**


## 15kg Peters Excel CalMag Finisher 13-2-17+5Ca

**$167.81** (Inclusive GST)

**(Chelates)**




**Sulphates**

**NOTE: DO NOT MIX**


# PUMP UP SPRAYER

## LIQUID FEED – ROOTS ONLY

- MANUTEC 0.5g/L x 6
- AUXINEONE 0.25g/L x 3

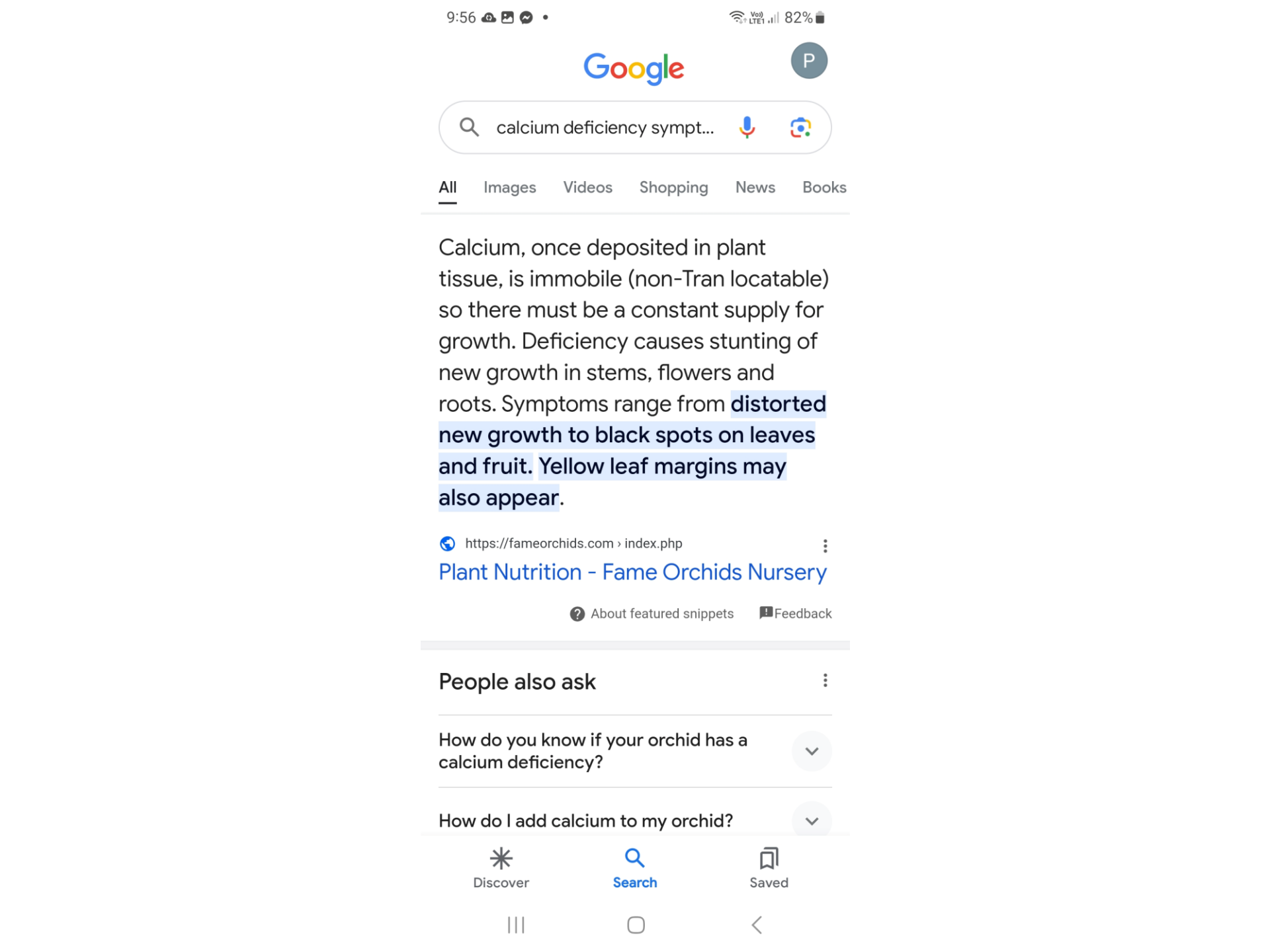
## FOLIAR SPRAY ONLY

- PETER'S FINISHER 0.5g/L x 6
- AGRI-FOS 600 0.5m/L x 8
- EPSOM SALTS 2g/L x 4

## TOP OF POT ONLY

- OSMOCOTE 12-14 MNTH
  SEPT/OCT or AT POTTING

**OPEN MIX - HEALTHY ROOTS FOR NUTRIENT UPTAKE**


9:56
82%
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calcium deficiency sympt...
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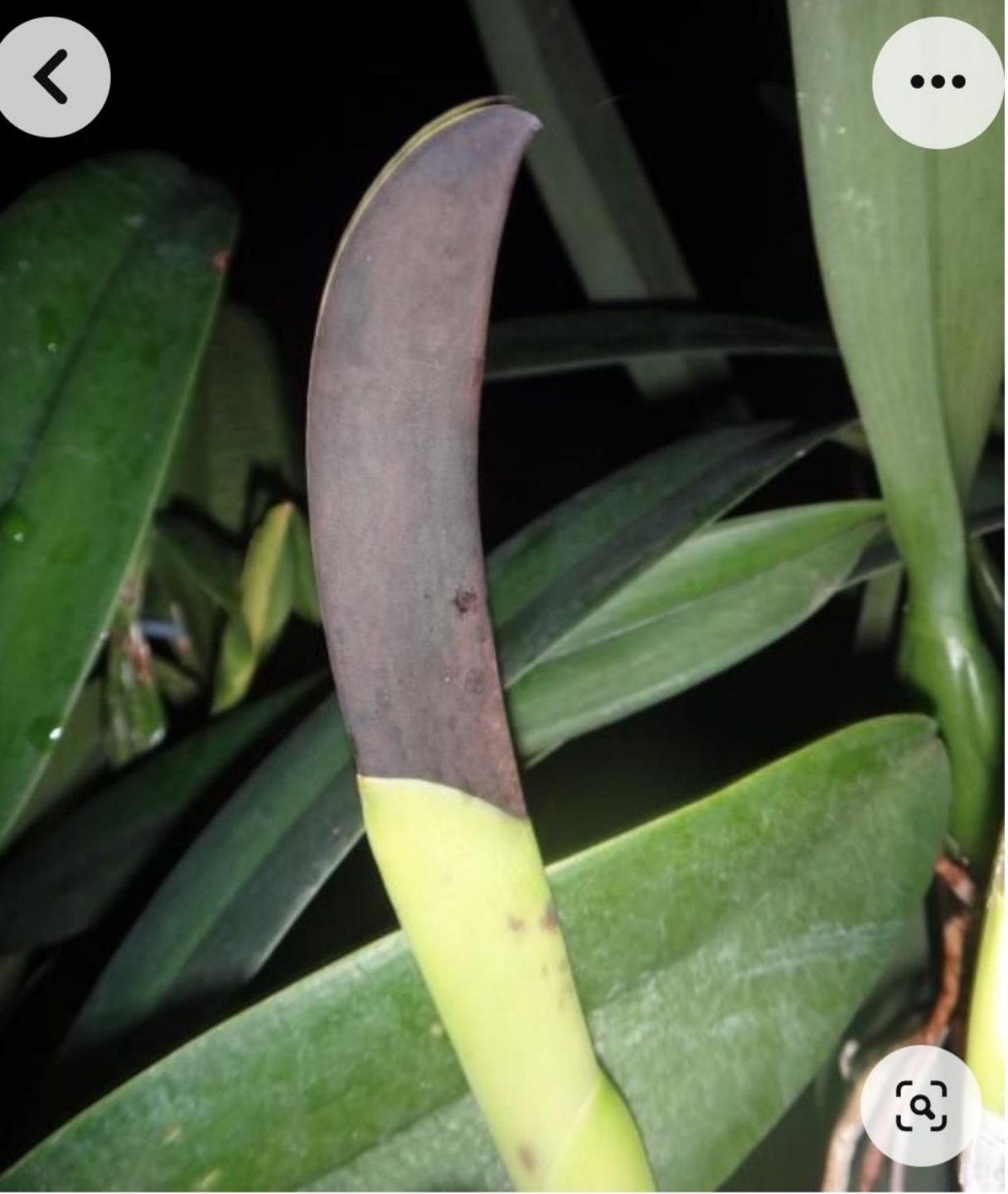
Calcium, once deposited in plant tissue, is immobile (non-Tran locatable) so there must be a constant supply for growth. Deficiency causes stunting of new growth in stems, flowers and roots. Symptoms range from distorted new growth to black spots on leaves and fruit. Yellow leaf margins may also appear.
https://fameorchids.com › index.php
Plant Nutrition - Fame Orchids Nursery
About featured snippets
Feedback
People also ask
How do you know if your orchid has a calcium deficiency?
How do I add calcium to my orchid?
Discover
Search
Saved

## Examples of Calcium Deficiency in Cattleyas

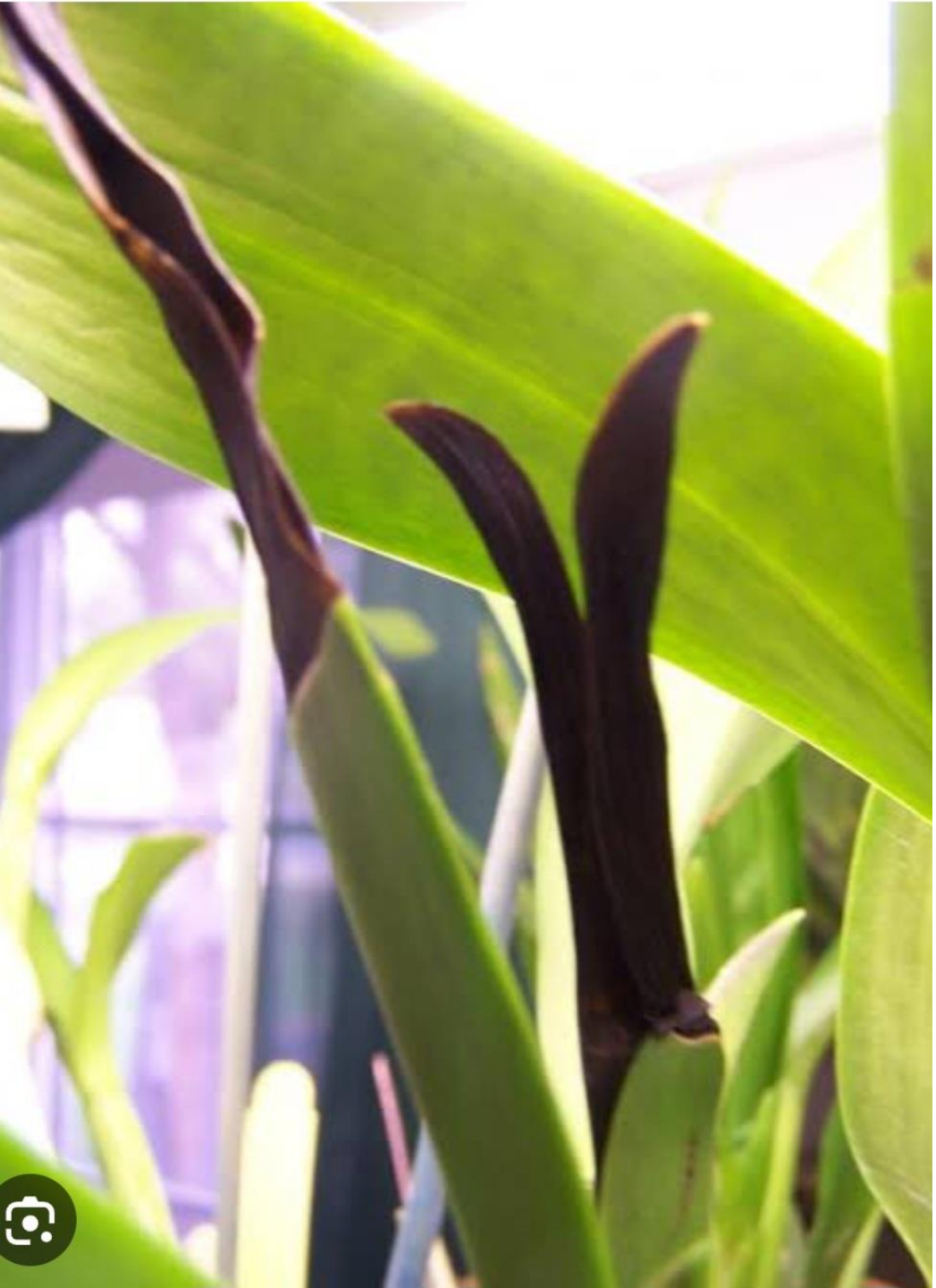
The most rapidly expanding tissue is affected first,
Such as new growths and leaaves

You might think your plant has black rot, but this
Problem is physiological rather than pathological



# ACUTE CALCIUM DEFICIENCY

# CATTLEYA



# ACUTE CALCIUM DEFICIENCY

# CATTLEYA


# CALCIUM DEFICIENCY

# CATTLEYA

# LOW CALCIUM

# ONCIDIUM HYBRID

# LOW CALCIUM

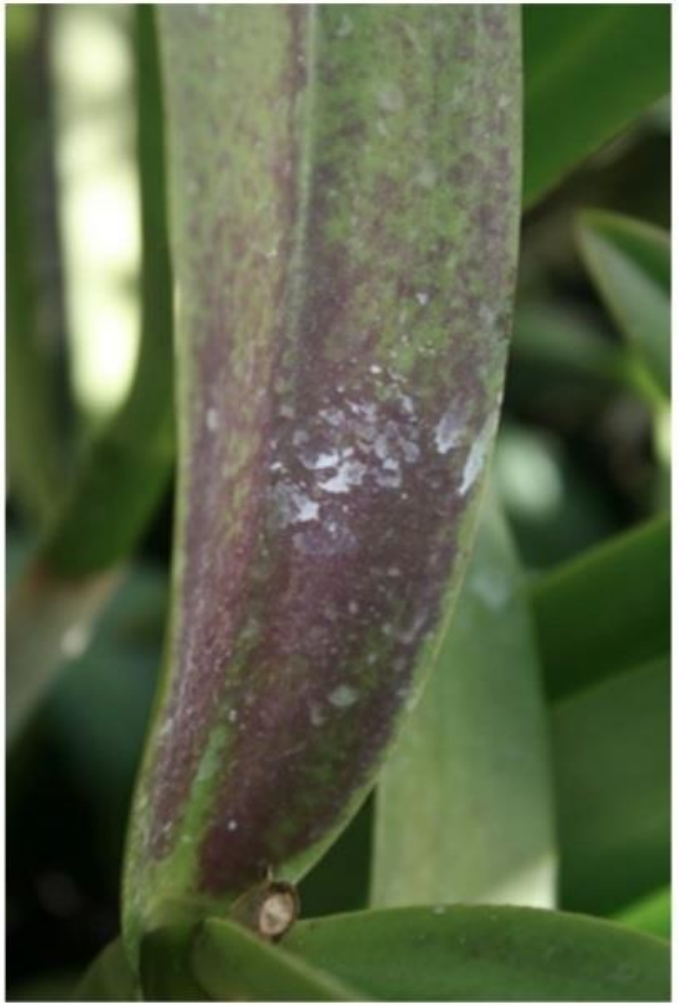
# PHALAENOPSIS HYBRID

# LOW CALCIUM

# PHALAENOPSIS bellina

# Examples of Magnesium Deficency

Cattleyas grown in bright light with insufficient magnesium may exhibit mottling indicative of chlorophyll damage



Leaves may turn a reddish purple after exposure to cold if they are magnesium deficient. Correct this with a megadose of Epsom Salts (1 tsp/gal).

# LOW MAGNESIUM

# PINEAPPLE

# PHALAENOPSIS LEAF DROP OF OLD LEAVES IN JAN/FEB

# LESS EACH YEAR WITH ADEQUATE CALCIUM


# EXPOSED TO NORTHERLY WINDS


# EXPOSED TO WINDS NORTH & SOUTH


# OPEN ENDS – WIND TUNNEL
# CAN FERTILISE OFTEN

**PROTECTED FROM ALL WINDS**

**TAKE AGES TO DRY OUT**

**FERTILISE LESS OFTEN**

**MORE FOLIAR - ‘NITRATES’**

**LESS ROOT DRENCHES – ‘AMMONIUMS’**

**DO NOT MIX**

**ANY FERTILISER CONTAINING**

**CALCIUM NITRATE**

**WITH**

**ANY ‘SULPHATE FERTILISER’**

**AS IT FORMS A CALCIUM**

**SULPHATE (GYPSUM) SLUDGE**

| | NUTRIENT CONTENT | | | | | |
|---|---|---|---|---|---|---|
| ***FERTILISER*** | ***N*** | ***P*** | ***K*** | ***Ca*** | ***Mg*** | ***S*** |
| **Calcium Nitrate** | **15.5** | | | **19** | | |
| **Magnesium Nitrate** | **10.5** | | | | **9.4** | |
| **Potassium Nitrate** | **13.0** | | **45** | | | |
| **Magnesium Sulphate (Epsom Salts)** | | | | | **9.8** | **13** |
| **Potassium Sulphate** | | | **42** | | | **17** |
| **Calcium Sulphate (Gypsum)** | | | | **23.3** | | **18.6** |
| **Lime - Agricultural** | | | | **37-40** | | |
| **Dolomite Lime** | | | | **22.7** | **11.8** | |
| **Calcium Ammonium Nitrate** | **27** | | | **8** | | |
| **Urea** | **46** | | | | | |
| **Ammonium Nitrate** | **34** | | | | | |
| **Ammonium Sulphate** | **20.2** | | | | | **24** |
| **MAP - Mono Ammonium Phospate** | **10** | **21.9** | | | | |
| **DAP - Di Ammonium Phosphate** | **17.7** | **20** | | | | |
| **Single Super Phosphate (SSP)** | | **8.8** | | **21.9** | | **11** |

# CONCLUSION

1. Always read the label and know what you are using
2. Fertilise little & often when watering is due in place of just water
3. Leach water without fertiliser every 6-8 weeks
4. Commence fertilising after flowering with the start of new growth in spring
5. Reduce high Nitrogen fertilisers in late summer/autumn to encourage flowering
6. Combination of Nitrate and Ammonium suits both tank/rain water or town water – potting mix pH!!

# CONCLUSION cont.

7. Peter's Cal Mag Finisher ideal as foliar to supply Ca, Mg, K & Nitrates – 0.5g/L monthly winter & fortnightly summer
   (500g & 1kg tubs available from 'Orchid Den' & Red Fox Orchids)

8. Neutrog Australia – 'Strike Back for Orchids Liquid'
   Ideal applied to roots to supply Ca, Mg, Sulphates and Ammonium - 2ml/L monthly winter & fortnightly summer
   (available from Bunnings)

9. Try soaking bark in pre-dissolved natural Gypsum 2.6g/litre to supply Calcium

10. OR consider fortnightly foliar sprays of Calcium Nitrate 0.5g/L plus Magnesium Nitrate 0.25g/L during active growth spring to late summer to supply Ca & Mg