

# Calcium Cyanamide Fertiliser

## Use in vegetables

**Integrated  
Crop Protection**  
PROTECTING CROPS



**Soil Wealth**  
NURTURING CROPS

### What is Calcium Cyanamide Fertiliser?

Calcium Cyanamide Fertiliser, also known as nitrolime, has been used in Germany as a slow release nitrogen and calcium fertiliser with liming effect for over 100 years. It was introduced into Australia by the German manufacturer Alzchemie AG Germany ([www.alzchem.com](http://www.alzchem.com)) in 1996.

**Growers must not use any unrefined, industrial grades of calcium cyanamide. These non-fertiliser products are not formulated for the safe use on soils and crops; they are not wax coated to suppress dust development. The dust may be a risk to work place safety as it would contain free, carcinogenic carbide, and potentially further toxic substances. Industrial grade products may also lead to crop losses and soil contamination.**

**Always use fertiliser grade products, follow material safety data sheets (MSDS) and adhere to manufacturers' recommendations.**



**Image 1:** Calcium cyanamide provides control of soil-borne diseases, newly germinated weeds, and assists with organic residue breakdown when applied as a fertiliser

### What effect does Calcium Cyanamide Fertiliser have?

#### Effect on soil borne diseases

Calcium Cyanamide Fertiliser offers proven control of clubroot and some species of *Phytophthora*. Research has shown that other organisms causing soil-borne diseases may also be controlled. A preliminary trial in carrots in Western Australia has shown a decline in soil levels of *Pythium sulcatum*, the pathogen causing cavity spot and forking.

Calcium Cyanamide Fertiliser does not act like a soil fumigant with broad spectrum, destructive effect on all soil life. It is well suited to integrated crop protection, nutrient and soil health management approaches.

#### Effect on weeds

The hydrogen cyanamide phase of calcium cyanamide acts only in the top 3 to 4 cm of the soil. It therefore affects most of the weeds that have germinated to that depth and even small weeds up to the 4-leaf stage. Weed seeds located at deeper levels, or weeds propagating by rhizomes, are not adequately controlled.

### Key messages

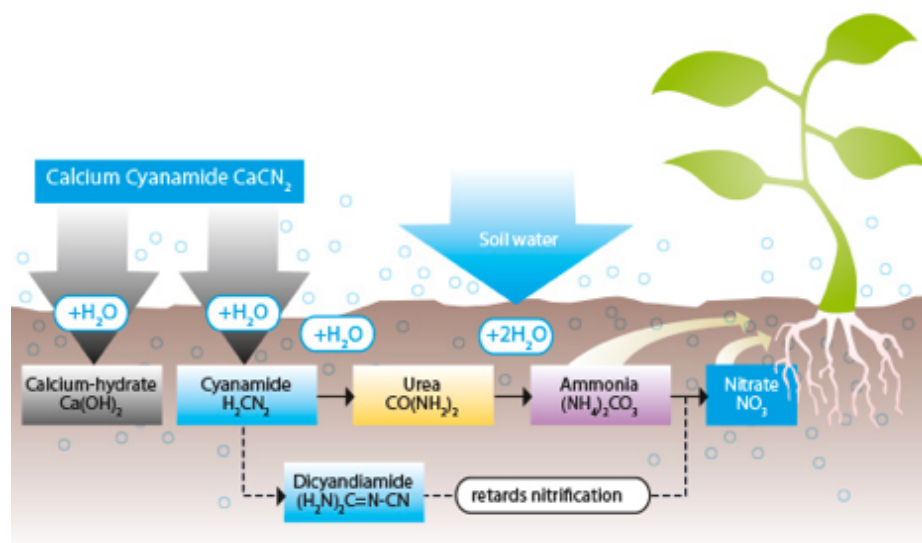
Calcium cyanamide can be used:

- As a non acidifying, slow release nitrogen fertiliser
- To reduce soil borne disease pressure
- To control weeds that have just germinated
- To break down organic matter such as crop residues or compost ingredients.

This fact sheet explains how Calcium Cyanamide Fertiliser works, how to use it in vegetables and how to handle and store it safely.

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**Figure 1:** An illustration of calcium cyanamide's reactions within the soil. (Image from <https://www.alzchem.com/en/agriculture/calcium-cyanamide-perlka/effect>)

### Breakdown of crop residues

Calcium Cyanamide Fertiliser can be used to accelerate the breakdown of crop residues or organic matter including materials for composting because it supplies nitrogen and has a liming effect; its sanitising effect helps suppress weeds and diseases.

### How Calcium Cyanamide Fertiliser works

A few hours after the fertiliser has been applied to the soil, the soil water reacts with calcium cyanamide to form calcium dihydroxide and hydrogen cyanamide (not cyanide). Hydrogen cyanamide is toxic to plants, and has strong fungicidal properties. It can inhibit the growth and sporulation of pathogenic fungi, and unlike cyanide, does not form poisonous gases in the presence of moisture.

Hydrogen cyanamide is completely converted to urea in 7–14 days and, to a certain extent, to dicyandiamide, which is a nitrification inhibitor. Urea in the soil is further converted to ammonium, however the dicyandiamide hinders further breakdown of ammonium to nitrate.

The calcium dihydroxide has a liming effect, and this leads to an accumulation of ammonium nitrogen in the soil before the ammonium can be absorbed by clay minerals, temporarily immobilised by soil microflora or taken up by plants.

This means calcium cyanamide is a slow release form of nitrogen for the crop, and is eventually converted to nitrate (refer to <https://www.alzchem.com/en/agriculture/calcium-cyanamide-perlka/effect> or <http://www.campbellsfert.com.au/> for further information).

### Properties

**Table 1: Chemical properties**

CHEMICAL PROPERTIES	CALCIUM CYANAMIDE
Total nitrogen	19.8%
Nitrate nitrogen	1.8%
Cyanamide nitrogen	>15%
Dicyandiamide nitrogen	approx. 0.5%
Neutralising value (CAO)	>50%

**Table 2: Physical properties**

PHYSICAL PROPERTIES	CALCIUM CYANAMIDE
Appearance and composition	Grey-black granulate
Pouring density	1000 kg/m <sup>3</sup>
Grain size	0.8 - 3.5 mm

### Liming value

The so-called liming value specifies the effect of a nitrogen fertiliser on the lime balance of a soil. If a fertiliser provides more lime than is required to neutralise the acids that are produced when nitrogen is converted in the soil, its lime value is positive. In the opposite case its lime value is negative, which means it reduces the soil's pH. Liming values of different fertilisers is provided in Table 3.

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**Table 3: Liming values of various nitrogen fertilisers including calcium cyanamide**

FERTILISER	LIMING VALUE (KG CaO)	
	PER 100 KG CALCIUM CYANAMIDE	PER 100 KG N
Calcium cyanamide 19.8% N	+ 30	+ 152
CAN calcium ammonium nitrate, 27% N	- 16	- 58
Urea 46% N	- 46	- 100
NPK, e.g. 13-13-21	- 13	- 100
Ammonium sulphate nitrate	- 51	- 196
DAP 18-46	- 37	- 205
Ammonium sulphate 21%	- 63	- 300

### Use in vegetable crops

Calcium Cyanamide Fertiliser must always be used as part of a complete fertiliser and integrated crop protection program. It is high in nitrogen (19.8%) and high in calcium and therefore cannot be just added to existing nutrition programs.

In addition to the general use guides below, the wax coated Calcium Cyanamide Fertiliser may be band placed or blended with other compatible products. Three grades of coated Calcium Cyanamide Fertiliser are available in Australia to meet specific needs. Correct use is vital to achieving the desired results and avoiding crop damage. For further information on specialised uses please contact the supplier ([www.campbellsfert.com.au](http://www.campbellsfert.com.au)) or a nutrition adviser who is familiar with the product, relevant research and specific applications suited to your crops, soils and climate.

**Table 4: Brassica Crops**

WHEN TO APPLY	APPLICATION RATE (KG/HA)	IMPORTANT NOTES
<b>Clubroot infested areas</b>		
Two weeks before sowing or transplanting; to be repeated if necessary	400 - 500	Apply accurately across soil surface by drop or disc spreader. Irrigate immediately to a depth of 10cm or soil field capacity. If possible incorporate to a depth of 5-15cm by rotary hoe or by bed forming operation (adapted from <i>Perlka® Fertiliser Beats Clubroot</i> factsheet from Lefroy Valley)
Two to three weeks after sowing or transplanting	400 - 500*	Only on well-established brassica plants or sown brassica 10 to 15cm high, foliage must be dry (no dew!)
<b>Clubroot-free areas</b>		
Two to three weeks after planting	400 - 500*	Side-dress when plants are dry; the soil should be moist

\* with cauliflower not more than 300 kg/ha, with Chinese cabbage no top dressing.

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**Table 5: Leeks**

WHEN TO APPLY	APPLICATION RATE (KG/HA)	IMPORTANT NOTES
<b>Direct seeded</b>		
Application before seeding	300 - 350	Observe waiting period of 8-14 days
<b>Transplanted</b>		
Before planting	300 - 350	Observe waiting period of 8-14 days; possibly work into the soil to a shallow depth
Top dressing	300 - 400	Approximately 14 days after planting ; calcium cyanamide grains should not be allowed to contact the roots at transplanting. When using row application equipment, calcium cyanamide can also be applied later

**Table 6: Lettuce**

WHEN TO APPLY	APPLICATION RATE (KG/HA)	IMPORTANT NOTES
Before planting	300 - 350	Observe the following waiting periods: in spring: 2 - 2.5 weeks in summer: 1 - 1.5 weeks

**Table 7: Asparagus**

Spread on moist soil and on dry plants. Always spread **before** leaflets have formed.

WHEN TO APPLY	APPLICATION RATE (KG/HA)	IMPORTANT NOTES
<b>In the first year after planting</b>		
Crop stage: between planting and emerging	200	Use a harrow to flatten off the steep slopes of the beds into gentle waves
Crop stage: plants that are one hand high, before they branch out	200	Spread on dry plants but the soil should be moist
<b>In the second year after planting</b>		
After ploughing	300 - 500	Weeds should be growing but not beyond the 4-leaf stage, because in this stage they are particularly sensitive
<b>In the third year after planting and beyond</b>		
After ploughing	300 - 350	Weeds should be growing but not beyond the 4-leaf stage, because in this stage they are not sensitive



## Calcium Cyanamide Fertiliser use in vegetables



**Image 2:** To ensure the efficacy of Calcium Cyanamide Fertiliser, make sure that you follow the guidelines specific to the crop that you are growing

Photo RMCG: SoilWealth soil amendment trial with carrots, Forthside Vegetable Research Station, Tasmania, with Spencer Gibbs, Cradle Coast NRM

### Other crops

**Table 8: Calcium Cyanamide application to other crops**

CROP	APPLICATION RATE (KG/HA)	WHEN TO USE
Peas	200 - 300	1 - 2 weeks before sowing or in the period from when the tips break through until the plant is approx. 10cm tall
Broad Beans	200 - 300	1 - 2 weeks before sowing or after sowing until shortly before the plants emerge
Bush Beans	300 - 400	Before plants emerge
Carrots	300 - 400	2 - 3 weeks before sowing
Spinach	300 - 400	2 - 3 weeks before sowing
Radishes	300 - 500	2 - 3 weeks before sowing
Cucumbers	300 - 500	2 - 3 weeks before laying or planting
Celery	300 - 500	3 weeks before planting
Tomatoes	300 - 500	3 weeks before planting
Rhubarb	300 - 500	Before sprouting in spring

# Calcium Cyanamide Fertiliser use in vegetables

## General application rules

Table 9: Application guide

ITEM	RECOMMENDATIONS
<b>Soil moisture at application</b>	Conversion from calcium cyanamide to urea and then ammonium will only happen when soil conditions are moist i.e. just below or at field capacity
<b>Incorporation depth and method</b>	Normal cultivation depth, can be applied to the top of soil but then nitrogen losses may occur and the effect on diseases and weeds lessened
<b>Conversion and withholding time before seeding &amp; impact of soil organic matter</b>	<p>Conversion usually takes: 2–3 days per 100 kg/ha</p> <p>6–9 days for 300 kg/ha Calcium cyanamide</p> <p>8–12 days for 400 kg/ha Calcium cyanamide</p> <p>10–15 days for 500 kg/ha Calcium cyanamide</p> <p>Use longer withholding periods in light soils, especially if organic matter levels are low</p>
<b>Soil moisture after application</b>	Soil must be kept moist to incorporation depth during the conversion time. If the crop is sown after more days than it takes to convert it (e.g. 2 weeks), keep soil moist for the duration of conversion only
<b>Adjacent crop safety</b>	If there are crops close by that are in a sensitive development stage (e.g. establishment to 5-leaf for carrots), then ensure the crop does not get covered by calcium cyanamide dust
<b>Adjust the N fertiliser program</b>	<p>As with any nitrogen fertiliser, the application rate of calcium cyanamide may depend on the nitrogen requirements of the crop and the nitrogen supply from the soil (residual N from crops or cover crops and mineralisation from organic matter)</p> <p>Calcium cyanamide contains 19.8 % N</p> <p>An application of 300 kg/ha supplies 59.4 kg N/ha</p> <p>500 kg/ha supply 99 kg N/ha</p>
<b>Adjust liming</b>	Calcium cyanamide has a liming effect – refer to the liming value table above
<b>Environmental</b>	Even where chemical pesticides must be omitted in part or entirely, calcium cyanamide may still be used to take advantage of its phytosanitary effects in addition to its effect as fertiliser. In light soils, N may be washed through the root zone – monitoring is recommended
<b>Health and safety</b>	Breathing protection with a fine particle filter must be worn and other precautions applied as per the manufacturers MSDS

# Calcium Cyanamide Fertiliser use in vegetables

## Mixing

Calcium cyanamide can be mixed with other products, but note the following:

- Do not mix it with fertilisers containing ammonium nitrate! This could set off chemical reactions that could make the mixture greasy and result in ammonia loss
- All mixtures should always be stored dry! Cover loose goods with a tarpaulin
- Mixtures with hygroscopic-acting fertilisers should be spread as quickly as possible to avoid lumping
- To ensure an even distribution when spreading a mixture make sure that the mixture components have roughly the same grain sizes and specific gravities.

## Storage

- Calcium cyanamide must be stored dry and protected from damp in a clean area
- Do not store it together with highly flammable and combustible materials and substances
- Store it separately away from fertilisers containing nitrates, and away from substances that are acid and alkaline
- Calcium cyanamide (ground) may only be stored together with ammonium- and ammonium nitrate-containing fertilisers when it is adequately separated from them. Adequately separated means:
  - A minimum distance of 5m when stored loose outdoors
  - A minimum distance of 2.5m when stored loose in a storage room
  - A minimum distance of 1m for packaged products in a storage room (non-reactive substances can be stored in between)
- With loose calcium cyanamide and packaged calcium cyanamide there are no material-related storage problems since the product does not corrode wood, concrete, plastics or steel
- When storing in flat stores the usual precautions for loose storage of mineral fertilisers should be observed (cover with PE film)
- Storage in tower silos is straightforward; as long as damp is prevented from getting in, there should be no bridging and caking
- Transport and interim storage in sloped-bottom containers is also straightforward.