



# LIME SULPHUR INFORMATION

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Winter is the traditional time to prune and spray deciduous fruit trees and vines. Spraying is carried out at this time to eliminate pests and diseases which can overwinter and emerge in spring.

Two separate treatments are usually employed in winter. Oil sprays are often used to control overwintering pest insects, and fungicides are used to treat the many fungal diseases which emerge during the warm, wet spring season.

Lime Sulphur serves both as a fungicide to control certain fungal diseases and also kills overwintering pest insects.

### **What is Lime Sulphur?**

Lime Sulphur is a reddish-yellow liquid with a distinctive rotten egg smell which is soluble in water. It is a mixture of various calcium polysulphides, and its use is accepted in organic gardening as it's made by reacting together elemental sulphur and calcium hydroxide – which is different to garden lime (calcium carbonate).

It's quite alkaline, lime sulphur has a pH of 10.5-11.5, it's considered caustic or corrosive, but to put it into perspective, it's alkalinity is somewhere between milk of magnesia (pH 10.5) which is taken for indigestion and ammonia (pH 12).

At around pH 11, it's three pH points (10x10x10) or 1,000 times less alkaline than caustic soda with a pH of 14.

Either way, avoid contact with skin and eyes, as you would with any garden chemicals.

Lime sulphur is quite an old invention and is possibly the earliest synthetic chemical used as a pesticide. It was originally developed by Grison, the head gardener at the vegetable houses in Versailles, France in 1851 to protect plants against mildews. As such, it was originally known as "Grison Liquid" or "Eau Grison". The first use of lime sulphur for the control of peach leaf curl was in California in 1886.

### **How Lime Sulphur Works**

Lime sulphur acts by killing fungi on contact. It breaks down after it's applied, releasing sulphur. The sulphur is the only part that's toxic to fungi, and it eradicates them through direct contact or through fumigation by sulphur vapours, which can work from a distance.

In simple terms sulphur works with fungi because they absorb it and it interferes with their ability to create energy, it also turns into hydrogen sulphide (commonly known as "rotten egg gas") which poisons them.

In more technical terms, sulphur has two modes of action, impaired electron transport and hydrogen sulphide (H<sub>2</sub>S) formation. Sulphur disrupts the transfer of electrons in the cytochrome system respiratory chain of fungi, depriving the cell of energy, and causing the reduction of sulphur to hydrogen sulphide (H<sub>2</sub>S), which is toxic to most cellular proteins, killing the cell.

Lime sulphur generally prevents plant disease by allowing sulphur to penetrate leaf tissues and kill germinated spores. It is toxic to insects and mites due to hydrogen sulphide formed through reaction of the polysulfide components of lime sulphur with water and carbon dioxide, or put more simply, lime sulphur reacts with the atmosphere to produce hydrogen sulphide ("rotten egg gas") which poisons the pests.

### **Pests and Diseases Controlled with Lime Sulphur**

Lime sulphur can be used to control a range of fungal diseases including Black Spot, Powdery Mildew, Freckle, Leaf Curl, Rust, Shot Hole and Brown Rot, as well as various Scale and Mite pests.

### How to Use Lime Sulphur

Lime sulphur is primarily used when plants are dormant but can also be used as a growing season spray.

Dormant season applications are applied late winter, after frosts have passed and before leaves are present.

Growing season applications can be made when leaves are present but should be applied early morning or late afternoon to avoid leaf burn.

To avoid plant damage caused by lime-sulphur, **DO NOT** spray when:

- temperatures exceed 32°C
- when soil is dry and plants are suffering from moisture stress.
- when freezing weather is expected.
- within 14 days of an oil spray.
- 

When spraying, avoid contaminating waterways and fishponds, do not allow spray to drift onto aquatic environments.

Keep children, pets, wildlife and birds off treated areas until the spray is dry.

Lime Sulphur can be used to controls a range of fungal diseases and pests on apples, pears, stone fruit, citrus, grapes, tomatoes, roses & ornamentals.

There is no withholding period, it's a low toxicity product, so produce can be harvested as required.

It's an ideal winter clean up spray – spray in winter for prebloom powdery mildew control on apples, leaf curl control on peaches and nectarines, and control of scale on stone fruit trees. Spray roses after pruning to control powdery mildew and mites.

### Estimated Quantities.

250mls Lime sulphur makes 5 litres of spray at 20:1 ratio which is enough to spray around 30-40 medium sized bonsai trees.

For winter wash - spray thoroughly making sure to get into all the little crevices in the bark where pests can overwinter and lay eggs.

Try to avoid getting too much onto the soil by covering with a suitable material. A little won't hurt.

Spraying benches and other woodwork can be done with a stronger solution avoiding run off and contamination of ponds etc.

## 3. DANGEROUS GOOD CLASSIFICATION

Not classified as Dangerous Goods by the criteria of the "Australian Code for the Transport of Dangerous Goods by Road & Rail" and the "New Zealand NZS5433: Transport of Dangerous Goods on Land".

## 3. COMPOSITION INFORMATION

CHEMICAL ENTITY	CAS NO	PROPORTION
Calcium polysulfides	1344-81-6	200 g/L
Ingredients determined to be non-hazardous or below reporting limits		Balance
		100%

## 4. FIRST AID MEASURES

If poisoning occurs, contact a doctor or Poisons Information Centre

**Inhalation:** Remove victim from exposure - avoid becoming a casualty. Remove contaminated clothing and loosen remaining clothing. Allow patient to assume most comfortable position and keep warm. Keep at rest until fully recovered. Seek medical advice if effects persist.

**Skin Contact:** Effects may be delayed. If skin or hair contact occurs, immediately remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre or a Doctor; or for 15 minutes and transport to Doctor or Hospital.

**Eye contact:** If in eyes, hold eyelids apart and flush the eyes continuously with running water. Continue flushing until advised to stop by the Poisons Information Centre or a Doctor; or for at least 15 minutes and transport to Doctor or Hospital.

## When to Spray Lime Sulphur

The best times to spray different crops depends on the crop and the pest or disease. As a quick guide:

Stone Fruit such as almonds, apricots, nectarines, peaches, plums are sprayed while trees are dormant, prior to bud swell. It's too late to spray once flowering occurs.

Pomme Fruit such as apples are sprayed during dormancy to late bud swell.

With apples, there are a few precautions to be aware of. Lime sulphur used after late green tip will restrict growth and depress yield.

**Do not** use lime sulphur on Delicious or Cox's Orange Pippin apples. Lime Sulphur used after late green tip stage (period of bud movement when the buds show green tips from the emerging leaves) will restrict growth and depress yield.

Grape Vines are sprayed as near as possible to bud burst.

Roses and many other ornamentals can be sprayed during dormancy as a winter spray, or during the growing season from spring to autumn, make sure to wet the leaves and repeat as required.

Tomatoes and other vegetables can be sprayed during the growing season from spring to autumn, make sure to wet the leaves and repeat as required.

## Sulphur Sensitive Plants

Some plants are sensitive to sulphur and should NOT be sprayed during the growing period when they are in leaf – these include apricots, raspberries, cucurbits, and peaches. Check if plants are sulphur sensitive before spraying during the growing period.

Lime Sulphur or Copper Fungicides?

Lime sulphur is both an insecticide and a fungicide, whereas copper fungicides are just that. Another important consideration is that copper is toxic to plants when there's a lot of it in the soil, and it doesn't break down at all. Repeated seasonal spraying with copper-based fungicides aren't the best for the soil. Never apply copper to strawberries, because severe phytotoxicity (plant toxicity) will result under almost any conditions. Use copper fungicides when the use of lime-sulphur is not advised (and the use of copper fungicide is!), and in those cases, use just enough spray to wet the plant surfaces without runoff.

As a handy tip, some organic gardeners prevent runoff or spray drift by placing newspaper or plastic sheet under the tree being sprayed with copper fungicide to prevent it getting into the soil.

## References:

Lime-sulfur: A fungicide used to control a variety of diseases by Don Janssen, Extension Educator, University of Nebraska–Lincoln, Nebraska Extension in Lancaster County – <https://lanaster.unl.edu/hort/articles/2002/lime-sulfur.shtml>

<https://www.agric.wa.gov.au/fruit/fruit-trees-and-vine-protection?page=0%2C1>

2018 Crop Protection Guide for Tree Fruits in Washington, Fruit and Leaf Injury, Washington State University – [http://www.tfrec.wsu.edu/pages/cpg/Leaf\\_Injury](http://www.tfrec.wsu.edu/pages/cpg/Leaf_Injury)

University of Maryland Extension, Home and Garden Information Center, Fruit – Fungicides – <https://extension.umd.edu/hgic/fruit-fungicides>

Rural Industries Research and Development Corporation – Growing Organic Apples – World class production systems for new Australian apple varieties

This material is hazardous according to health criteria of Safe Work Australia.



### Signal Word

Warning

### Hazard Classifications

Acute Toxicity - Oral - Category 4

Skin Corrosion/Irritation - Category 2

Serious Eye Damage/Irritation - Category 2A

Sensitisation - Skin - Category 1

Specific Target Organ Toxicity (Single Exposure) - Category 3 Respiratory Tract Irritation

### Hazard Statements

H302 Harmful if swallowed.

H315 Causes skin irritation.

H317 May cause an allergic skin reaction.

H319 Causes serious eye irritation.

H335 May cause respiratory irritation.

### Prevention Precautionary Statements

P102 Keep out of reach of children.

P103 Read label before use.

P261 Avoid breathing dust, fume, gas, mist, vapours or spray..

P264 Wash hands, face and all exposed skin thoroughly after handling.

P270 Do not eat, drink or smoke when using this product.

P271 Use only outdoors or in a well-ventilated area.

P280 Wear protective clothing, gloves, eye/face protection and suitable respirator.

### Response Precautionary Statements

P101 If medical advice is needed, have product container or label at hand.

P301+P310 IF SWALLOWED: Immediately call a POISON CENTRE or doctor/physician.

P302+P352 IF ON SKIN: Wash with plenty of soap and water.

P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P312 Call a POISON CENTRE or doctor/physician if you feel unwell.

P330 Rinse mouth.

P333+P313 If skin irritation or rash occurs: Get medical advice/attention.

P337+P313 If eye irritation persists: Get medical advice/attention.

P362 Take off contaminated clothing and wash before reuse.

### Storage Precautionary Statements

P403+P233 Store in a well-ventilated place. Keep container tightly closed.

P405 Store locked up.

### Disposal Precautionary Statement

P501 Dispose of contents/container in accordance with local, regional, national and international regulations.

Poison Schedule: Not Applicable

The following tables are the dilution rates that have worked best for me.  
Remember DO NOT spray in direct sunlight.  
If using the dip method, dip the tree upside down into solution for a few seconds. Remove and place on its side to drip dry.  
Leave spray on the plant to dry.  
Alternatively, During spring and summer months, if you are at all concerned about marks on new leaves, you can rinse it off after 30 minutes with a hose using plenty of water. You may need to re-apply

Plant	Pest or Disease	Dilution Rate	How to apply
Deciduous trees	Treats overwintering pests.	50ml (1 litre) 20:1	Spray or dip. Apply as a winter wash while trees are dormant.
Coniferous trees	Treats overwintering pests.	33ml (1 litre) 30:1	Spray or dip. Apply as a winter wash during dormant period.
Ornamentals & Roses	Rust Two Spotted Red Spider Mite Powdery Mildew	10ml (1 litre) 100:1	Spray from spring to autumn. As required. Do not spray in strong sunlight.
Ornamentals & Roses	Black spot Scale insects	50ml (1 litre) 20:1	Spray or dip during dormancy as close as possible to bud burst.
Tomatoes & Vegetables	Powdery mildew, Tomato mites, Two spot mites, Rust	10ml (1 litre) 100:1	Apply from spring to autumn- Wet leaves and repeat as necessary.
Stone Fruit (Almonds, Apricots, Plums, Peaches, Nectarines)	Leaf curl, rust shot hole, brown rot, bryobia mite	50ml (1 litre) 20:1	Apply while trees are dormant prior to bud swell.
Apples	Blackspot, Pear leaf blister mite, Powdery mildew	50ml (1 litre) 20:1	Apply during dormancy to late budswell. <i><u>Note: Lime sulphur used after late green tip will restrict growth and suppress yield.</u></i>

DO NOT spray on;-  
Cox's apples, Delicious Apples, Raspberries or other Sulphur sensitive plants.

### **Lime Sulphur**

Controls a range of fungal diseases and pests on fruit trees, tomatoes, grapes, roses & ornamentals. No withholding period.

### **Features**

Ideal as a winter clean up spray – spray fruit trees and roses during winter to control hard to kill pests and diseases such as mites and leaf curl.

Low toxicity.

Ingredients

Active constituent: 200g/L Sulphur (S) present as Polysulfide sulphur

### **How to prepare**

DO NOT mix more than needed at time of spraying. DO NOT mix with any other product. Use required amount of Lime Sulphur shown in the table and mix in water.

### **How to use**

Shake well before using. DO NOT spray when temperatures exceed 32°C or when soil is dry and plants are suffering from moisture stress. DO NOT apply when freezing weather is expected. DO NOT apply within 14 days of an oil spray.

### **Caution**

DO NOT use on Delicious or Cox's Orange Pippin apples. DO NOT apply to apricots, peaches or other sulphur sensitive plants during the growing season. DO NOT allow chemical containers or spray to get into drains, sewers, streams or ponds.

### **Storage and disposal.**

Store in the closed, original container in a cool, dry place, out of reach of children. DO NOT store in direct sunlight. Dispose of empty container by wrapping in paper, placing in plastic bag and putting in dustbin.

### **Liability**

This product must be used strictly as directed. The seller will not be liable for any loss or damage arising from a failure to strictly follow the directions for use

### **To preserve deadwood on bonsai.**

If there is green algae present, remove it by scrubbing gently with plain water and an old toothbrush.

Where the deadwood has been freshly created on live parts of the tree, it is best to allow a couple of weeks for the area of newly created deadwood to dry out a little.

Dampen the deadwood before application. This facilitates better and deeper penetration of the lime sulphur solution and speeds up the whitening process.

Apply neat lime sulphur for the first coat on newly created deadwood or deadwood that has been scrubbed clean.

For the second and subsequent coats dilute the lime sulphur 1:1 with clean water.

On deadwood that is already dry, spray a little water onto the deadwood areas to be treated. Allow to soak in.

While the wood is still damp, apply the lime sulphur with a small paintbrush.

(Synthetic bristle brushes will last longer than natural bristles.)

When finished put the tree somewhere that the deadwood can dry completely.

The freshly painted areas will turn white within a few hours or even minutes.