

**NORDOX****Nordox 750 WG Copper Fungicide****750g/kg COPPER (Cu)****present as CUPROUS OXIDE****GROUP M1 FUNGICIDE**

# Copper Fungicide and Nordox Info Sheet

## Copper formulations

There are five common types of copper formulations: copper oxychloride, copper hydroxide, tribasic copper sulphate (green & blue copper), copper ammonium complex (dark blue liquids) and cuprous oxide (red copper).

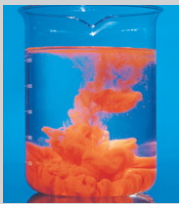
Products are formulated as either wettable powder, wettable granule, flowable suspension or aqueous liquids. Formulations contain between 8% and 75% active copper and application rates vary accordingly.

**Dusty WG formulation****Low dust Nordox 750WG**

## Mixing and handling

NORDOX 750 WG is a dust free 75% wettable granule that is easy to mix. A natural occurring dispersing agent and hollow spherical granules ensure rapid dispersion. There is no need to pre-mix. Directly add to a 3/4 full tank with agitation or wash through the filler strainer when filling.

**NORDOX 750 WG pours and handles like a liquid and can be measured volumetrically.**

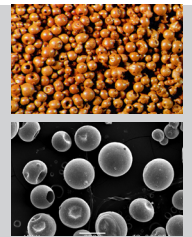


**NORDOX 750 WG is a highly concentrated quality formulation with low label rates.**



**Same amount of copper Hydroxide WG/Nordox 750WG**

**Unique low dust hollow spherical granules are easy to handle and disperse rapidly.**

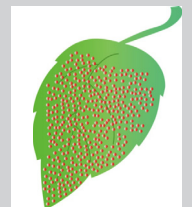


## Mode of action of copper fungicides

Copper fungicides must be applied evenly to the plant surface prior to infection to prevent disease development. They prevent infection by killing bacteria and preventing fungal spores from germinating.

Copper will not control a fungal disease once established. Applied copper stays where it is deposited and does not spread to any great extent across plant surfaces.

**Effective disease control depends on complete coverage and strong retention over all plant surfaces.**



## How copper works

Copper fungicides are most effective on those diseases that need free water present to infect plants. Copper fungicides also need water present on plant surfaces to work. In moist conditions, plant and spore exudates form weak organic acids on the plant surface and reduce the pH of this moisture

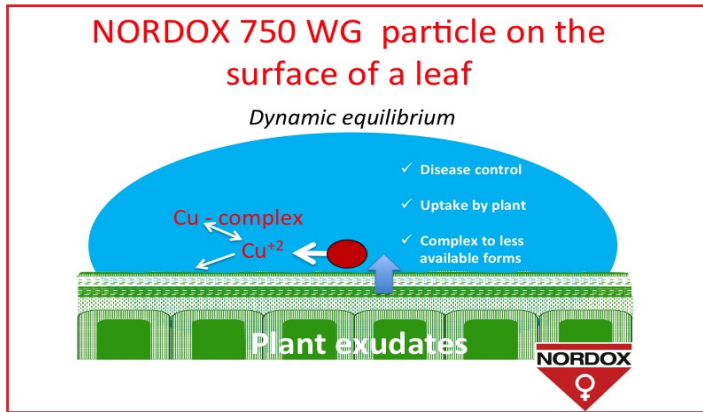
As the pH decreases below 6.5 - 7.0 the solubility of the fungicide increases and copper ions ( $\text{Cu}^{2+}$ ) are released. A small but constant supply of copper ions are released as long as there is moisture present.

Cuprous oxide also releases cuprous ( $\text{Cu}^+$ ) ions that rapidly convert to cupric ( $\text{Cu}^{2+}$ ) ions. Both ( $\text{Cu}^+$ ) and ( $\text{Cu}^{2+}$ ) ions have fungicidal and bactericidal activity. Spores or bacteria coming into contact with this moisture pick up copper ions. Copper ions pass through their cell walls and disrupt cellular enzyme systems. This process is irreversible resulting in death of the pathogen.

Not all of the copper ions released into leaf moisture are taken up by pathogens. Some copper ions are taken up by the plant as a nutrient. Excessive levels of soluble copper ions on a plant can result in reductions in plant vigour and in extreme cases phytotoxic effects such as burning of leaves. The remainder of copper ions on the leaf are rapidly complexed into unavailable forms by the same weak organic acids and compounds responsible for solubilising the relatively insoluble copper fungicide.

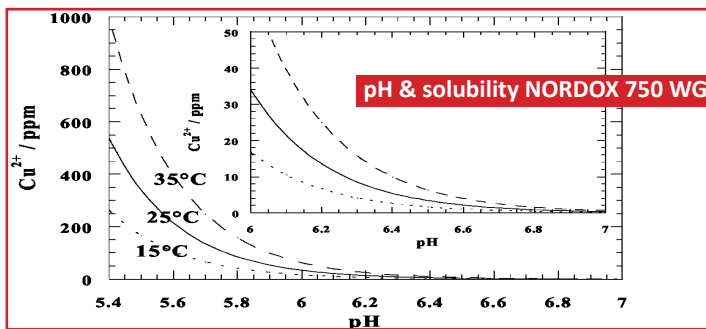
**A dynamic equilibrium of available copper ions is established in the presence of water on the plant surface.**

Fixed copper fungicide is solubilised to release copper ions that kill disease organisms, are taken up by the plant or complexed into less available forms. This process occurs continuously in the presence of moisture.



### Water pH and copper solubility

Most copper fungicides are formulated to be almost insoluble in water at pH 7.0. As pH decreases solubility increases and more copper ions are generated. If the spray water is too acidic (below pH 6) and depending on the solubility of the copper formulation, excessive amounts of copper ions can be generated resulting in phytotoxic damage to the plant.



**NORDOX 750 WG is formulated to be almost insoluble at pH 7.0 providing high crop safety.**

### Formulation and solubility

Hydroxides are more soluble than oxychlorides, which are more soluble than tribasic copper sulphates which are more soluble than cuprous oxide. Less soluble formulations are usually more persistent and safer on fruit and foliage. Other factors such as particle size have a big effect on persistence and efficacy.

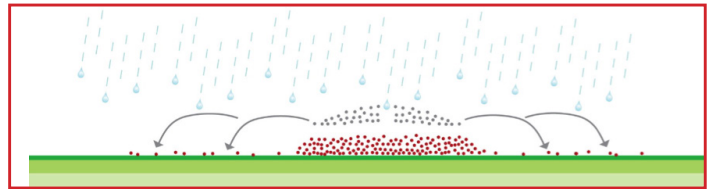
### Persistence of copper on plants

The main factors influencing effective copper retention on plants are:

- Growth dilution (the surface area of lemons increases 14X from fruit set to harvest, whereas expanded leaves only increased slightly).
- Rainfall dislodging larger particles and rain solubilisation.
- Wind (particles over 3-4 microns can be blown off plants).

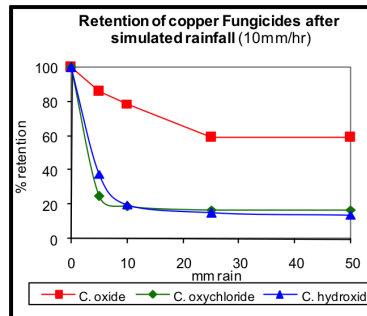
**Particle size is the key to effective disease control and persistence.**

The smaller the particle size, the greater the number of particles per gram resulting in greater fungicidal and bactericidal activity. Smaller particles have a significantly greater surface area available per gram of product. This allows a greater release of copper ions when moisture is present and superior coverage and retention on plant surfaces.



Research has demonstrated that the efficacy of a copper fungicide is considerably improved by reducing particle size. Smaller particles resist dislodgement because they are lighter and have a larger surface area relative to their weight. This greater surface area in contact with the plant gives greater adhesion. The high initial losses from weather arise from the rapid and complete loss of large particles, whilst the remaining residue consists of the remaining small particles.

**NORDOX 750 WG smaller particle size delivers superior retention and efficacy.**



The larger particles in the hydroxide and oxychloride are rapidly lost after a small amount of rainfall.

Typical physical characteristics of common copper formulations.

	% Cu	Size ( Microns)	
NORDOX 750WG	75	<1.0	Red
Hydroxide	35 -50	2.5 - 4.5+	Blue /white
Oxychloride	50 -52	1.8 - 5+	Green / white
Bordeaux	25	3.1 - 6.4+	Blue
Tribasic CuSO4	19	<1.0	Blue
Tribasic CuSO4	20	3.0	Blue

NORDOX 750 WG	
Range in particle size	%
0 - 0.75	15
0.75 - 1.0	40
1 - 2	30
2 - 3	10
3 - 5	5

### Environmental safety

NORDOX 750 WG is manufactured from very pure sources of copper and has low levels of heavy metal impurities.

### Compatibility

NORDOX 750 WG is compatible with most commonly used fungicides, insecticides and miticides. (Always check the label).

### Crop safety

Some copper fungicides can cause a reduction in plant vigour. This is caused by excess copper ions entering the plant. Soluble copper salts can increase initial levels of copper ions to excessive levels causing burning of leaves and blemishes on fruit. This and higher solubility partly explains the marked differences between copper formulations in regard to crop safety.

**NORDOX 750 WG contains no copper chloride and the lower solubility of cuprous oxide makes it particularly beneficial when applying copper to sensitive crops.**

### Organic certification

NORDOX 750WG has certification for use in organic farming.

Tanuki Pty Ltd | [tanuki.com.au](http://tanuki.com.au)  
 +61 7 4639 2009 | [office@tanuki.com.au](mailto:office@tanuki.com.au)  
 27 Heinemann Rd, Wellcamp QLD 4350