



Septoria spot and Anthracnose disease management

Riverina – 22nd April 2021

Dr Nerida Donovan

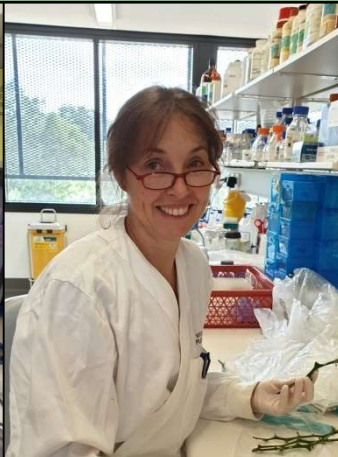
Citrus Pathologist, NSW DPI



Primary
Industries



Citrus Pathology Program EMAI, NSW DPI



NSW DPI Citrus Pathology – research

Prevention

National Citrus Repository Program

Auscitrus propagation scheme

Preparedness and management of huanglongbing to safeguard the future of the citrus industry in Australia, China and Indonesia

Detection

Improving diagnostics and biosecurity for graft-transmissible citrus diseases

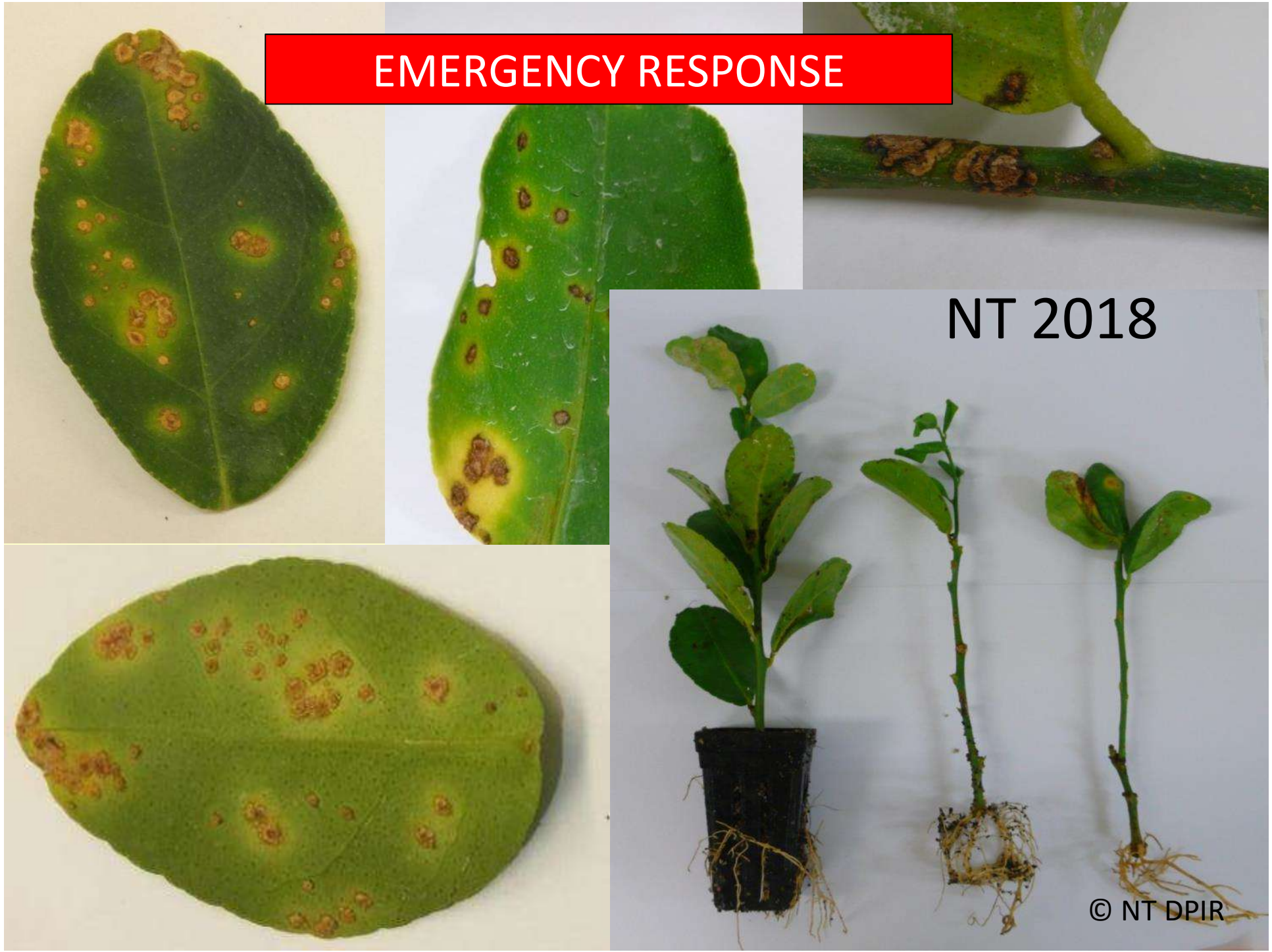
Improving preparedness of the Australian horticultural sector to the threat potentially posed by *Xylella fastidiosa* (a severe biosecurity risk)

Horticulture

Evaluation of new rootstocks for the Australian citrus industry

National tree crop intensification in horticulture – impact of viroids

EMERGENCY RESPONSE



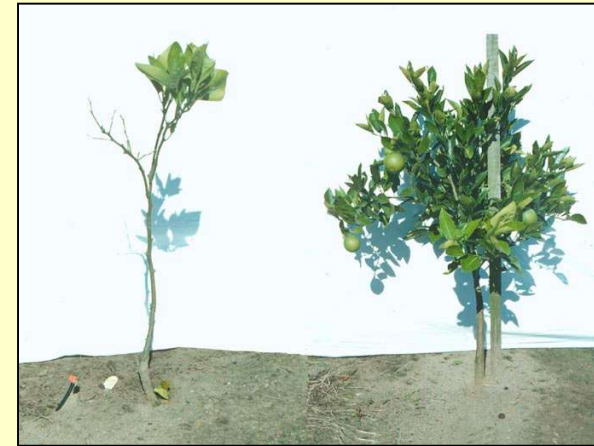
NT 2018

Graft-transmissible diseases



reduced
yield and
quality

stunting



TREE DEATH



Graft-transmissible diseases



reduced
yield and
quality

NO CURE



TREE DEATH

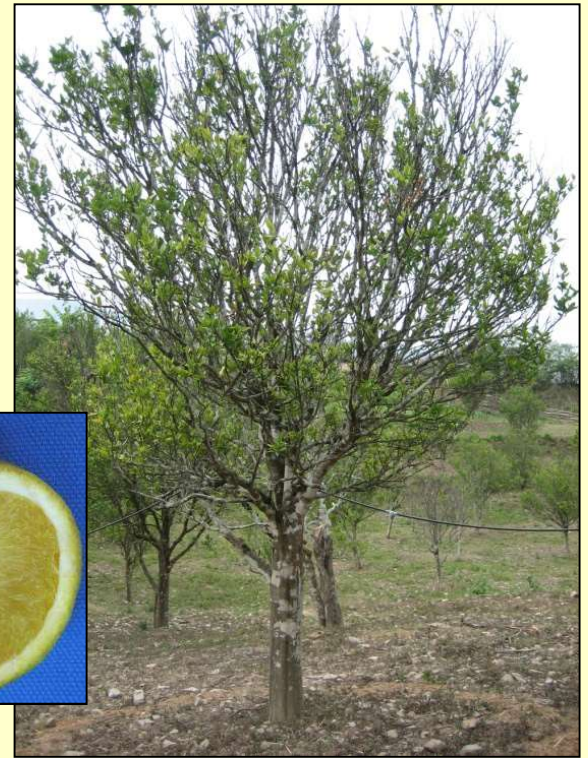




Asian citrus psyllid



HLB





Auscitrus supplies citrus budwood and rootstock seed that is:

- true to type
- healthy

Make sure your nursery plants are from Auscitrus tested material

Septoria spot

Septoria spot

Fungus: *Septoria citri*

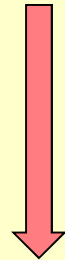
Infection commonly occurs in late summer / autumn after damp weather when fruit is still green

The fungus then remains dormant in the fruit until cold weather (particularly frost) allows it to develop as the fruit colours in late winter and early spring

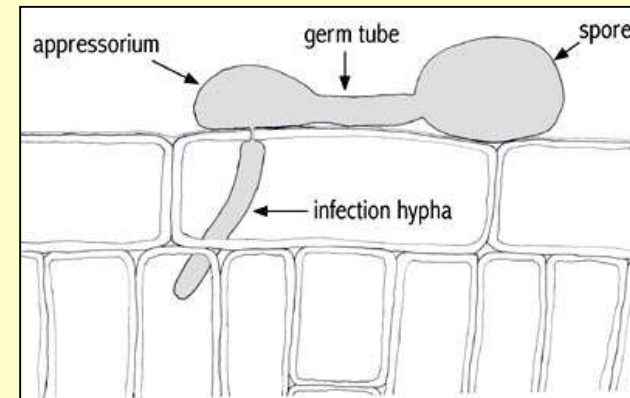
Symptoms are generally more severe on the south-west and south-east sides of trees

Septoria spot

autumn
infection

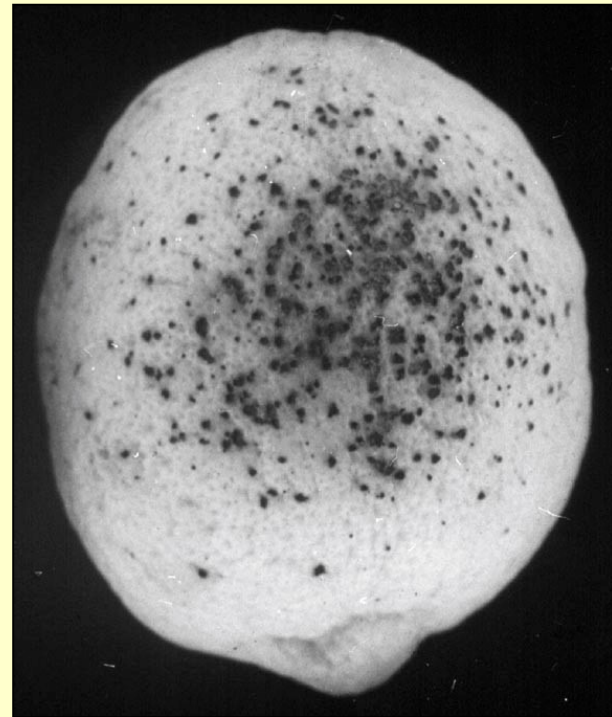


late winter / spring
symptoms appear



Septoria spot - symptoms

Symptoms appear in winter as small, round pits / depressions 1-2 mm in diameter, that extend no deeper than the flavedo
Pits are light tan with a narrow greenish margin, becoming reddish-brown as the fruit matures



Septoria spot – symptoms

Small black fruiting bodies may be produced in the lesions

Spots may enlarge and coalesce to form brown to black blotches during storage or if over-mature on the tree



Septoria spot – symptoms

Lesions on leaves are small raised, blister-like black spots with a yellow halo



Septoria spot – management

Apply copper fungicide sprays to canopy in autumn

Additional applications needed in high rainfall seasons

Prune tree skirts – improve air movement

Use frost protection

Maintain tree health

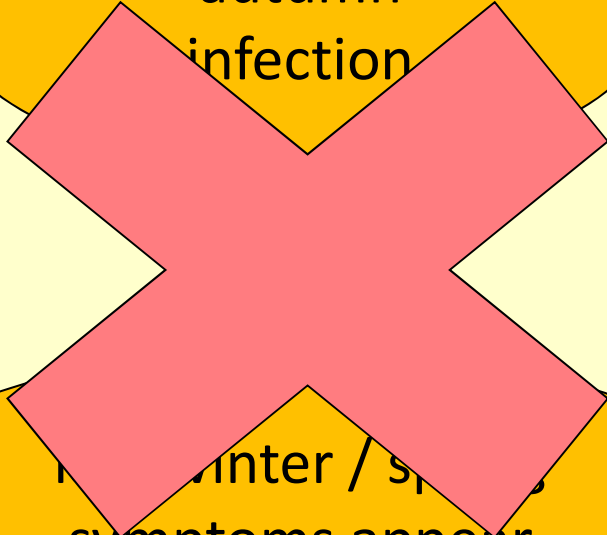
Don't leave fruit to hang on tree for too long

Destroy fallen leaves and fruit

spray before
autumn rains

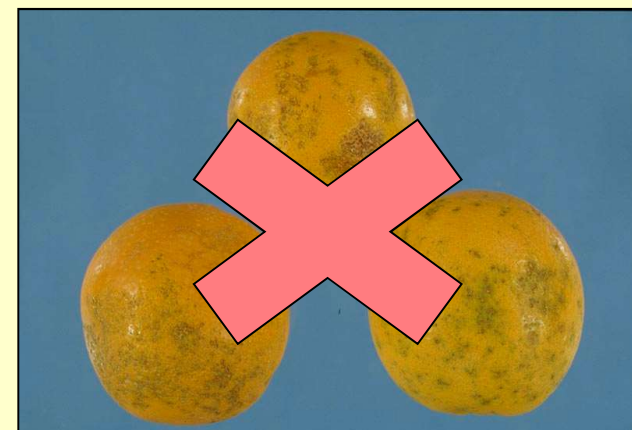
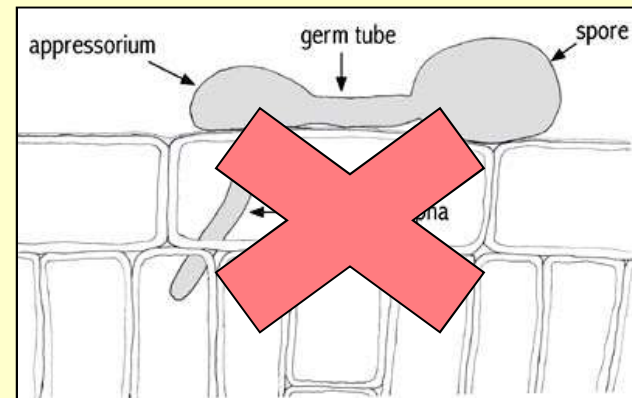


autumn
infection



winter / spring
symptoms appear

Septoria spot



Anthracnose

Anthracnose

Fungus: *Colletotrichum gloeosporioides*

Spores found throughout canopy, abundant on dead wood

Secondary invader of:

weakened tissue – physical injury, heat, cold

over ripe fruit

fruit held too long in storage

early season fruit after degreening

Anthracnose

Superficial red brown discoloration on fruit rind
can be tear staining



Anthracnose

Firm, sunken brown to black spots



Anthracnose - management

Prune trees to remove dead wood

Apply copper fungicide spray in autumn – 2nd spray if late harvest

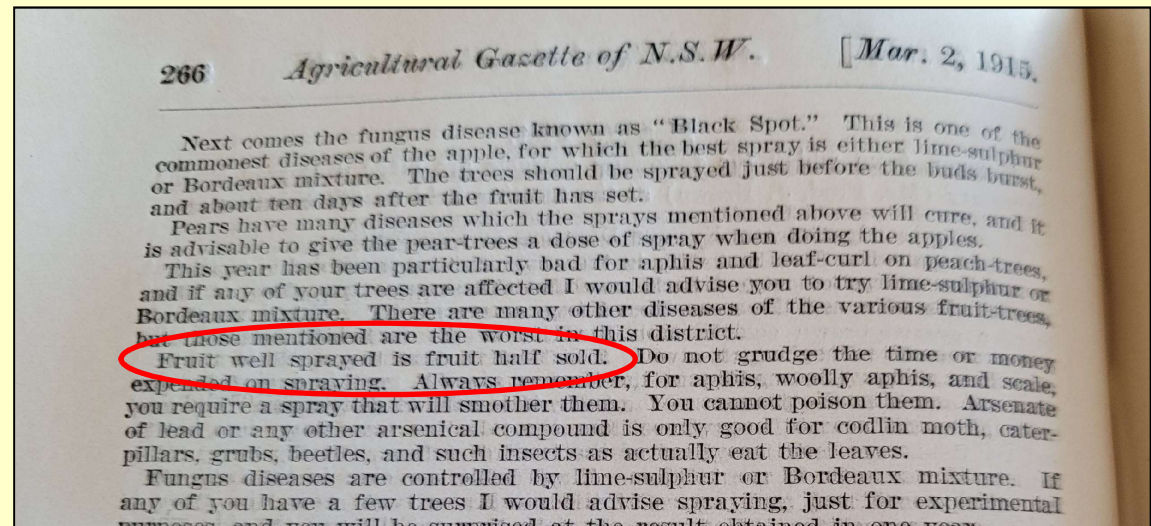
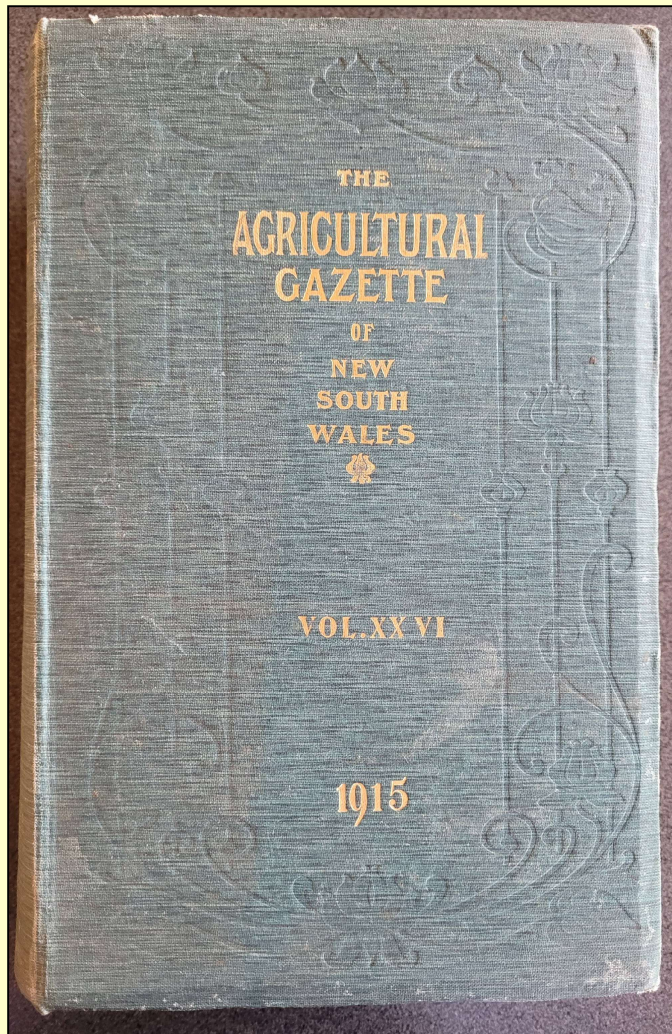
Avoid picking immature fruit to reduce the need for degreening

But, if rind starting to senesce, don't leave fruit on tree

Do not pick, pack or degreen wet fruit

Take care during and after harvest to reduce injury

Store fruit at optimum temperature



Fruit well sprayed is fruit half sold

Using copper sprays

Copper sprays

Copper sprays can protect foliage and fruit from fungal infection

Successful disease management depends on

even distribution

good retention

of copper over all of the plant surfaces

How does copper work?

When water is present on the plant's surface (rain, dew, irrigation), chemicals produced by the plant form weak acids, lowering the pH of the surface water.

As the pH drops, the copper slowly dissolves to release copper ions.

When fungal spores or bacteria contact the surface water containing copper ions, the ions travel through the pathogens' cell walls and disrupt cellular enzyme activity.

How does copper work?

Over time, copper coverage declines due to

- leaf and fruit growth
- action of rain and wind

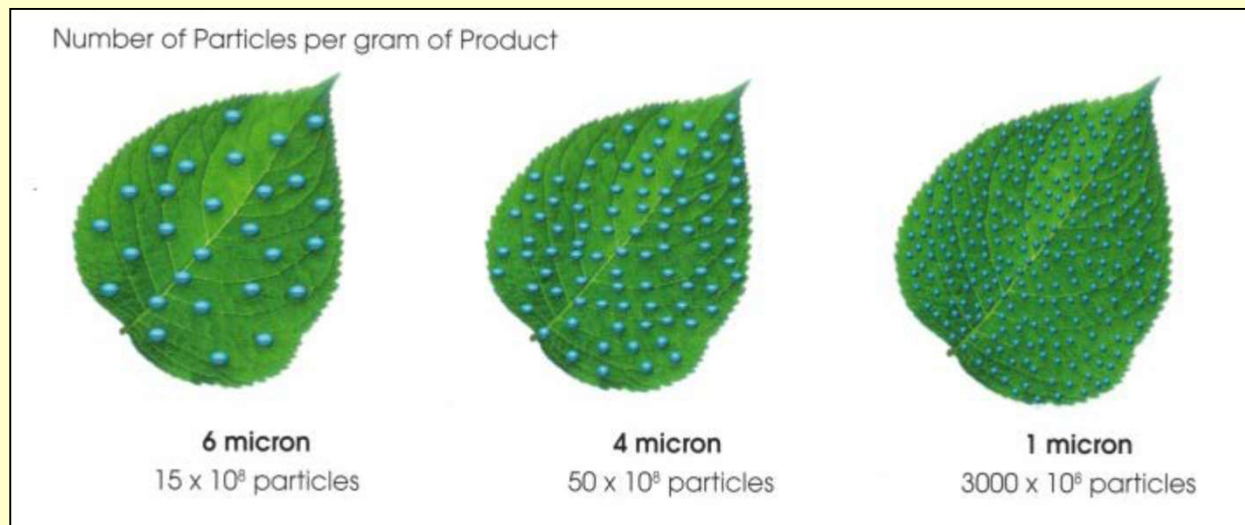
More frequent copper sprays are needed:

- if in a high rainfall area
- if the season has higher than normal rainfall
- where overhead irrigation is used

Efficacy of copper products

Smaller particle size

- increases leaf coverage
- improves retention
- improves longevity
- improves disease management



Using copper sprays

Frequent applications at lower rates are more effective than the same amount of copper applied in fewer applications.

Use a good-quality copper formulation.

Always follow the product label recommendations.

Excessive water rates result in spray runoff, wasting spray and contaminating soil.



CRI International

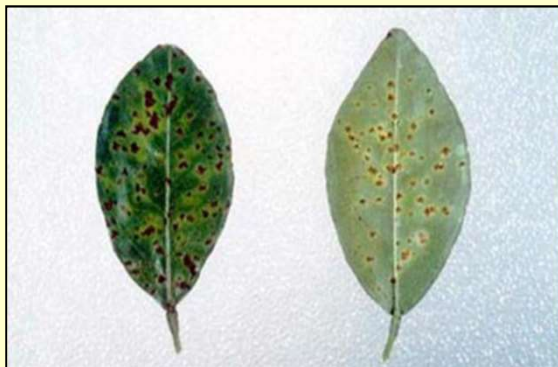
Copper spray damage

If the water or spray solution is too acidic (i.e. pH <6.5), excessive amounts of copper ions may be released, burning the plant tissue.

Copper damage = dead (necrotic) spots between oil glands.

Copper sprays may also darken existing blemishes e.g. wind.

Don't apply copper when fruit or leaf temperatures are high, humidity is high or the fruit is wet.



Using copper sprays to control diseases in citrus

April 2017 Primefact 757 second edition
Agriculture NSW

Copper-based fungicides can be used to manage coastal diseases such as melanose, citrus scab, *Alternaria* brown spot and citrus black spot, as well as greasy spot, brown rot and *Septoria* spot, which are also found in southern inland growing areas.

Warm, humid conditions favour a range of citrus fungal diseases. In Australia most disease-management programs rely on copper sprays to protect the foliage and fruit from infection. Successful disease management depends on both an even distribution and good retention of copper over all of the plant surfaces.

Septoria spot is a fungal disease of southern inland areas that can be managed by protectant copper sprays



How copper works

Copper sprays are protectant fungicides that must be applied evenly to the plant or fruit surface before the disease develops to prevent infection. Copper is not a systemic chemical and cannot be carried internally through the plant to kill the pathogen. Once the copper is applied it sticks only where it hits and does not spread to a large extent across the fruit or leaf surface.

It's no coincidence that copper is most effective on those diseases that need free water to develop. When water is present on the plant's surface (from rain, dew or irrigation), exudates from the plant form weak acids, lowering the pH of the surface water. As the pH drops, the solubility of the copper product increases, slowly dissolving to release a small and constant supply of copper ions. When fungal spores or bacteria come into contact with surface water containing these copper ions, the ions travel through the pathogens' cell walls and disrupt cellular enzyme activity.

Over time, the coverage of copper over the plant or fruit surface declines because of leaf and fruit growth.

Rain and wind action also erodes the copper coverage over time. In areas of high rainfall, copper fungicides offer a shorter period of protection than in dry conditions. More frequent reapplication of the protective copper layer is thus needed in coastal locations or subtropical regions. Frequent reapplication may also be required where overhead irrigation is used.

Copper formulations

The five basic copper formulations available for disease management are copper oxychloride, copper hydroxide, tribasic copper sulfate (green and blue coppers), copper ammonium complexes (a dark blue aqueous complex of copper and ammonia) and cuprous oxide (red copper).

In the past, most copper products were wettable powders and contained about 50% copper as the active ingredient. However, today's formulations contain from 8% to 75% copper and application rates vary accordingly. Products are formulated as wettable powders, water-dispersible granules, liquid flowable suspensions or aqueous liquids.

Summary

	Septoria spot	Anthracnose
Cu spray	canopy	canopy
1 st Cu spray	before autumn rain	autumn
Prune	canopy	canopy
Infection	late summer / autumn	injured tissue
Symptoms	late winter / early spring	

The diagnostic process

If possible, speak to a plant pathologist

Send photos – environment + problem

Ask what to send and how to send it

The RESULT may not be the ANSWER

PRIMARY CAUSE vs SECONDARY INVADER