

## Tech Note

# Sulphur as an Alternative to Copper as a Bactericide

March 2008

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Bacterial Canker (*Pseudomonas syringae*) is a serious disease in a number of crops including stone fruit, and affects both the tree health and the fruit.

Bacteria are effectively controlled by low rates of copper. Copper is a useful product in that its application both controls both fungal and bacterial diseases.

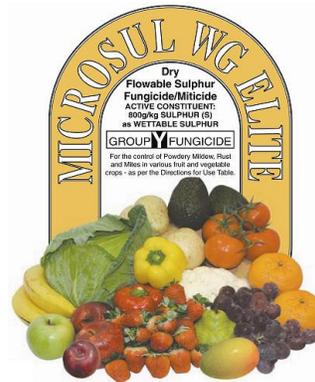
Over-use of any product is not the best management option. Copper treatments have been a traditional means of bacterial control and hence and it is now time to search for alternative treatments.

Research originally out of NZ points to sulphur in combination with coppers at lower rates is a possible alternative to copper for bacterial control. There are however a few cautionary notes to be observed:

- Crop sensitivities have not been established
- Varietal differences/ sensitivities within each crop have not been examined.
- Hot temperatures. Refer to copper and sulphur labels.

For this reason extreme care ought to be applied if spraying sulphur is considered.

Sulphur is also an essential nutrient for plant growth and some soils are deficient, so foliar applications are useful from both a disease management point of view and that of nutrition.



## Trials.

<b>Timing and Rate of Application</b>				
	13 & 25 Sept; 8 & 17 Oct	4 & 18 Nov 2 & 16 Dec	6 & 20 Jan 3 Feb	% fruit without symptoms
<b>2002/ 3</b>				
Cuprous oxide	19.5	-	-	65.6
Copper oxychloride	15	-	-	61.6
Copper hydroxide	10.5	-	-	61.7
Copper hydroxide	-	10.5	-	56.5
Copper hydroxide	-	-	10.5	54.6
Copper hydroxide + sulph	10.5+80	-	-	98.5*
Sulphur	140	-	-	92.9*
Untreated	-	-	-	59.5
LSD (P=0.05)				10.8

Acknowledgement: HortResearch: Dr Gillian McLaren

<b>Timing and Rate of Application</b>				
	10 & 25 May	13 & 31 Aug	21 Sept; 4 & 18 Oct 2 Nov	% fruit without symptoms
<b>2004/ 5</b>				
Sulphur	140, 160	-	-	85.9
Sulphur	140, 160	160, 140	-	91.2
Sulphur	140, 160	160, 140	140, 140, 140, 140	91.6
Sulphur		160, 140	140, 140, 140, 140	98.9*
Sulphur			140, 140, 140, 140	90.7
Sulphur on ground	140, 160	160, 140	140, 140, 140, 140	86.5
Copper hydroxide	40, 66.5	-	-	79.3
Copper hydroxide	40, 66.5	66.5, 40	-	89.4
Copper hydroxide	40, 66.5	66.5, 40	10.5,10.5,10.5,10.5	84.5
Copper hydroxide	-	66.5, 40	10.5,10.5,10.5,10.5	75.5
Copper hydroxide	-	-	10.5,10.5,10.5,10.5	73.6
Untreated	-	-	-	76.0
LSD (P=0.05)				16.3

Acknowledgement: HortResearch: Dr Gillian McLaren

### **Note:**

August = Late dormant to early bud movement  
 Early September = Bud swell  
 Mid September = Full bloom  
 Early November = Stone Hardening

*“This series of trials has clearly demonstrated that foliar sulphur is effective at reducing symptoms of bacterial damage on nectarine fruit”*

*“Possible phytotoxicity was avoided by applying sulphur and/ or copper during the growing season at rates lower than those used on dormant trees”*

*“All applications of sulphur and copper were applied at the recommended time and at label rates in Autumn and the late dormant stage, but there is no label claim for the use of copper over the growing season”*

Ref: Fruit Disease Management. Sulphur as an Alternative to Copper for the Control of Bacterial Blast on Nectarine Fruit

Recognizing bacteria are more sensitive to fungi, the application of copper - lower than the usual recommended rates - was used. This reduced the possibility of phytotoxicity.

- Replicated trials showed that there was significant reduction in pseudomonas when sulphur was applied as a foliar spray.
- Application: at 14 day intervals between flowering and shuck fall (Sept/ Oct).
- Sulphur was not effective when sprayed during autumn.

The copper + sulphur mix was the most effective in the 2002/ 03 trial.

Having examined this detail I can see a fit for both copper and sulphur in the treatment of bacterial disease. This is a program we will be exploring.

1. 75-100% leaf-fall through to July  
Coppox® WG @ 2.5kg/ Ha
2. August  
Coppox® WG @ 2kg/ Ha + Microsul® WG Elite @ 1.75kg/ Ha
3. September (within a week of bud opening)  
Coppox® WG @ 2kg + Microsul® WG Elite @ 1.75kg/ Ha
4. Post bud opening to mid/ late October  
Coppox® WG @ 150-500g/ Ha - follow directions on Coppox® WG label + Microsul® WG Elite @ 1.4kg/ Ha

This tech note is designed as food for thought but is not a recommendation. This concept requires further trial work on a range of stone fruit.