



## Technical Note

# Do Copper Products Play a Role in Frost Protection?

### Report One:

*A grower in the Northern Wheatbelt of Western Australia sprayed his wheat with Coppox® for copper deficiency. He was half way through his paddock when his spray vat ran out, and he didn't bother to finish the rest. A couple of nights later there was a frost, and the difference between the sprayed area and non-sprayed was phenomenal...*

### Report Two:

*Two different vine grower in Strathalbyn, SA – applied an early spray of copper (for an unrelated reason), when a frost occurred. Losses in the district were substantial – with the exception of the two growers who had applied the early copper sprays.*

It is believed, that the reason for such a response is due to Ice nucleating bacteria (*Pseudomonas syringae*, *Erwina herbicola* and *Pseudomonas fluorescens*), which have been reported on a number of different crops, such as [certain varieties of] citrus, vines, olives, avocados, tomatoes, cherries, and wheat.

In the case of frost, these bacteria will freeze first – on the surface of the plant. The plant tissue itself does not actually freeze until the temperature reaches around  $-2^{\circ}\text{C}$  to  $-4^{\circ}\text{C}$  (depending on the crop).

Ice nucleating bacteria can be controlled with protectant copper products. The rates of use for bacterial control are significantly lower than fungal control, as bacteria are more susceptible to copper.



Copper based products are both fungicidal and bacterial, and therefore have the ability to destroy bacteria such as pseudomonas. Controlling these (pseudomonas) Ice Nucleating Bacteria has some affect in protecting the plant when temperatures drop – and frost damage occurs.

If temperatures drop further (to below  $-2^{\circ}\text{C}$  and  $-4^{\circ}\text{C}$ ), damage will occur irrespective of the application of the copper spray.

It is also important to note, that adequate time must be given between application and the frost – so that the ice-nucleating bacteria can be destroyed (as per the directions for use – for all copper control). Copper – as is the case with all pesticides – should not be applied to stressed plants, including during freezing conditions.

It can therefore be inferred that copper products can play a role in protection against frost damage. Certainly, it should be considered in a frost-management system.

These observations are theory at this stage, and should not be construed as a claim. We will be monitoring such events and would certainly appreciate any information or experiences you have had – either now or in the future.

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