Cooperative Research Centre for Viticulture

SUMMARY REPORT

Survey of copper levels in Australian vineyard soils

INTRODUCTION

Copper-based fungicides have been used in vineyards throughout the world to control downy mildew for many decades.

However, it is known that use of such fungicides can result in an accumulation of copper in surface soils, e.g. concentrations from 130–1280mg/kg have been reported in European vineyards.

Reports vary on the concentrations of copper that are potentially harmful to soil organisms. Values reported to be harmful vary over a very wide range from 53–1000mg/kg. Should such harmful effects occur, there could be negative impacts on key soil processes such as nutrient cycling and breakdown of litter.

There is little published data reporting concentrations of copper in vineyard soils. As a result, an Australia-wide survey was undertaken to:

- assess the extent and magnitude of copper accumulation in Australian vineyard soils; and
- provide an indication of the likely risks, if any, that copper accumulation may pose to the long-term sustainability of vineyards in Australia.

THE SURVEY

Ten viticultural regions of Australia were invited to participate in the survey, with 7–13 vineyards included in the survey for each region, resulting in a total of 98 vineyards surveyed.

The objective for each region was to survey vineyards with the greatest potential for high copper concentrations (i.e. vineyards situated on heavy soil, such as clay, which have accumulated copper for at least 30 years from fungicide sprays), because it is preferable to overestimate than underestimate risk.

In each vineyard, surface soil (10cm depth) was collected from the undervine area at 10 locations. These sub-samples were combined to obtain a composite sample for each vineyard.

Soil samples were analysed for total copper concentrations.

Soil samples were also collected from two or three different areas of remnant vegetation (i.e. no artificial inputs of copper) in each region to provide an indication of background concentrations of natural copper.

Information on copper-based fungicide usage (i.e. years of use, annual applications) was also collected for each vineyard.

FINDINGS

Almost all vineyards surveyed (96%) had elevated concentrations of copper in soil compared to the background concentration (typically no more than 20mg/kg) in their region.

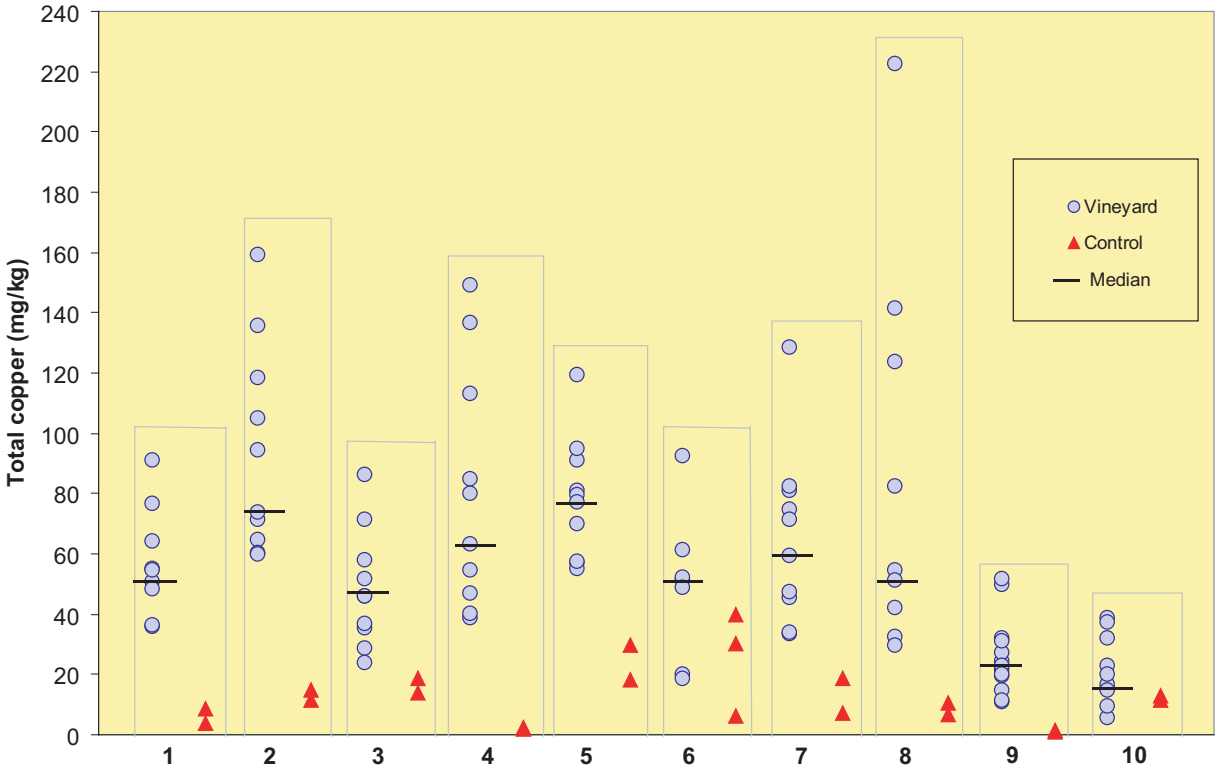
While copper concentrations were generally much lower (6–160mg/kg) than those reported in European vineyard soils (i.e. 130–1280mg/kg), the use of copper-based fungicides is associated with some copper accumulation in Australian vineyards.

In general, copper concentrations increased with increasing total amount of copper applied, soil pH, soil salinity, and exchangeable sodium and calcium.

Further research is now needed to assess the bioavailability of the copper to key soil organisms and whether there may be associated impacts on soil health.

The range of total copper concentrations (mg/kg) detected in the surveyed vineyards are detailed in the graph over the page.

Figure 1
Range of total copper concentrations (mg/kg) detected in vineyards and control location for each region.



FURTHER INFORMATION

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