

Reductive development of white wine during bottle aging: Time-line of protection from specific Cu fractions



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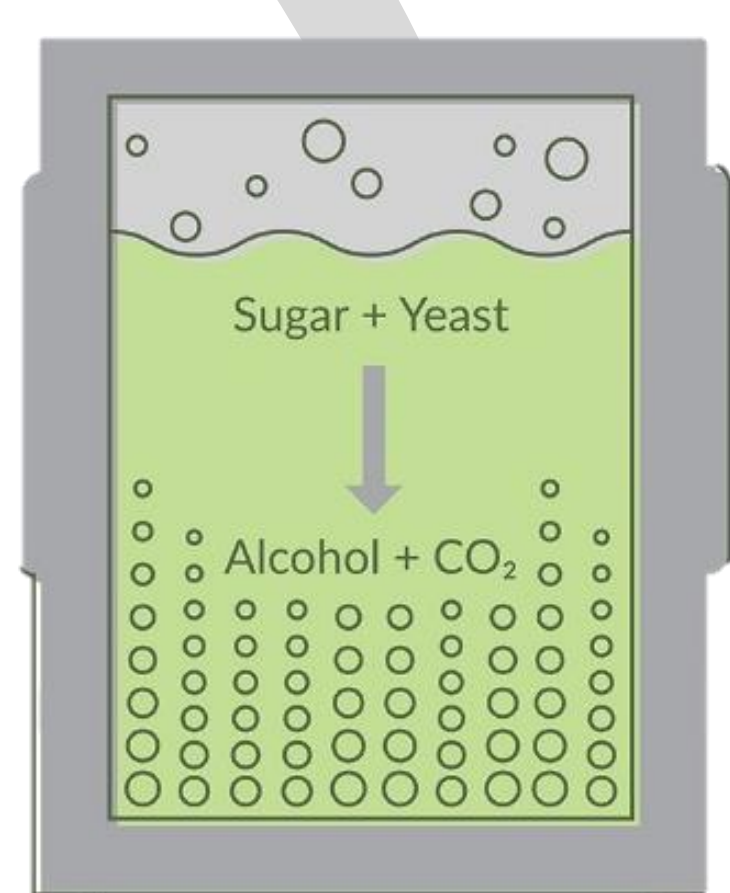
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COPPER IN WHITE WINE

Cu Fraction & Determination	Attributed Forms	Wine Implication
Cu fraction III (Cu F3) Cu fraction III = Total Cu – (Cu fraction I + II) total Cu measured by ICPOES or colorimetry	sulfide-bound Cu 'inert' Cu(I)-thiol Cu(I)-thiol	sulfhydryl-bound Cu Suspended particles in wine (size < 0.2 μm) Not aroma active.
Cu fraction II (Cu F2) Cu fraction II = (Cu fraction I + II) – Cu fraction I Cu fraction I & II measured by colorimetry	Cu(I)-thiol	sulfhydryl-bound Cu Not aroma active.
Cu fraction I (Cu F1) directly measured by colorimetry or electrochemistry	Cu(II)-organic acid	non sulfhydryl-bound Cu Inhibits free H ₂ S and lowers free thiols.

METHOD

Chardonnay & Pinot Grigio
2019, NSW, Australia



- analysis:**
- SO₂
 - H₂S
 - Cu fractions
 - Sensory (Pivot® Profile)



bottle ageing for 12-14 months (14 °C, in dark)



bottling + Cu(II) at 0 & 0.3 & 0.6 mg/L

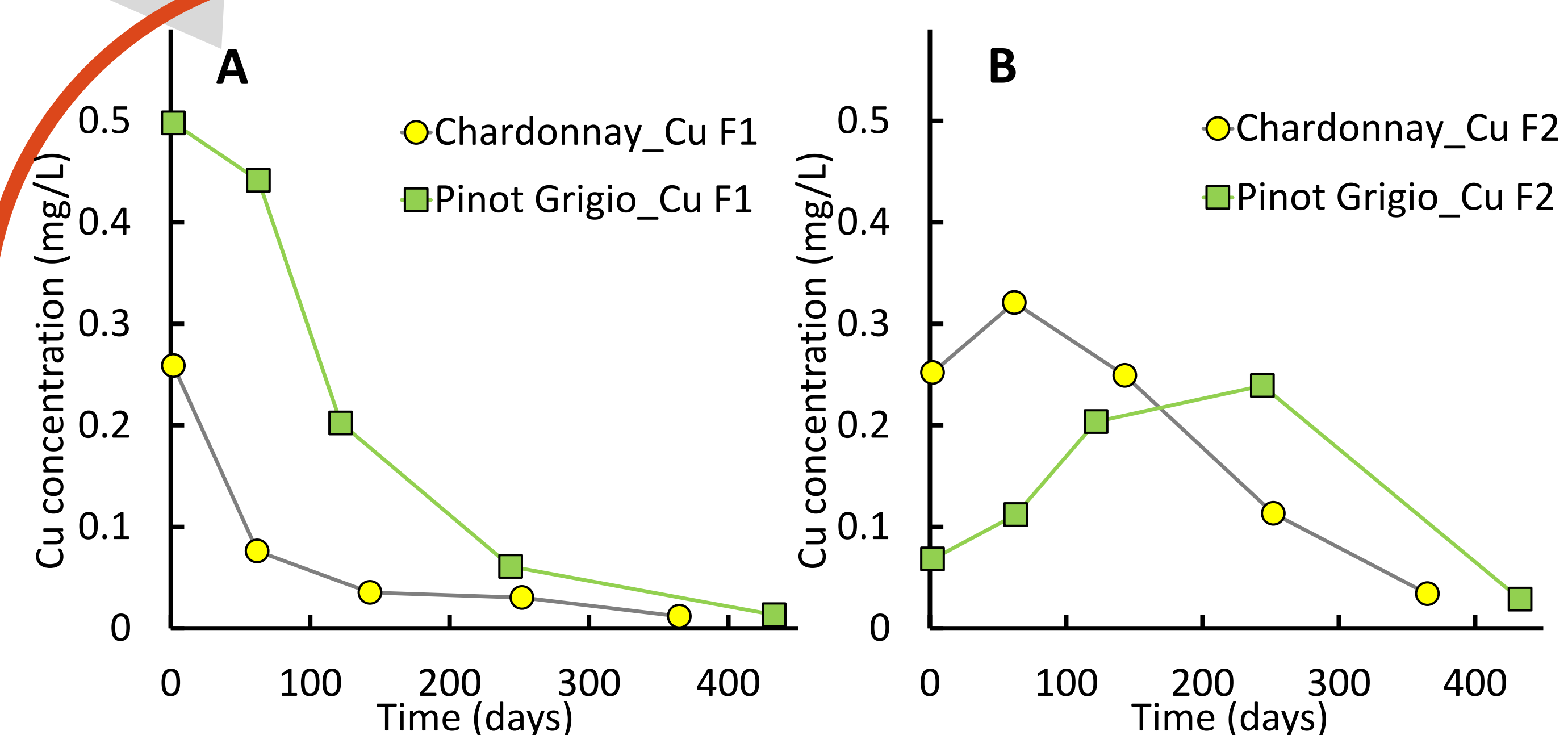


Figure 1. The concentrations of Cu fractions I (A) and II (B) in Chardonnay and Pinot Grigio wines. Data from 0.6 mg/L Cu(II) treated wines.

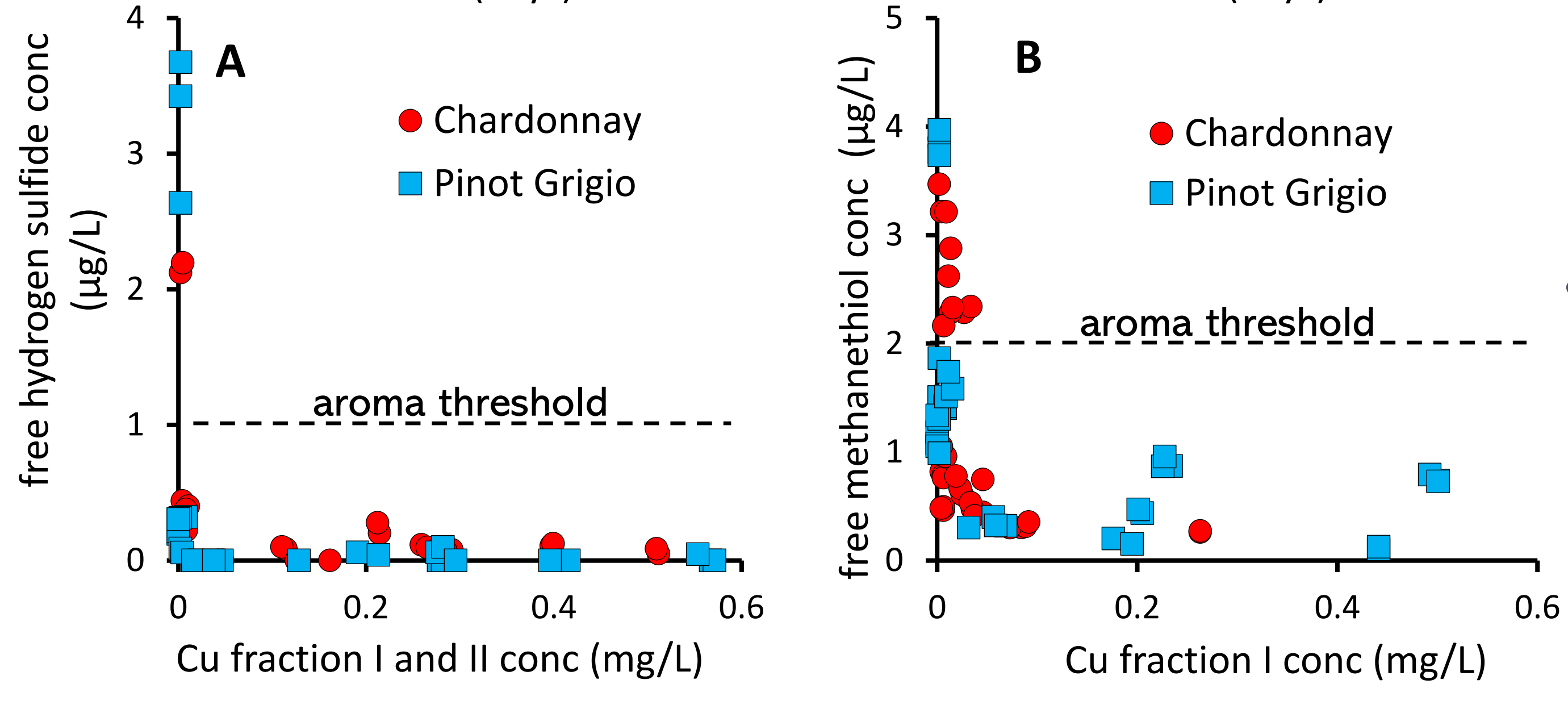
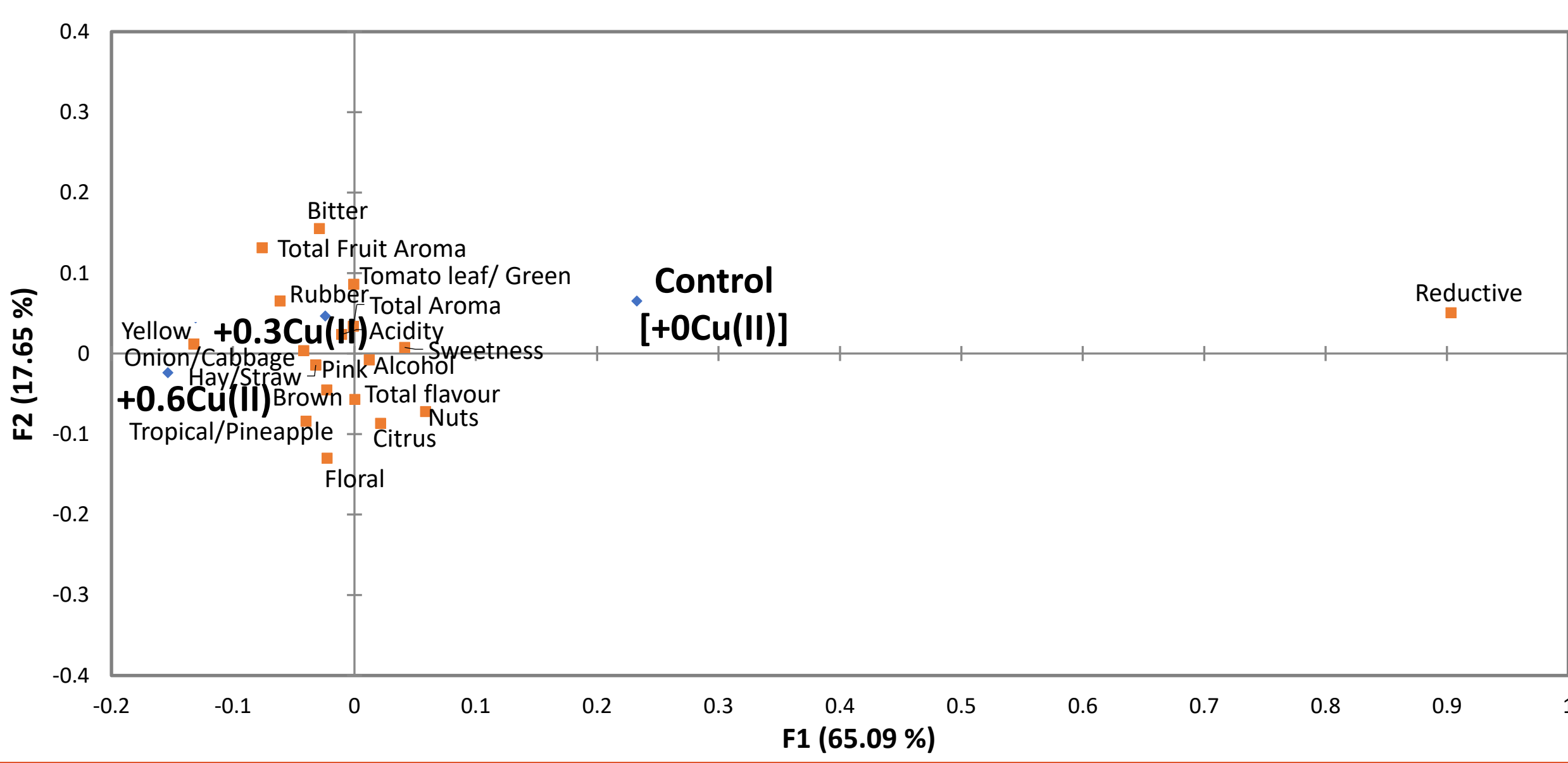


Figure 2. Concentrations of free H₂S (A) and free MeSH (B) in all Chardonnay and Pinot Grigio wines versus Cu fraction I concentrations (B), and the combined Cu fraction I and II concentrations (A).

Figure 3. Correspondence analysis of biplot for the sensory data of Pinot Grigio after 12 months of bottle ageing. The Chardonnay wines showed a similar result.



- ### RESULTS
- Cu fraction I: decreased immediately after bottling.
 - Decay rate of Cu fraction I was wine dependent.
 - Cu fraction I & II remained in wine until 8 months after ageing.
 - Free H₂S: suppressed by Cu fraction I + II concentration > 0.015 mg/L.
 - Free MeSH: suppressed by Cu fraction I concentration > 0.035 mg/L.
 - No free H₂S and MeSH accumulated above aroma threshold in any Cu treated wines.
 - Sensory panel assessed Cu treated wines as having less reductive character than the control wines after 12 months bottle ageing.

- ### CONCLUSIONS
- Cu fraction I & II:
- suppress reductive aroma;
 - protect wine for significant period of bottle ageing time.