

# New insights on how white and red wine composition affects cold instability

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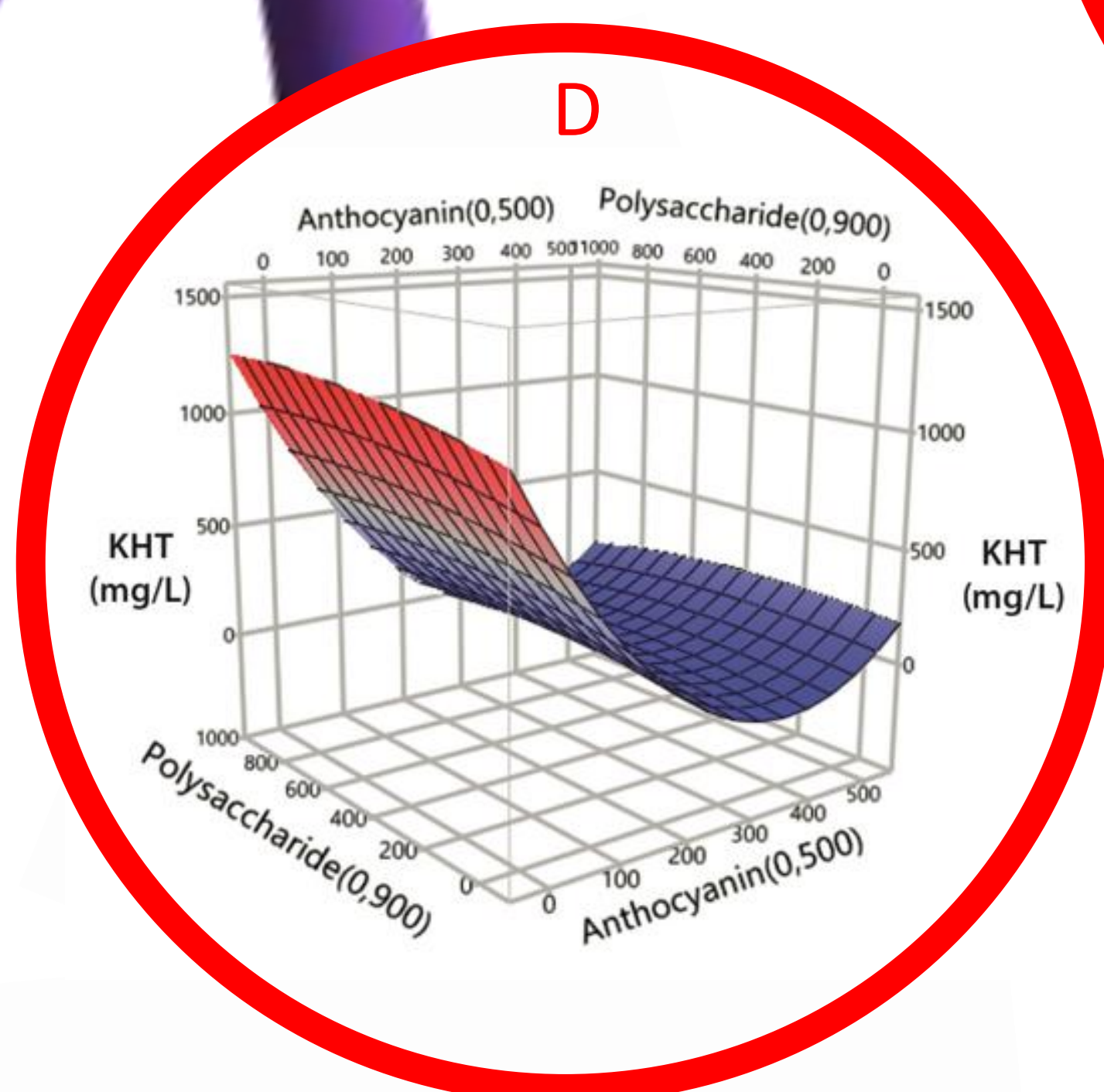
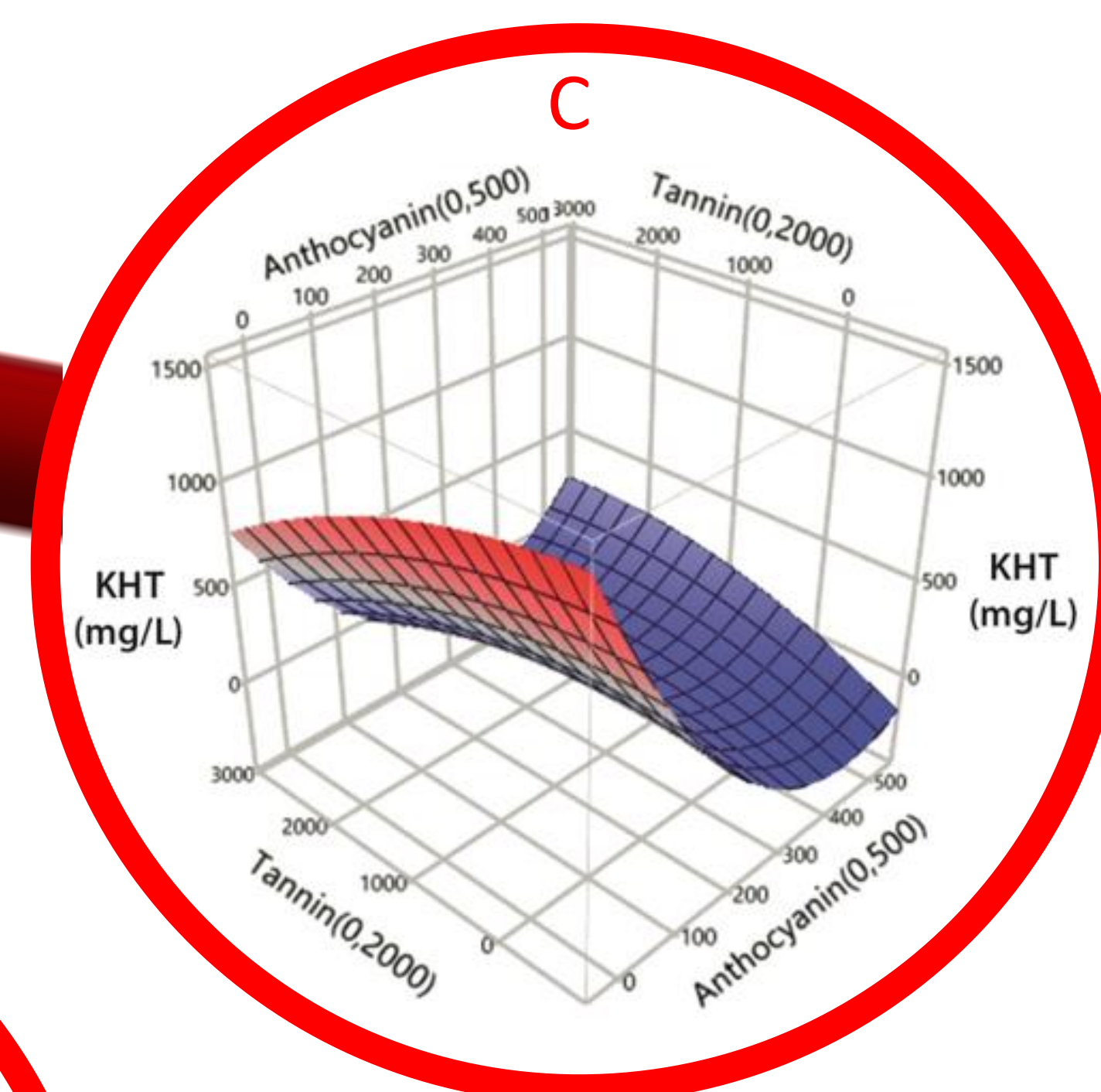
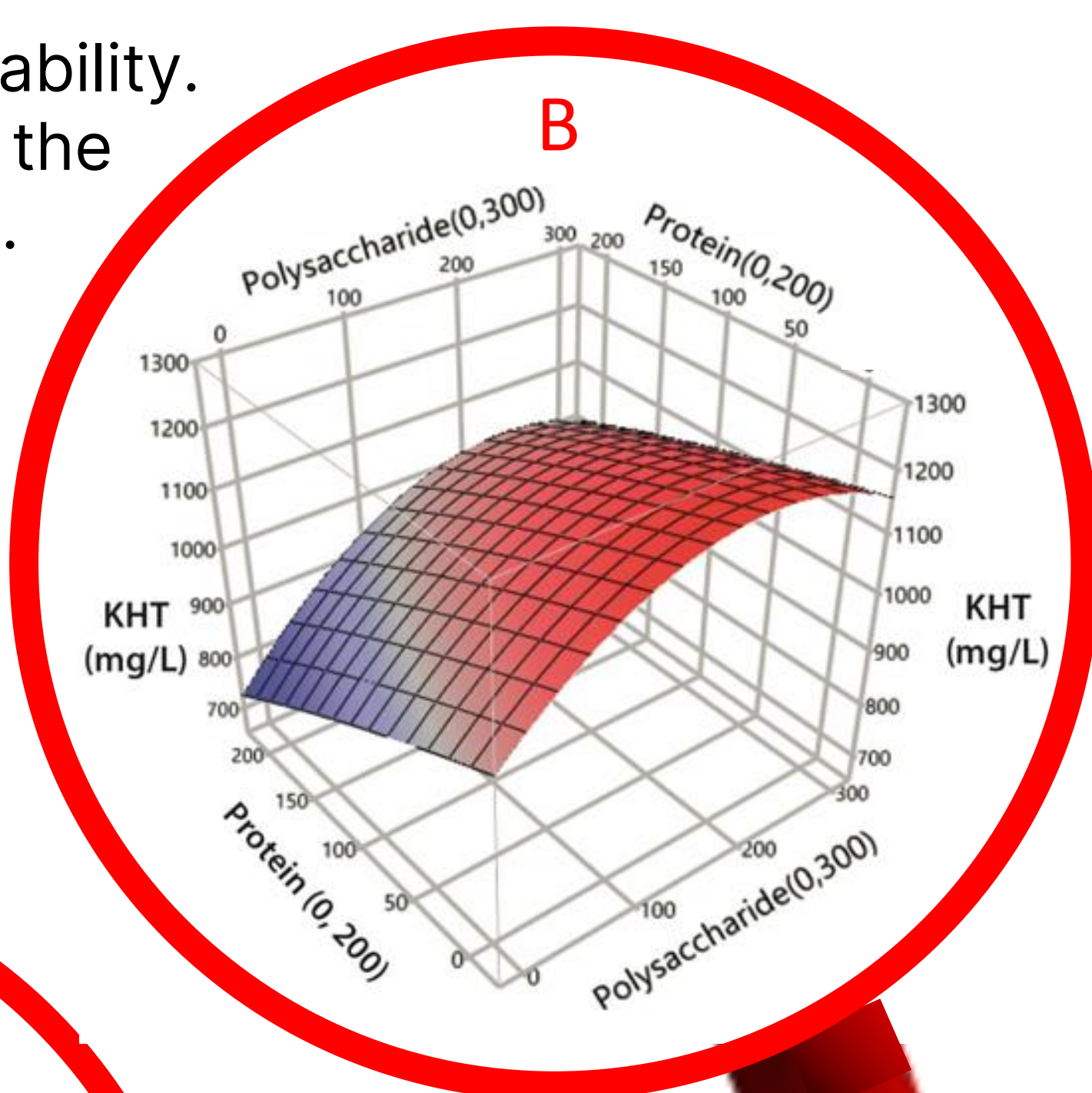
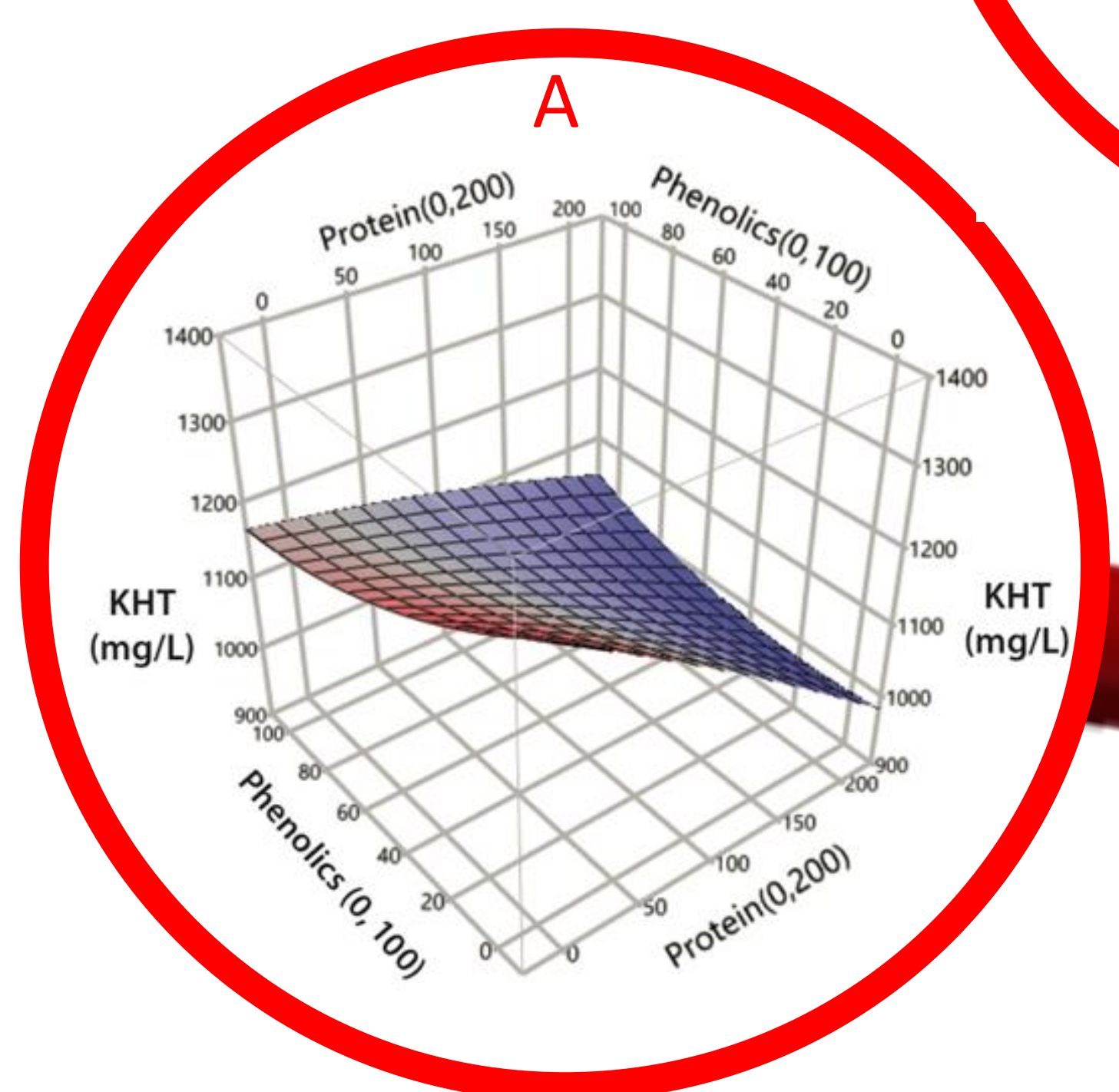
## Background and aims:

Potassium bitartrate (KHT) crystals may form in wine, after chilling, blending, filtering or as the wine ages. This can be perceived as a wine fault by consumers. Therefore, preventing KHT instability in wine is critical. It is known that red wines are generally more cold stable than whites. Certain macromolecules are thought to limit crystal formation by preventing nucleation and/or growth.

- A comprehensive investigation of red and white wine composition was carried out over two vintages.
- This was related to various measures of cold instability using multivariate statistics.
- Follow-up experiments modelled how macromolecular interactions confer cold stability.

## Results:

- Wine polysaccharides did not impact cold stability.
- White wine cold instability was explained by the concentration of tartaric acid and potassium.
- In red wine, higher tannin concentration was correlated with higher cold instability.
- Response surface modelling was used to further unravel how macromolecules affect KHT crystallisation.



Figures A and B show models for white wine:

- Polysaccharide did not impact KHT crystallisation.
- Protein and phenolics reduced KHT crystallisation slightly, and had a synergistic effect.

Figures C and D show models for red wine:

- It was confirmed that polysaccharide had no effect on KHT crystallisation
- Contrary to the findings from the compositional study, tannin was found to slightly reduce KHT crystallisation.
- Anthocyanin was found to completely stabilise the wine, even at the lowest concentration in wine (250 mg/L).

## Conclusions:

- Natural white wine macromolecules provide limited protection against crystallisation.
- Low-dose anthocyanin addition to cold-unstable white wine achieved cold stability.
- Monomeric anthocyanin explains the difference between red and white wine stability.
- To account for the positive association of wine tannin and KHT crystal formation, wines with higher tannin concentrations may undergo more rapid polymerisation reactions with anthocyanin, losing the protective monomeric forms.
- The measurement of anthocyanin, and its expected conversion to other forms, may provide a useful prediction of cold instability developing during red wine maturation.