Mānuka Honey Mead; Worth the Buzz?

Mead?
Mead is an alcoholic beverage made from fermented honey and water, which has been around since ancient times. While not as prevalent as it once was, mead has seen a resurgence in popularity, largely thanks to TV shows such as Game of Thrones!

Why Mānuka?
Mānuka honey contains a potent bioactive compound called methyl glyoxal, or MGO. MGO has significant and well-established antibacterial properties, and honeys containing high levels of this compound have very high retail value. A record price of nearly $5,000 per 230 g jar can be found on the shelves at Harrods, London.

This Research
Initial studies showed that when Mānuka honey undergoes fermentation by a wine strain of *S. cerevisiae*, the MGO does not persist into the finished mead product.

Curcuminoids as Glo1 Inhibitors
Curcumin, the primary active compound in turmeric, is an inhibitor of human Glo1, so we proposed to test it, and other structurally similar compounds, to inhibit Glo1 in yeast, which has significant structural similarities to the human enzyme.

Molecular Modelling
Molecular models of the binding of a range of curcumin analogues with the *S. cerevisiae* Glo1 enzyme indicated which compounds are more likely to act as inhibitors, thereby helping MGO be retained in the final mead.

Synthesis of Potential Inhibitors
Based on the modelling results, a selection of compounds most likely to inhibit MGO were synthesised. Nine new compounds were made using this developed method.

Fermentations
Initial trial: A series of Mānuka honey ferments, inoculated with *S. cerevisiae* wine strain EC-1118, were spiked with curcumin and three of its analogues at 20 µM:
- Curcuminoid addition did not negatively impact the yeast’s fermentative ability.
- MGO was still not preserved in the mead...

Next Steps
• Conduct fermentations spiked with higher concentrations of inhibitor than was used in the initial trial.
• Test additional curcumin analogues
• Investigate the use of whole turmeric spice as an inhibitor.
• Investigate spontaneous fermentation with wild yeast present in the honey, alongside inoculated fermenters.

Promisingly, addition of these compounds does not appear to affect fermentation, leaving the door wide open for further investigation. We hope to soon share with you more about our research into what could be the next uniquely New Zealand product!

Background
Initial studies showed that when Mānuka honey undergoes fermentation, the MGO does not persist into the finished mead product.

References

Mānuka honey fermentation profiles

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This diagram illustrates the fermentation profiles of mead over time, showing the progression of fermentation stages and highlighting the key points where MGO signals were monitored.

MGO signals lost

Inhibitor?

It is suspected that this loss of MGO is the result of a pair of enzymes in the glyoxalase pathway, which metabolise MGO into D-lactate.

To enable the MGO from the honey to persist during fermentation, we proposed to inhibit the first enzyme in this pathway, Glo1, with a natural product based compound.

Molecular Modelling
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Curcumin

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