Introduction

Ethyl phenylacetate (EPhA) and phenylacetic acid (PhAA) may be chemical markers of sour rot infection & both compounds are the cause of the sweet, moldy honey-like, off-odour. Determining the concentration at which these compounds are detected in sparkling wine is important in helping wineries to establish 'tolerance' levels for the flavours. Threshold levels can provide a baseline target for remedial treatments aimed at reducing EPhA and PhAA to 'acceptable' levels.

![Chemical structures of Ethyl phenylacetate and Phenylacetic acid](image)

**Figure 1. Diagram illustrating the impact of ethyl phenylacetate and phenylacetic acid on Pinot Noir sparkling wine flavour.**

Aims

To determine the detection and rejection thresholds in Pinot Noir sparkling wine:
- For ethyl phenylacetate (EPhA only)
- For ethyl phenylacetate + phenylacetic acid (EPhA/PhAA)

Methods

- Six panelists carried out bench testing trials to establish the concentration ranges for the main study.
- Final concentration range (μg/L) = EPhA: 5 – 644.9; EPhA + PhAA: 5 – 25 – 644.9 + 3224.5.
- Formal testing conducted in the CCOVI sensory laboratory with 32 participants.
- Detection threshold testing: Forced choice ascending concentration series, method of limits (each triad = 2 base wines ‘blanks, 0’ and 1 base wine + added substance ‘target, +’). Five scale steps used at concentration factor of 3.37.
- Rejection threshold testing: Paired preference tests presented in ascending concentration series (each pair = 1 base wine ‘blank, 0’ and 1 base wine + added substance ‘target, +’). Five scale steps used at concentration factor of 3.37.

**Table 1. Detection and consumer rejection thresholds for EPhA and PhAA.**

<table>
<thead>
<tr>
<th>Compound/comboination</th>
<th>Detection threshold (DT)</th>
<th>DT results</th>
<th>Consumer rejection threshold (CRT)</th>
<th>CRT results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethyl phenylacetate (EPhA)</td>
<td>285.8 μg/L</td>
<td>21/31 (67.7%) of panelists’ BET were not verified per ASTM. Likely due to guessing or under estimation as threshold not reached.</td>
<td>604 μg/L</td>
<td>The group rejection threshold for EPhA can be concluded from the data set.</td>
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<tr>
<td>Ethyl phenylacetate (EPhA) + phenylacetic acid (PhAA)</td>
<td>261.0 μg/L / 1347.3 μg/L</td>
<td>Group DT cannot be concluded. 68% of individual thresholds were not determined via more than one consecutive target identification per ASTM protocol.</td>
<td>EPhA + PhAA = 95 μg/L / 509 μg/L</td>
<td>CRT cannot be concluded with confidence. Significance was not maintained as the concentration increased.</td>
</tr>
</tbody>
</table>

Conclusions

- EPhA consumer rejection threshold but not detection threshold determined.
- Consumer rejection threshold could not be determined for EPhA + PhAA combination by a consumer panel.
- The ranges of EPhA & PhAA present in sparkling wines is currently unknown.
- EPhA & PhAA will be investigated for the ability to act as biomarkers in sour rot prone grapes during ripening.
- Allowing panelists to re-do the tests until stable responses are achieved is recommended for threshold tests with sparkling wine.

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