INFLUENCE OF PECTINASE PRODUCING NON-SACCHAROMYCES YEASTS ON RED WINE

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Background

- Application of sensory evaluation in study of wine quality is important to ensure continued wine quality
- Wine quality is a multidimensional concept that involves all sensory perceptions in mouth and olfactory
  - Attributes such as clarity, fruit notes, integrated wood notes and volume/body are associated with high quality wine
- Pectin is present in red wine fermentation
  - When pectin is processed with pectinase, it can increase juice yield, color, and release aromatic compounds
- Trend over recent decades are higher alcohol wines
  - Lower alcohol wines are becoming more prevalent again and methods to complete this are being examined
Background

- Non-Saccharomyces yeasts
  - Microbiological strategies (use of wine yeasts) are helpful to address lowering alcohol, including the use of non-Saccharomyces strains
  - Recent studies have shown that co-or sequential inoculation of non-Saccharomyces yeast with Saccharomyces yeasts produces wines with modified volatile profiles
  - Mouthfeel differences
    - Previous study has identified several non-Saccharomyces strains that produce pectinase
    - May have additional mannoprotein production
  - BUT formal sensory evaluation studies in this area are scarce
Overall Research Objective

- Evaluate the influence of non-Saccharomyces yeasts on the sensory and chemical profile of wines
Evaluate the influence of non-Saccharomyces yeasts on the sensory profile of wines

- Red wine processing: Focused on non-Saccharomyces strains found to have high pectinase activity
  - Syrah grapes harvested and wine made in 2016
    - 30kg of must per treatment
  - Fermentation treatments applied:
    - Control fermentations: Saccharomyces cerevisiae and uninoculated
    - Non-Saccharomyces strains: I. orientalis, P. kluyveri or cocktail of Cr. adeliensis, I. orientalis and P. kluyveri
    - Non-Saccharomyces strains inoculated 1 day prior to S. cerevisiae introduction
Sensory Evaluation of the wines

- Sensory profiling of finished wines:
  - Descriptive analysis by 10-12 trained panelists
  - 12-15 hours of training
  - Aromas, flavor, taste and mouthfeel properties
  - Intensity evaluations using 15-cm line scale
  - Data collection using Compusense Cloud (sensory software)

- Data analysis
## Wine chemistry measurements

<table>
<thead>
<tr>
<th></th>
<th>TA (g/L)</th>
<th>pH</th>
<th>Malic Acid (g/L)</th>
<th>Succinic Acid (g/L)</th>
<th>Volatile Acidity (g/L)</th>
<th>Glycerol (g/L)</th>
<th>Ethanol %</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>I. orientalis</em></td>
<td>6.18ab</td>
<td>3.30bc</td>
<td>2.77a</td>
<td>2.85a</td>
<td>0.21a</td>
<td>10.59b</td>
<td>13.54ab</td>
</tr>
<tr>
<td><em>P. kluyveri</em></td>
<td>6.61b</td>
<td>3.23a</td>
<td>2.69a</td>
<td>2.75a</td>
<td>0.19a</td>
<td>10.41ab</td>
<td>13.36ab</td>
</tr>
<tr>
<td><em>Cr. adeliensis, I. orientalis,</em> and <em>P. kluyveri</em></td>
<td>6.51b</td>
<td>3.25ab</td>
<td>2.56a</td>
<td>2.91a</td>
<td>0.21a</td>
<td>10.29ab</td>
<td>13.22a</td>
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<tr>
<td><em>S. cerevisiae</em></td>
<td>5.89a</td>
<td>3.33c</td>
<td>2.59a</td>
<td>2.81a</td>
<td>0.26a</td>
<td>9.99ab</td>
<td>13.84b</td>
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<tr>
<td>Uninoculated</td>
<td>6.37b</td>
<td>3.23a</td>
<td>2.73a</td>
<td>2.85a</td>
<td>0.23a</td>
<td>9.78a</td>
<td>13.59ab</td>
</tr>
</tbody>
</table>
Trained panel profiling of wines prepared with different non-Saccharomyces strains
Trained panel results

- The control wine fermented with *S. cerevisiae* had higher pungency, increased roughness, and increased intensities of berry and dried fruit notes
- The uninoculated control was described as having more chemical, vegetal and yeast notes
- The wines prepared with *P. kluyveri* and *I. orientalis* strains were described as more fruity and estery notes
- The wine fermented with the non-*Saccharomyces* cocktail was described as more woody and earthy
Conclusions

- Addition of non-Saccharomyces yeasts influenced chemical properties, specifically glycerol, ethanol and titratable acidity
  - *Limited influence on volatile acidity.*
- Wine treatments inoculated with specific non-Saccharomyces strains had higher concentrations of glycerol
  - *May influence perceived viscosity of wine*
- Wine produced without any S. cerevisiae had more negative attributes such as chemical and vegetal notes
- Utilization of the non-Saccharomyces yeasts may change the characteristics of the wine to include more fruity or estery notes
  - *Also lower the final alcohol content*
Future Research

■ Created red and white wines in 2017
  - *Used pectinase-producing non-Saccharomyces cocktail*
    ■ Non-Saccharomyces strains inoculated 3 days prior to *S. cerevisiae* introduction (instead of 1 day in 2016)
  - *Two factor treatment model*
    ■ Non-Saccharomyces yeasts and *S. cerevisiae*
    ■ Pectin added at 0.5g/L

■ Research into mouthfeel standards for use during panelist training
Acknowledgements

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- Thank you for your time and attention!
Questions?
References


