MANAGING DIACETYL

MAXIMIZING DIACETYL PRODUCTION

1. STRAIN CHOICE
   - Choose a strain with a high potential for diacetyl production (Beta and PN4).

2. CONTACT TIME WITH LEES
   - The shorter the contact time with yeast and bacteria, the higher the diacetyl. Rack off the lees or wait a few days for the yeast to die off after primary fermentation before adding bacteria. The living yeast and bacteria break down the diacetyl levels irreversibly.

3. TIMING
   - Add malolactic bacteria after primary fermentation for a sequential fermentation. Filtering the wine to remove yeast or racking off the lees will contribute to higher diacetyl levels.
   - Generally, the diacetyl level is highest right when the malic acid is depleted.

4. FERMENTATION TIME
   - The longer the malolactic fermentation (MLF) the higher the diacetyl.

5. WINE CONDITIONS
   - Lower pH and temperature conditions favor higher diacetyl because MLF will be slower under these conditions.

6. STIR DURING MLF
   - Stir the wine during MLF to avoid reductive conditions and to allow slight oxidative conditions. The higher redox potential will tend to favor the production of diacetyl rather than a reduction to acetoin and 2, 3-butanediol, which do not contribute to the overall aroma of the wine.

7. ADDITION OF SULFITES
   - SO₂ binds to diacetyl in a reversible reaction. When adding SO₂, the diacetyl level will seem to disappear, but over time the reaction will reverse and the diacetyl will be released back into the wine. SO₂ also inhibits yeast and bacteria activity and can stabilize the diacetyl content at the time of addition.

8. INOCULATION RATE
   - Lower bacteria inoculation rates result in higher diacetyl wines.

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### Diacetyl Concentration During Winemaking

<table>
<thead>
<tr>
<th>Strain</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>VP41</td>
<td>Only attacks citric acid after completion of malic acid</td>
</tr>
<tr>
<td>Elos 1</td>
<td>Medium producer</td>
</tr>
<tr>
<td>Alpha</td>
<td>Medium producer</td>
</tr>
<tr>
<td>Lalvin 31</td>
<td>Medium to low producer</td>
</tr>
<tr>
<td>Beta</td>
<td>High producer when used in sequential inoculation</td>
</tr>
<tr>
<td>PN4</td>
<td>Early attack of citric acid</td>
</tr>
</tbody>
</table>
MINIMIZING DIACETYL PRODUCTION

1. STRAIN CHOICE
   • Choose a neutral strain (VP41 or MT01).

2. CONTACT TIME WITH LEES
   • The longer the contact time with yeast and bacteria, the lower the diacetyl. The living yeast and bacteria break down the diacetyl levels irreversibly.

3. TIMING
   • A simultaneous alcoholic/malolactic fermentation will tend to produce a more fruit forward style. As the diacetyl is being produced, the yeast and bacteria will break it down. If bacteria is added after alcoholic fermentation, let the wine stay on the lees until a desired level of diacetyl is reached.

4. FERMENTATION TIME
   • The faster the malolactic fermentation (MLF), the lower the diacetyl.

5. WINE CONDITIONS
   • Higher pH and temperature conditions favor lower diacetyl levels because the MLF is faster.

6. DO NOT STIR DURING MLF
   • Try not to stir the wine during MLF. The lower redox potential will tend to favor the production of acetoin and 2,3-butanediol (rather than diacetyl) which do not contribute to the overall aroma of the wine.

7. ADDITION OF SULFITES
   • SO2 binds to diacetyl in a reversible reaction. Initially the diacetyl level will seem to disappear, but over time the reaction will reverse and the diacetyl will be released. Wait for the malic and citric acids to be utilized before adding sulfites. Follow the progression of diacetyl and stabilize when it reaches the desired level.

8. INOCULATION RATE
   • Higher bacteria inoculation rates result in lower diacetyl wines.