

Stuck Fermentations

Primary Fermentation

Stuck primary fermentations in winemaking refer to a situation where the fermentation process slows down or stops before all the available sugars are converted into alcohol and carbon dioxide. This can be a common challenge for winemakers and may result in an incomplete or unbalanced wine. Several factors can contribute to stuck fermentations, and it's essential to identify and address them promptly.

Common Causes of Stuck Fermentations:

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 1. **Temperature Fluctuations:** Yeast activity is highly sensitive to temperature. If the temperature is too low, the yeast may become sluggish or dormant. Conversely, if it's too high, it can stress the yeast and lead to stuck fermentation.
 2. **Nutrient Deficiencies:** Yeast requires various nutrients to thrive, such as nitrogen, vitamins, and minerals. A lack of essential nutrients can hinder yeast metabolism and lead to a stuck fermentation.
 3. **Inadequate Aeration:** Yeast needs oxygen during the early stages of fermentation. Insufficient aeration can limit yeast growth and fermentation progress.
1. **High Alcohol Levels:** As the alcohol content increases during fermentation, yeast activity may slow down or cease. This can be a self-limiting factor in some high-alcohol wines.
2. **pH Imbalances:** Yeast activity is influenced by the pH of the must. Extreme pH levels can affect the viability of the yeast and result in a stuck fermentation.
3. **Helpful information:** [Scott Labs, Techniques in Home Winemaking](#)

Tools to Analyze Stuck Fermentations:

1. **Hydrometer:** A hydrometer measures the specific gravity of the must or wine, indicating the sugar content. Monitoring the specific gravity over time can help identify changes and potential issues with fermentation progress.
2. **Densitometer:** Similar to a hydrometer, a densitometer measures the density of the liquid. It is particularly useful for determining the alcohol content and tracking fermentation.
3. **pH Meter:** Monitoring the pH of the must or wine is crucial. A pH meter helps ensure that the pH remains within the optimal range for yeast activity.
4. **SO2 analysis:** Determine your free SO2 levels

5. **Yeast Assimilable Nitrogen (YAN) Analysis:** This test measures the nitrogen available to yeast in the form of amino acids and ammonia. Ensuring an adequate YAN level helps prevent nutrient deficiencies.
6. **Temperature Monitoring Devices:** Regularly monitoring the temperature of the fermentation process is essential. This can be done using temperature sensors or infrared thermometers.
7. **Microscopic Analysis:** Microscopic examination of yeast cells can reveal their health and vitality. Stressed or dead yeast cells may indicate problems with the fermentation.
8. **Fermentation Monitoring Software:** Some winemakers use software applications that integrate data from various sensors to provide real-time information on fermentation progress.

When a stuck fermentation is identified, winemakers can take corrective actions, such as adjusting nutrient levels, controlling temperature, or re-inoculating with fresh yeast strains. Regular analysis and careful management of fermentation conditions can help prevent and address stuck fermentations, ensuring the production of high-quality wines.

Secondary Fermentation

Malolactic fermentation (MLF) is a secondary fermentation process in winemaking, where malic acid is converted into lactic acid by lactic acid bacteria (LAB). Stuck malolactic fermentation occurs when the MLF process is incomplete or comes to a halt prematurely. This can lead to undesirable characteristics in the wine, such as excessive acidity or off-flavors. Here are some considerations for testing and fixing stuck malolactic fermentation:

Testing for Stuck MLF:

1. **Chemical Analysis:** Regular chemical analysis of the wine can reveal the status of malic acid conversion. High levels of malic acid remaining indicate a stuck MLF. Vinmetrica's tools in the SC-50 system and the Sentia system. Measure parameters such as pH, titratable acidity, and SO₂ concentrations should be assessed. (See below)
2. **Tasting:** Sensory evaluation can also provide insights. Wines with incomplete MLF may taste sharper due to higher malic acid content.
3. **Microbiological Analysis:** Monitoring LAB populations through microbiological testing can help determine if the intended MLF bacteria are still active.

Fixing Stuck MLF:

Helpful information: [Scott Labs](#), [Techniques in Home Winemaking](#)

1. **Temperature Adjustment:** Ensure that the wine is at an appropriate temperature for MLF (usually between 20-25°C or 68-77°F). If the temperature is too low, warming the wine can reactivate the bacteria.
2. **Nutrient Addition:** Check if there are sufficient nutrients for the LAB to complete MLF. Adding nutrients like yeast derivatives or specific MLF nutrients can stimulate bacterial activity.
3. **Inoculation with Active Cultures:** If the MLF has stalled, inoculating the wine with a fresh culture of active LAB can kickstart the fermentation process.
4. **pH Adjustment:** LAB activity can be affected by pH. Ensure that the pH is within the optimal range (usually 3.2-3.6). Adjustments can be made using tartaric acid or calcium carbonate.
5. **Sulfite Management:** High levels of sulfur dioxide (SO₂) can inhibit LAB activity. If the wine has been treated with sulfur dioxide, it may be necessary to reduce or eliminate it to promote MLF. Measure free and Total SO₂ to be sure they don't exceed the limits for your strain of malolactic bacteria.
6. **Aeration:** Introducing oxygen into the wine through gentle aeration can be beneficial for MLF. However, be cautious, as excessive aeration can lead to oxidation.
7. **Time:** Sometimes, allowing more time for MLF to naturally restart may be the best course of action. Patience is key, and retesting at intervals is essential.
8. **Monitoring:** Regularly monitor the progress of MLF through chemical and sensory analysis. Adjust interventions based on the evolving conditions.

It's important to note that preventing stuck MLF through proper winemaking practices, including hygiene, temperature control, and nutrient management, is always preferable. If issues persist, consulting with a winemaking expert or enologist may provide valuable insights tailored to the specific circumstances of your winemaking process.