

Top tips for a successful yeast culture

Vintage is here and it's time to think yeast. To help you get the best out of your ferments this year, here are some common questions received at the AWRI about yeast and some top tips for yeast rehydration.

ARE ALL YEASTS THE SAME?

There is a wide range of yeasts available today for achieving a variety of wine styles, with most winemakers trialling at least one new yeast each vintage. Different yeasts can vary greatly in properties such as nitrogen demand; production of hydrogen sulfide, sulfur dioxide, volatile acidity (VA) and glycerol; tolerance to sugar, alcohol, pH and VA; and fermentation speed. For example, in recent years, many people have moved to using yeast with medium to high nitrogen demand. In these cases, the yeast assimilable nitrogen (YAN) level in grapes or must should be analysed, and adjustments made to suit yeast demand. It's important to know your yeasts and treat them accordingly.

WHAT IS THE RIGHT INOCULUM RATE?

Different yeast suppliers and products often specify different inoculum rates. Generally rates are between 20-40 g/hL; some specify 25 g/hL. Following the manufacturer's recommended rates ensures a viable cell population > 5x10⁶ viable cells/mL of must. Rates can be confusing as they are often expressed in different units. Here is an example conversion: 25 g/hL is equivalent to 25 g in 100 L or 250 g in 1000 L. It can also be expressed as 0.25 g/L or 250 mg/L. For a 500 g packet, 250 mg/L equates to adding one pack to a total tank volume of 2000 L juice or must.

VARIATIONS IN INOCULUM RATE

For ferments predicted to be difficult, high sugar musts, or highly clarified white musts, a higher rate around 300 mg/L is recommended. Clarified musts will also require ferment nutrient and/or protectants such as sterol enriched inactivated yeasts. For stuck ferments it is advisable to use double the normal rate or 500 mg/L.

WHAT IS THE IDEAL CELL NUMBER AND CELL VIABILITY?

Rehydration of 250 mg/L Active Dried Wine Yeast (ADWY) will achieve a minimum of 5x10⁶ viable cells per mL of must. This is based on ADWY containing 2x10¹⁰ cell/gram. Initial

cell population should increase to 100-200 million viable cells/mL of juice depending on the yeast strain chosen and the nutritional content of the juice before cell growth stops and the alcoholic fermentation begins. Healthy ferments should ideally have 1x10⁸ cells/mL of must around halfway through fermentation. You can check the total yeast cell number by microscopy using a haemocytometer. Cell viability, or the number of living cells, is generally measured in a winery environment by viable staining using a methylene blue dye. Aim for >90% viability. A value of less than 60-70% suggests there are issues with the ferment.

WATER AND JUICE PARAMETERS

Hydration water should not contain chlorine. Use mineral water/rain water/clean tap water. Chlorine can be removed by sparging/boiling, or with sodium thiosulphate. Ensure that grape juice has < 10 mg/L free SO₂ / < 30-50 total SO₂ and does not contain agrochemical residues. Do not add yeast at the crusher if also adding acid and SO₂ for reds. VA in juice should be < 0.7 g/L. Bacteria and 'wild' yeast can produce VA and also deplete must nitrogen and vitamins. Check YAN levels in juice and adjust accordingly. Consider the addition of proprietary nutrients.

YEAST HYDRATION PROCEDURE

Step 1. Rehydration

- Pre-heat water to 38-40°C
- Add water to a container with a large surface area. If using multiple packets you might want to consider using a large drum.
- Rehydrate ADWY by sprinkling it slowly and evenly over the surface of 5-10 times its weight in water (e.g. for 500 g packet of yeast by suspending in 2.5 to 5 L).
- Avoid formation of yeast clumps. Clumping results in non-rehydrated yeast, and hence, inactive yeast. Gentle stirring (do not use a powered mechanical device, which can injure the cells) can help disperse some strains that show water repellent properties.
- Leave to stand for 10-15 minutes.

Step 2. Amelioration

- Mix the partially settled rehydrated yeast by stirring.

- The yeast culture should preferably be slowly cooled to within 5-10°C of the juice/must temperature before inoculation; this amelioration process seems to be most important for difficult to ferment juices/musts.
- Cooling can be achieved by sequentially adding appropriate volumes of clean water or juice (with low residual SO₂) from the tank to be inoculated over a period of 10-20 minutes. Steps of 5-10°C are usual.
- When water alone is used, the yeast should be inoculated immediately once the cooling steps have been completed to avoid inactivation of the cells. If this is not possible, add an equal volume of juice to the yeast culture and inoculate within several hours and before the sugars become depleted. Considerable foaming can, however, result. Note that foaming is not an indicator of yeast viability.

Step 3. Inoculation

- The juice/must temperature should equal or exceed 15°C when inoculated to advantage the yeast culture over indigenous strains.
- Active fermentation typically initiates within 24 hours. If not, check the proportion of budding and viable yeast by microscopic examination.
- Once active fermentation begins, the fermentation temperature can be controlled within a small range. Temperature changes exceeding 3-5°C per day have been reported to partially inactivate budding yeast.

BULK CULTURES

With a successful hydration, yeast cell walls will have incorporated sufficient growth factors to grow for about five generations under anaerobic conditions. If scaling up a yeast culture tank to use to inoculate several tanks, keep for a maximum of 5 days to maintain viability and purity of strain. It is also difficult to keep sterile culture conditions for long periods so beware keeping a culture more than 5 days as other bugs can creep in. Use and top up no more than three times during this time and don't draw down more than 75% of the culture.

More information is available on www.awri.com.au or, contact the AWRI Winemaking Services team at winemakingservices@awri.com.au or 08 8313 6600.