



Ways to introduce oxygen into an active red ferment



Background

Winemakers may wish to introduce oxygen into active ferments both to support yeast in conducting vigorous fermentation and to influence wine sensory properties and style. In white winemaking it is relatively simple to introduce oxygen using in-tank spargers fed with compressed air. In red winemaking, however, the options need to be more varied depending on the fermenter type used.

Options for different fermenter types

Open fermenters are often believed to be largely oxidative; however the blanket of carbon dioxide (CO₂) above the cap actually prevents any substantial aeration, even during vigorous plunging. A pump-over with fanning/spraying or use of an irrigator higher than the CO₂ blanket can be used to introduce oxygen. Alternatively, an in-line injection system can be used.

Potter fermenters/Sweeping arm Potter fermenters are essentially closed systems and need active methods for introducing oxygen, such as a pump-over tub with inclined plane or screen.

Rotary fermenters are inherently reductive in nature. Many winemakers use a rack and return to introduce oxygen. Others have added small spargers along a feed tube placed below the screens and along the bottom of the tank. Care is needed to balance the pressure/flow rate at each sparger point to ensure even distribution of oxygen.

In-line air introduction options

Fitting some sort of air bleed into the pump-over system either before or after the pump can be the most convenient method to introduce oxygen into ferments.



A range of options is outlined below:

Options for in-line aeration	Comments
Delivery Venturi injector (e.g. Mazzei injector)	Placed after pump Often requires high flow rates Non-return valve required if below irrigator/point of delivery
Air draw tube	Placed on suction side of pump Limited air intake
In-line spargers (delivery side)	Requires compressed air supply
In-line spargers (suction side)	<i>Passive</i> suction gives lower levels <i>Active</i> aeration requires compressed air supply but improves pump performance
Classic venturi (suction side)	High dissolved oxygen (DO) possible May cause pump cavitation
'Cracking the fitting'	High DO possible May cause pump cavitation

How much oxygen do different methods introduce?

DO measurements recorded before and after the use of four oxygen delivery methods are shown below. It can be seen that 'cracking the fitting' and an open tap on the suction side of a pump result in the highest (and very similar) DO concentrations, followed by the in-line

sparger and then the air draw tube. As understanding grows of the oxygen requirements of different types of fermentations, this information will allow winemakers to tailor their oxygen delivery to achieve optimum results. The Venturi injector can be a very effective way of increasing DO, and is simple to install; however the high flow rates required may be difficult to implement.



Device	DO before (% air sat)	DO steady state (% air sat)
Airdraw tube (20 µm frit) attached to bottom tank valve	1.1	2.3 – 8.8%
In-line spargers (~2 µm frit) attached to pump suction inlet	1.0	21.5%
Open tap on pump suction	2.5% (uninoculated juice)	35.6%
'Cracking the fitting'	4.0%	37.3%
Mazzei Venturi injector (3 inch) placed at bottom of fermenter	0.6% (43 ppb)	19.9% (1.43 ppm)
Mazzei Venturi injector (3 inch) placed at top of fermenter	0.8% (55 ppb)	42.2% (2.92 ppm)

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Reference and further reading

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