PROTOCOL P

Lowering SO_2 Additions during Winemaking

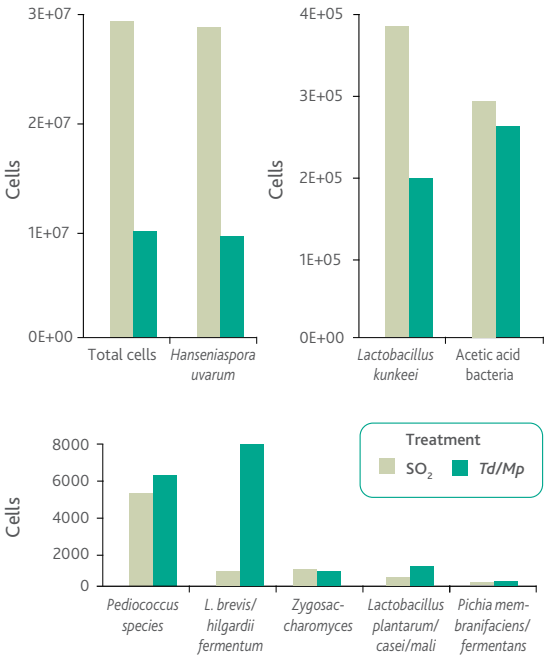
1 Harvest and pre-fermentation

BIOPROTECTION:

√ ZYMAFLORE® ÉGIDE™MP: *Torulaspora delbrueckii* and *Metschnikowia pulcherrima* (with or without rehydration):

- Application on winemaking equipment in contact with grapes (harvesting machines, transportation bins, reception line etc.).
- During grape crushing and vatting (perform a thorough homogenization of the tank once it has been filled).

BIOProtection with ZYMAFLORE® EGIDE™MP results in superior control of spoilage microorganisms compared to the standard SO_2 addition.

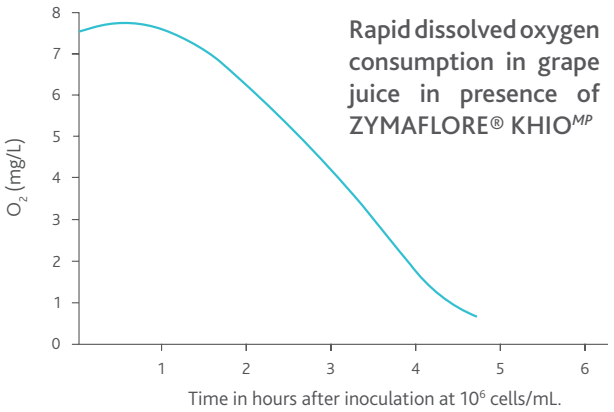


The dose of ZYMAFLORE® ÉGIDE™MP and ZYMAFLORE® KHIO™MP should be adjusted depending on the duration and the temperature of the pre-fermentation phase, and the microbial pressure::

~ Maximum dose is recommended in case of low temperatures and strong microbial pressure.
~ Lower doses for long pre-fermentation phases at milder temperatures.

√ ZYMAFLORE® KHIO™MP: *Metschnikowia pulcherrima* strain (with or without rehydration):

- Protection from oxidation due to dissolved oxygen consumption.
- Control of the indigenous potentially detrimental microbiota.
- Particularly adapted for BIOProtection of grape must and juices long pre-fermentative stages at low temperatures



Rapid dissolved oxygen consumption in grape juice in presence of ZYMAFLORE® KHIO™MP

WARNING

PRECAUTIONS TO TAKE

- Optimal sanitary state of the grapes.
- Temperature control (lower temperatures preferred).
- Avoid berry crushing/bruising.
- Ensure maximum hygiene in the cellar.
- Protect all tanks with inert gas.

BIOPROTECTION: ENOLOGICAL GOALS

√ Control of the indigenous microflora:

- Colonization of the equipment and grape juice/ must with selected non-*Saccharomyces* yeasts.
- Inhibited development of spoilage microorganisms.

√ Protection against oxidation:

- Rapid dissolved oxygen consumption by ZYMAFLORE® KHIO™MP.

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2 Grape Processing & Fermentation

Enzyme addition:

√ Choose an enzyme according to the desired wine style.

- For fast juice clarification with white & rosé must, use **LAFAZYM ®CL** or **LAFASE® XL EXTRACTION**.
- For fast color and tannin extraction in red must and better settling post fermentation, use **LAFASE® FRUIT**, **LAFASE® HE GRAND CRU**, or **LAFASE® XL EXTRACTION.**

Tannin addition to red grapes:

√ Using **TANIN GALALCOOL®** for whites, and **TANIN VR SUPRA®** or **VR SUPRA® ELEGANCE** for reds can replace traditionally used SO_2 for anti-oxidation activity. Tannins are especially important in the case of rot and subsequent laccase activity.

Adjust acidity:

√ Acidulate must or juice to lower pH and limit the growth of spoilage microorganisms.

Active Dry Yeast:

√ Select strains producing low SO_2.

√ **ZYMAFLORE® XPURE**.

- For highly aromatic red wines, with black fruit aromas, release of Hsp12 and very low SO_2 production.

√ **ZYMAFLORE® XORIGIN**.

- For elegant and balanced white and rosé wines, respect of the varietal character and terroir.

> Add NOBILE® FRESH GRANULAR 24M (2 g/L)
>
> • Enhances complexity and roundness, preserving the fruit – can be used during fermentation phases.

Fining of white and rosé must during fermentation:

√ Remove oxidizable phenolics to prevent browning or pinking of wine during aging and preserve aromatic potential.

√ **POLYMUST® PRESS** (300 – 500 ppm)

PVPP, Vegetable Protein (patatin), & bentonite, non-allergenic, GMO-free.

√ **VEGECOLL®** (20 – 100 ppm)

Vegetable Protein (patatin), non - allergenic, GMO-free.

Addition of glutathione:

√ **FRESHAROM®** provides glutathione, a powerful anti-oxidant for whites and rosé wines (200-300 ppm).

WARNING

Precautions to take

- Manage temperature carefully.
- Conduct strict cellar hygiene.
- Protect tanks with inert gas before AF.
- Minimize wine movement.

Enological goals

- Protection against oxidation. Use inert gas cover for all juice and wine movements.
- Color extraction and protection with reds.
- White/Rosé juice clarification and fining.
- Excellent oxygen/aeration management.
- Minimize the time gap between AF - MLF to avoid undesirable microbial proliferation.

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Co - inoculation or sequential inoculation with *Œnococcus œni*:

√ LACTOENOS® 450 PREAC or LACTOENOS® B7 DIRECT

- Bacteria highly effective for direct inoculation, active over a wide pH, alcohol, and temperature range.

3 Aging in Cellar

Protect wines from oxygen:

Slow down oxygen consumption in the wine with POWERLEES® LIFE:

- Yeast-derived rich in reducing compounds (additions of 10 to 20 ppm every month or for each transfer, along the entire ageing period).

Tannin additions – protect wines from oxygen:

√ **QUERTANIN®** Range (additions of 10 to 20 ppm every month, during the entire aging period).

- **TANFRESH®** specifically formulated for white and rosé wines. Dosage: 10 - 30 ppm.

Microbial Control – protect wines from microbial spoilage:

Preventive treatments

√ **MICROCONTROL® (100 ppm)**

- Chitosan and inactivated yeasts.
- Reduces the overall pressure of spoilage microorganisms (yeasts and bacteria).

Curative or Preventive treatments

√ **OENOBRETT® (100 ppm) or OENOBRETT ORG (100ppm)**

- **OENOBRETT®** is Chitosan and *ß-glucosidase* enzyme.
- **OENOBRETT ORG®** is 100% chitosan.
- Both products can decrease spoilage organisms such as *Brettanomyces*.

WARNING

Precautions to take

- Implement thorough wine chemistry analysis on regular basis with a close watch on VA numbers.
- Taste wines often watching for signs of oxidation.
- Limit wine transfers to the minimum possible.
- Constant wine protection with inert gas.
- Regular topping program for cooperage and tanks.

Enological goals

- Excellent oxygen management.
- Microbiological control and management.
- Shape wine to be ready for bottling early.
- Fining treatments, clean racking, mannoprotein additions.
- Consider early bottling and commercial release of the wine.

Prepare wine for early bottling - Build mouthfeel and finesse:

√ **POWERLEES® ROUGE** (200 ppm)

- Specific formulation of inactive yeast and ß-glucanase used for wine fining and building mid-palate weight and sweetness perception in the wine. Use during fermentation or aging on all wine types.

√ **MANNOFEEL®** (30 - 150 mL/hL)

- Mannoprotein in liquid form for smoothing tannins or astringency and building mid-palate weight.
- Can be used during aging or just before bottling on all wine types.