PRACTICAL BOOKLET

DECREASING SULFITES IN WINEMAKING AND MATURATION

A study made by the ITAB (Technical Institute of Organic Agriculture) in 2008 demonstrated consumers' rejection of sulfites which they see as unhealthy and the cause of headaches. Sulfites are also associated with off flavours and aromatic faults in wines. Only a minority of consumers accept the use of sulfites since they believe that there are no alternatives.

SO_2 IS THE OLDEST STABILISER USED IN WINE. ITS HAS MANY ROLES:

- **Antiseptic** against wine microorganisms
- **Anti-oxidasic** against polyphenol oxidases (tyrosinase and laccase)
- **Antioxidant** against the effects of oxidation during maturation

It is important to understand these three aspects to be able to best use the alternatives and **to effectively limit SO_2** for risk-free vinification and maturation. This requires a high level of technicity. Microbiological and oxygen management at each stage is essential. This involves inerting musts and wines as well as maintaining rigorous hygiene. The following protocol gives certain solutions proposed by Lamothe-Abiet for the production of sulfite-free white or rosé wines.

PROTECTION OF WHITE AND ROSÉ WINES DURING THE PRE-FERMENTATION PHASE

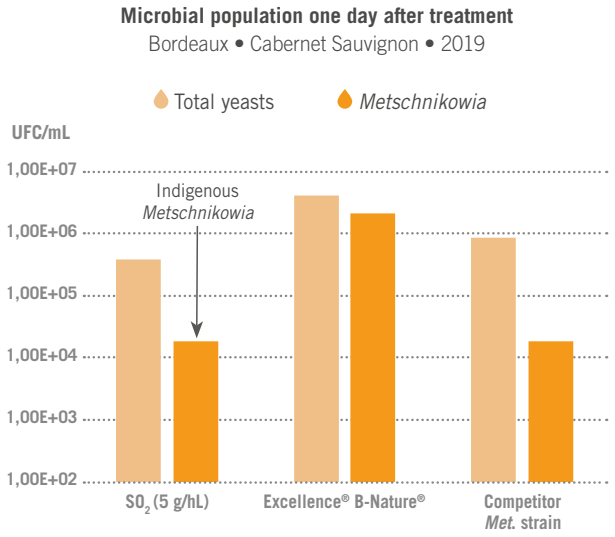
1. Antiseptic

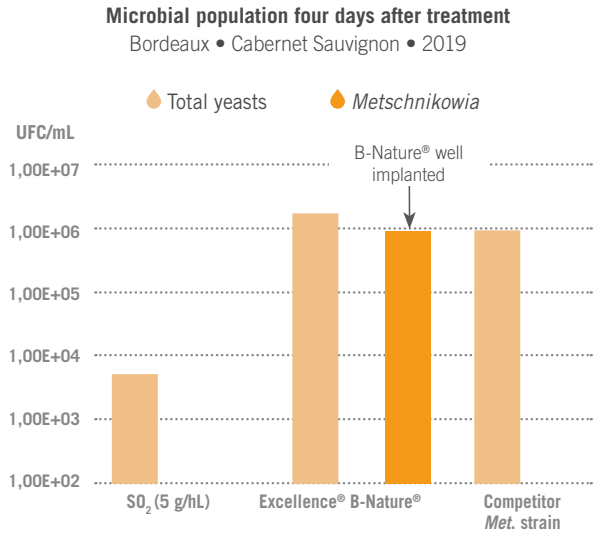
To decrease or stop the use of sulfites on grapes or musts, **bioprotection** is an excellent alternative. This practice involves exercising early control of the indigenous flora present on the grapes. In the time between the harvest and yeast addition, this medium is extremely sensitive, representing a major risk of microbial spoilage (non-*Saccharomyces* yeasts, including the apiculate yeasts *Brettanomyces*, and other bacteria are often the source of these faults).

Contrary to sulfite addition, which destroys these microorganisms, biological control involves inoculating a yeast with very low fermentary capacities, which occupies the environment and thus naturally prevents undesirable microorganisms from developing.

Excellence® B-Nature is a non-*Saccharomyces* yeast selected by Lamothe-Abiet, of the species *Metschnikowia Pulcherrima*. It has several advantages:

- Fast implantation in the must
- Strain with low fermentation capacity, avoiding AF starting
- Resistant to difficult conditions (low pH, low temperature)
- Can be sprinkled directly onto the grapes





L.A SOLUTIONS

Excellence® B-Nature

- 3 to 5 g/hL

- Fast implantation in the must
- Microbiological control of the flora

2. Anti-oxidasic

The mycelial fungus *Botrytis cinerea* can develop on the grapes' surface as grey rot. Its development has a huge enological impact and winemakers should act quickly and rethink their entire vinification protocol.

This fungus produces extracellular enzymes, in particular laccase activity. Laccase is particularly resistant (SO_2, low pH, high temperature) and is not removed during clarification (since it is completely soluble). Its presence has several consequences:

- Oxidation of phenolic compounds
- Alteration of certain aromas
- Oxidative browning

The **use of tannins such as Tanin Gallique à l'Alcool significantly decreases the laccase activity** in the must and efficiently blocks oxidations without altering the colour.

Botrytis also produces glucans. These polysaccharides are responsible for clarification and filtration problems for the musts and wines. They are not broken down during the maceration or the alcoholic fermentation, even at high temperatures. Glucan can be broken down by β-glucanases (Vinotaste® Pro).

L.A SOLUTIONS

Tanin gallique à l'alcool

- 3 to 15 g/hL, according to health of the grapes

- Decrease laccase activity
- Anti-oxydant

Vinotaste® Pro

- 4 to 10 g/hL, according to health of the grapes

- Remove Botrytis glucanes
- Improve filterability

FOR AF AND MLF MANAGEMENT:
see the practical booklet "alcoholic fermentation management"

3. Antioxidant

Must is sensitive to oxidation. When the sulfite is decreased or removed, the grapes' own polyphenols may turn into quinones. These quinones then polymerise, making the must turn a brown colour and causing a large decrease in aroma precursors. **In order to reduce oxygen's impact, fining with pea protein (GreenFine® Must) can be done**. This helps to remove the potentially oxidisable and already oxidised polyphenols. In this way, the must undergoes less browning and the ageing potential of the wine is increased.

This might include glutathione, a sulfurous tripeptide with high reductive capacity. **Aroma Protect®** is made from inactivated yeasts that are naturally rich in glutathione. This specific formulation offers optimal protection to white and rosé wines' aromas. It gives **immediate protection from oxidative mechanisms** by giving off glutathione (GSH) which significantly slows oxidation phenomena and increases the must and wine's buffering capacity in respects to oxygen.

L.A SOLUTIONS

Aroma Protect®

- 10 to 40 g/hL (depending on grapes)

- Protects the must's aromas
- Protects against oxidation
- Stops the musts from browning

GreenFine® Must

- 10 to 50 g/hL (depending on grapes)

- Removes oxidised and oxidisable polyphenols
- Protects must's aromas
- Stops the musts from browning

TO FIND OUT MORE ABOUT CLARIFICATION:
please see the practical booklet "Tools and solutions for good must clarification"

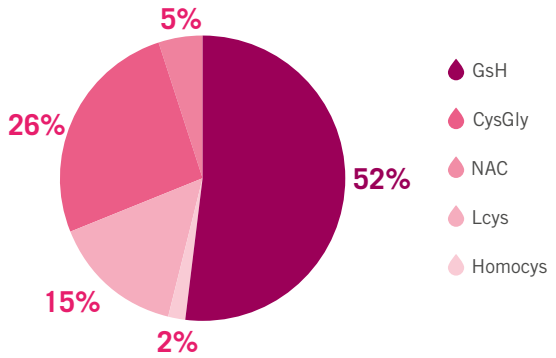
PROTECTING WINES AFTER THE FERMENTATIONS

Maturation is an important step in wine production. It is especially delicate when it is long, carried out in wood, on whole lees and with high pHs. The main faults are microbiological and oxidative.

1. Antioxidant

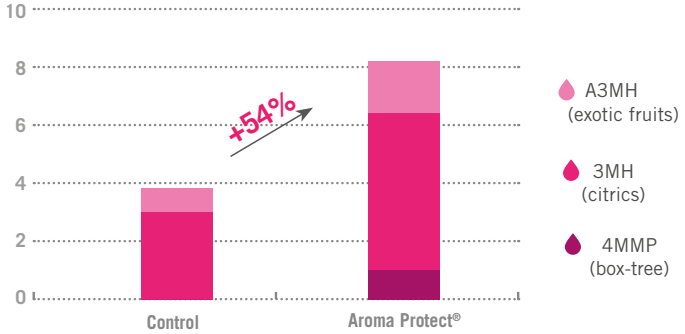
When they are not protected by sulfites, wines are very sensitive to oxidative phenomena after the AF. It is therefore important to use an inert gas to stop oxygen from getting into the wine. The usage of yeast derivatives rich in reductive compounds is also useful. **This helps the wine to be more resistant to oxidation**.

Aroma Protect®
Proportion of different reductive compounds in the formulation



Thanks to its high glutathione content (over 50%), Aroma Protect® is a good tool for conserving aromatic potential during maturation.

Aromatic Indices (IA)
Grenache rosé trial • south-east France • 2018
analysis 1 month after AF



1 month after the end of AF, aromatic intensity is double for the modality treated with Aroma Protect®.

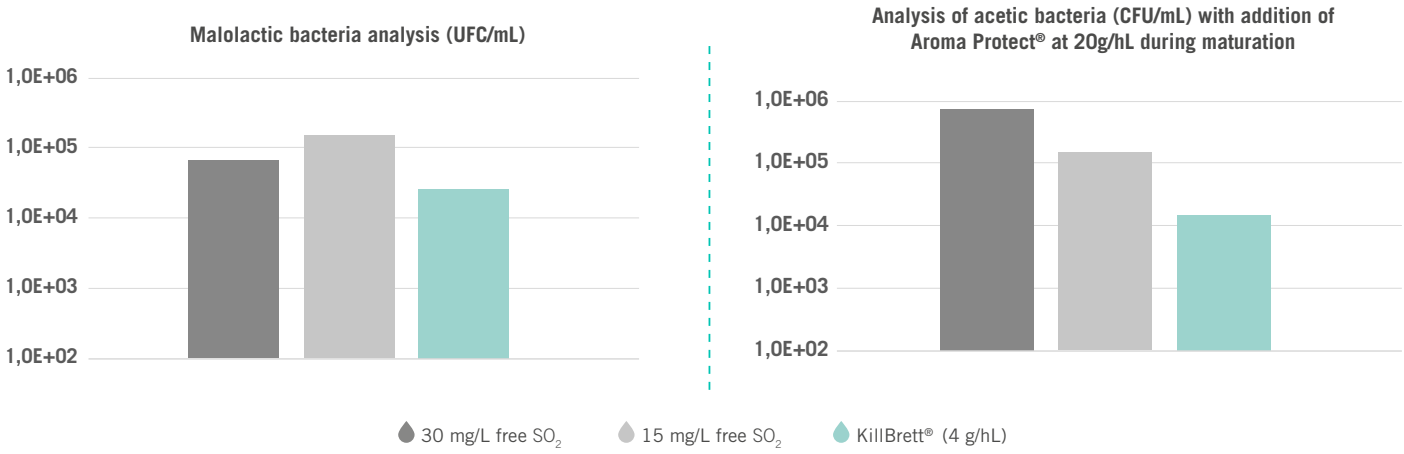
2. Microbiological

To manage the microbiology, several solutions are now available:

It is possible to simply carry out a fining to pull the microorganisms into the lees. The use of gelatin is particularly effective to decrease the presence of spoilage microbes in the wine.

Another practice involves a **preventive treatment of an antiseptic solution**. Chitosan and lysosomes play this role:

- **Chitosan** is a polysaccharide of fungal origin (the only one authorised in enology). It helps to eliminate certain spoilage microorganisms, such as *Brettanomyces*, certain malolactic bacteria, and to a lesser extent acetic bacteria.
- **Lysozyme** is an enzyme produced from egg whites. It is able to attack the peptidoglycans that make up the bacterial cell walls, causing them the rupture. This antibiotic protein is effective against Gram+ bacteria such as *Œnococcus*, *Lactobacillus* and *Pediococcus*.



The use of tools such as **KillBrett®** have shown good results compared with sulfites.

Adding *Aroma Protect®* helps to reduce the wine's redox potential. This decrease in potential helps to reduce the acetic bacteria population in the wine by fixing the dissolved oxygen which they need to develop.

L.A SOLUTIONS

KillBrett®

- 4 to 10 g/hL

- Alteration of the vital functions of certain yeasts (particularly Brettanomyces) and bacteria
- Reduction of the microbial population in suspension in the wine
- Authorised in organic winemaking

Aroma Protect®

- 10 to 40 g/hL, to be adapted according to when the wine will be commercialised

- Protects the wines' aromas
- Protection against oxidation
- Decreases the population of acetic bacteria

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