

A NEW FRONTIER IN WHITE WINES' OXIDATIVE AND MICROBIOLOGIC STABILITY

Until a few years ago, white wines were consumed mainly young, in their origin place of production and they would hardly arrive at their second year without acquiring some oxidative notes. Nowadays, a big part of the Italian wine is exported and served all around the world. Producing wines with a long shelf life and with an oxidative and microbiological stability is an everyday challenge.

This challenge is even more difficult if we consider the trend of these years to consume healthy food and to limitate sulphur dioxide in wine. This additive is an important tool in enology: because of its oxidative protection and its anti-oxidase and antimicrobial action.

The growing interest in producing wines with low levels of sulphur dioxide, encouraged **VASONGROUP** R&D department to deepen the knowledge about these phenomenons in order to find alternative solutions. Specific protocols about how to manage fermentations, so as bio-protection or more innovative techniques of oxygen removal through membranes, are only few of the results emerged by these researches.

Since now, the most difficult aspect of white wine making is to maintain the "freshness" of the wine, contrasting oxidations and avoiding spontaneous MLF, in order to preserve, during time, its aroma. Different experimentations leaded by R&D Department of the Group gave rise to a new clarifier of the **Clarito® line: Bactoclean**, a product made up by natural and selected Chitosan, fish gelatin and P.V.P.P.



Bactoclean and malolactic fermentation's control

Instruments now available against undesired MLF are well-known. However, many of them present also some unwanted effects:

- **Sulphur dioxide.** It's commonly known that sulphur has an antioxidant and antimicrobial effect, especially against lactic bacteria. However, high values of SO₂ are necessary to prevent undesired fermentations, especially in wine with a high pH. Moreover, it's important to remember that sulphur dioxide has toxic effects, even if only little, on men's health.
- **Low temperature.** Malolactic bacteria are inhibited by temperatures below 10°C (better between 5-6°C). Wine tanks at these temperatures lead to an increase of energetical costs, but also to a higher oxidation risk, due to a greater oxygen's dissolution.
- **Filtration.** Wine filtration after alcoholic fermentation is surely one of the simplest, efficient and less onerous technique. However, it can't allow to obtain all benefits associated to batonnage on fine lees; this bring to a higher sensibility to oxidations and to a loss of structure and complexity.
- **Lysozyme.** This enzyme has a high activity in prevention and blocking the MLF, especially in white and rosé wines. However, this solution has undesired effects too: lysozyme is an allergen that can remain in wine and its presence must be indicated on the label. Moreover, by a technical point of view, lysozyme destabilizes the wine protein so, after its use, some specific clarifications are necessary, with an depletion of the product as a consequence.

In these years, **VASONGROUP** Researchers' Team studied the activity of different types of Chitosan in order to classify its bacteriostatic efficacy against MLF bacteria. Thanks to these results it could be possible to formulate a specific product like **Clarito® Bactoclean**: a real valid support to classical techniques **to contrast lactic bacteria development**.



Experimental proofs

Hereby the results obtained during experimentations.

| ANALYTIC DETERMINATION | U.d.M. | Wine Z |
|------------------------|---------|--------|
| Alcohol | % v/v | 8,68 |
| Total acidity | g/L | 6,4 |
| Volatile acidity | g/L | 0,35 |
| pH | at 20°C | 3,45 |
| L-Malic Acid | g/L | 2,65 |
| Free SO2 | mg/L | 1 |
| Total SO2 | mg/L | 30 |



In **Fig. 1** you can see how **Clarito® Bactoclean** can control a grafted MLF with a MLF inoculation with double the dosage of one of the best commercial strain *Oenococcus Oeni* available on the market. The slowdown of the MLF progress after using **Clarito® Bactoclean** (10 g/hL and 20 g/hL) is comparable with the one obtained using lysozyme at a dosage of 30 g/hL and significantly higher than the effect of the treatment with 10 g/hL of pure chitosan, which is not specific for this type of activity. These results are due to the excellent bacteriostatic characteristics of **Clarito® Bactoclean**, able to reduce twice the lactic bacteria's activity in wine, compared to the control - depending on the used dosage. (**TAB. 2**).

TABLE 1. Analytics parameters of the wine used for malolactic fermentation's control trials.

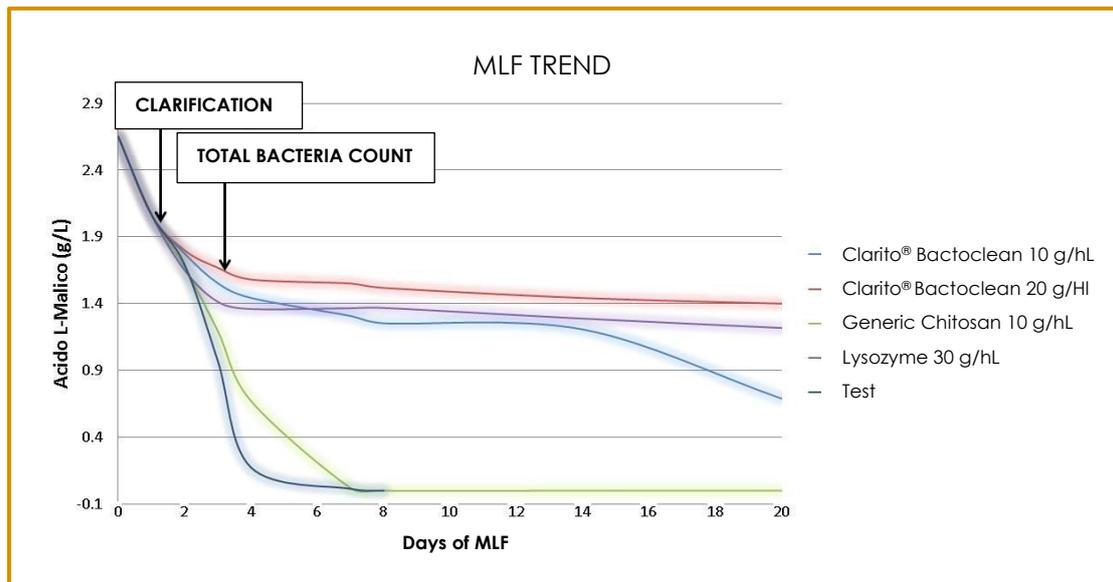


FIGURE 1 MLF trend of a wine treated with **Clarito® Bactoclean** (10 g/hL and 20 g/hL), generic chitosan (10 g/hL) and Lysozyme (30 g/hL) compared to a control test. Clarification were made a day after *Oenococcus Oeni* inoculation and after that the MLF start was verified. Proofs were made in lab conditions, at 22°C.

| Bacterial count after 2 days from addition | Bacteria | | | |
|--|----------|------|-----|----|
| | -3 | -4 | -5 | -6 |
| Dilution | -3 | -4 | -5 | -6 |
| Clarito® Bactoclean 10 g/hL | >250 | 115 | 14 | 1 |
| Clarito® Bactoclean 20 g/hL | >250 | 16 | 1 | ND |
| Generic chitosan 10 g/hL | >250 | >250 | 65 | 7 |
| Lysozyme 30 g/hL | 21 | 1 | ND | ND |
| Test | >250 | >250 | 186 | 14 |

TABLE 2. Count of lactic bacteria after two days from clarification.

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Bactoclean and wine oxidability prevention

Thanks to its formulation, **Clarito® Bactoclean** it's not only efficient against lactic bacteria, but it also represents **an important tool to contrast wine oxidability**.

Chitosan is a high reactive polymer, even towards (+)epicatechin, this activity stops free radicals' actions and allow to preserve wines' original aroma.

Antioxidant action is helped by the ability of chitosan to chelate Iron and Copper, which are both metals that take part to oxidative processes.

In addition to these preventive actions, chitosan can reduce the browning effect of white wines, amplifying the P.V.P.P. action;

Oxidability Dynamic Test

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The Oxidability Dynamic Test ODT, developed by Giottoconsulting, is a forecasting methodic that allows to accurately evaluate the wines' oxidative kinetics. Contrarily to other spectrophotometric tests (POM test and overoxidation's test), the ODT bases itself on the continuous measurements of DO 420 nm and CIELAB colour changing of wines exposed to oxidative conditions. In particular, colour analysis CIELAB can correlate chromatics wine characteristics, defined by a* parameters (relation between red and green) and b* (relation between yellow and blue) to its oxidative state. It has been demonstrated that during oxidative processes, wines initially present an increase of red component "increase of a*" and yellow component "increase of b*" (browning phase), followed by a second phase where the yellow component continues to increase and the red one decreases, giving wine its classic gold colour.

the unique and balanced formulation of **Clarito® Bactoclean** is the result of an accurate study with different types of wine as object.

As an example, you can observe some results regarding the efficiency of a treatment using **Clarito® Bactoclean** on a white wine made without SO₂ and its predisposition to oxidize itself (**Fig. 2**). This characteristic was determined by Oxidability Dynamic Test ODT (yellow box).

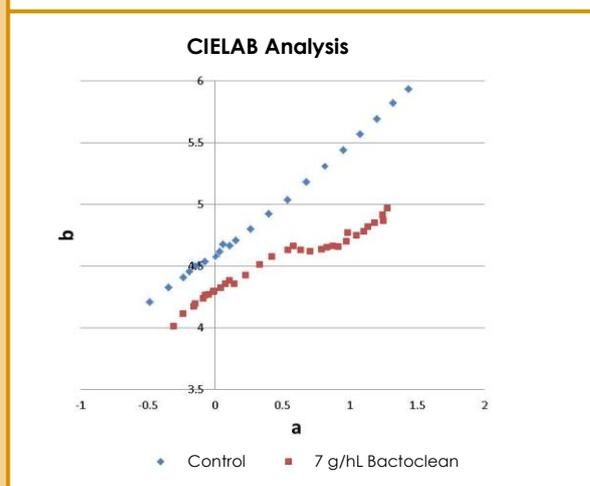
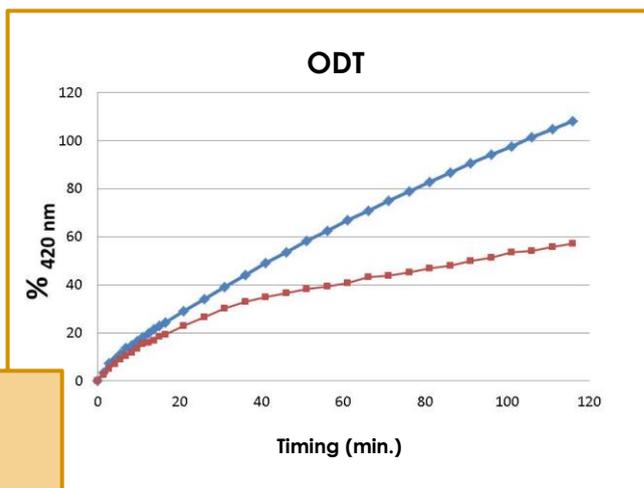


FIGURE 2. ODT analysis of a wine without SO₂. In the top figure you can see the oxidative kinetic (expressed in terms of % increase of optical density at 420nm) of control test wine (in blue) and treated wine with 7 g/hL of **Clarito® Bactoclean** (in red). The comparison of kinetics highlights a clear protective effect against oxidations, confirmed by CIELAB color evolution's analysis test (bottom figure). Wine treated with **Clarito® Bactoclean** shows an increase of red (a*) and yellow (b*) chromatic component much lower than the control (analysis timing: 120 minutes).



Bactoclean and base wine for sparkling

Growing demand of sparkling wine, ensures this type of product the cover of a very important market segment in world production. One of the criticalities on the productive process of sparkling wine is storage and warehousing of the base wine, before re-fermentation. In this phase is fundamental to maintain a low level of sulphur dioxide with the direct consequence that wines are more sensitive to oxidative phenomenons and more vulnerable towards spontaneous and undesired MLF.

Clarito® Bactoclean, with its specific action, demonstrates to be the optimal adjuvant for a good storage of the base wine on fine lees, inhibiting lactic bacteria activity and limiting oxidative phenomenons.

This research demonstrates that, within three months, wine kept on fine lees and treated with indicated dosage of **Clarito® Bactoclean**, presents a color that tend to a green color and with a lower yellow component, compared to the same not treated wine (color analysis through CIELAB method) (**Fig. 3**).

rack the wine from the clarifications lees after 2/3 days from the addition).

In case of conservation and batonnage on fine lees, adding **Clarito® Bactoclean**, fractioned out in time, will lead to inhibition of malolactic fermentation and to a better conservation of the product, thanks to a drop of oxidable compounds. (**Fig. 3**).

VASONGROUP Technical Service is at your disposal for further informations and in-depth analysis.

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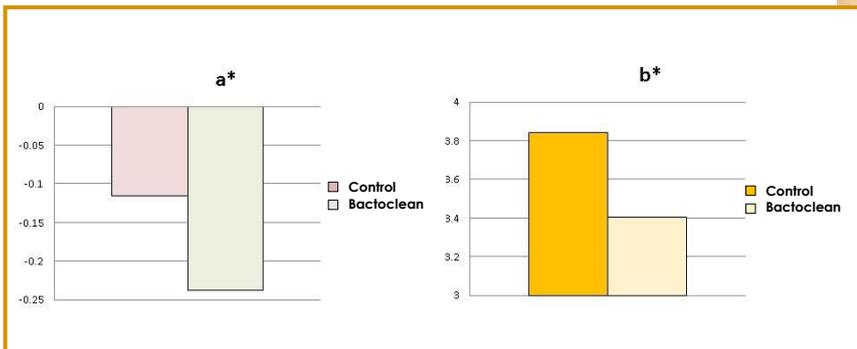
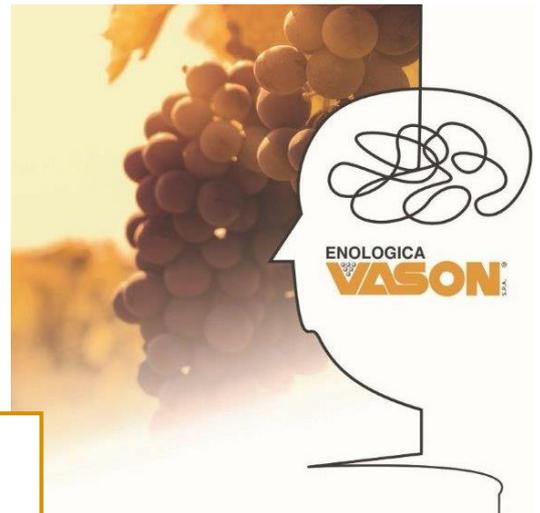


FIGURE 3. Comparison of CIELAB parameters of a Prosecco base treated with **Clarito® Bactoclean** (5 + 5 g/hL) to the same non-treated wine. After three months from the treatment a* (red component) and b* (yellow component) parameters of treated wine are lower than the control test, sign of a protective effect of **Clarito® Bactoclean** against oxidative processes.



Conclusions and suggestions

The researches confirm that **Clarito® Bactoclean** represents a valid help both in contrasting unwanted malolactic fermentations, and preventing development of oxidative phenomenons, in order to guarantee to the wine a higher longevity and a better aroma profile. From practical cellar experiences, for what concerns lactic bacteria inhibition, it's better to determine **Clarito® Bactoclean** dosage considering also wine turbidity (in this case it's recommended to