

CHITOCCEL PRODUCTS

THE ALLIES OF YOUR



DISCOVER OUR **CHITOSAN-
BASED PRODUCT RANGE**
FOR WINE CLARIFICATION
AND STABILISATION.



 **AEB**[®]

CHITOSAN, A NATURAL PROTECTION FOR WINE AND MUST

CHITOSAN IS A NATURAL DERIVATIVE OF BIOLOGICAL ORIGIN THAT IS OBTAINED FROM PARTIAL DEACETYLATION IN AN ALKALINE ENVIRONMENT OF CHITIN, A POLYSACCHARIDE COMPOSED OF N-ACETYL-D GLUCOSAMINE UNITS.

CHITOSAN PERMITTED FOR USE IN OENOLOGY MUST BE OF FUNGAL ORIGIN, FROM FERMENTATION OF FUNGAL ORIGIN, FROM FERMENTATION OF *ASPERGILLUS NIGER*.

THE PROPERTIES OF CHITOSAN

Chitosan has multiple benefits on musts and wines.

1 INHIBITS *BRETTANOMYCES*

with far greater effectiveness than any other adjuvant.

2 AIDS MUST CLARIFICATION

because, by exploiting its antiseptic action against micro-organisms, it inhibits them, thus preventing fermentation, which has a negative impact on all clarification processes.

3 ACTS AGAINST BACTERIA whether Gram negative or positive, including acetic bacteria, which are among the main culprits in raising volatile acidity, and oenococcus oeni, lactic bacteria responsible for malolactic fermentation.

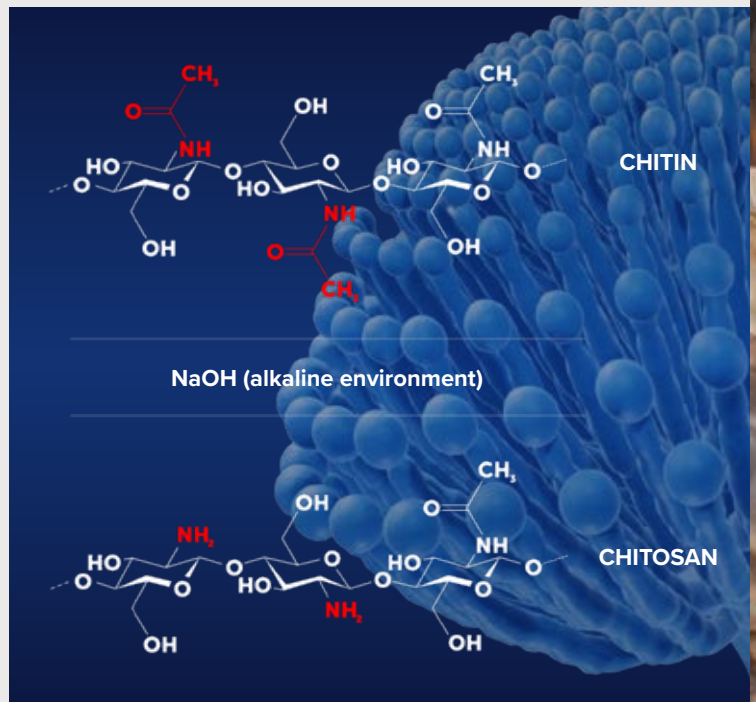
4 REDUCES THE CONTENT OF HEAVY METALS, such as iron, lead, cadmium, copper, thus preventing ferric and copper cases.

5 REDUCES UNDESIRABLE COMPOUNDS

such as ochratoxin A through synergy with yeast hulls. Ochratoxin A is a fungal toxin found as a result of microbial changes in grapes, which is present in particular wine production areas

6 ENABLES THE REMOVAL OF SIGNIFICANT OLFACTORY ALTERATIONS

in combination with FREE4FENOL, an AEB adjuvant based on activated charcoal. FREE4FENOL adsorbs odours while chitosan prevents the proliferation of the micro-organisms responsible for these odours.



THE REGULATIONS

According to EU Regulation 2019/934 and subsequent derogations, the use of chitosan in oenology is allowed for:

- for **wine treatment**
- as a **clarification aid in both wines and musts**



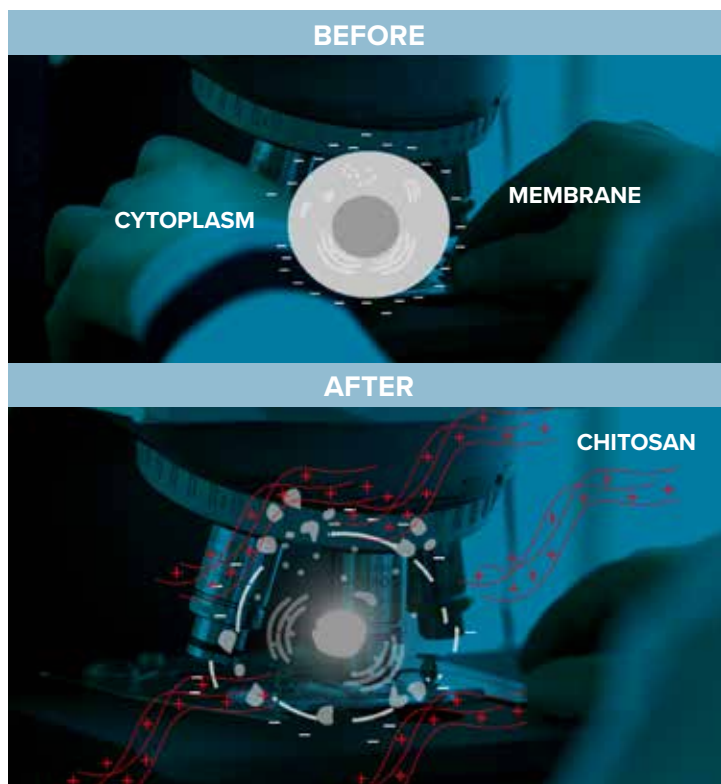
HOW DOES IT ACT?



To understand how chitosan acts, we must start with its structure. While chitin is an essentially neutral polymer, the **DEACTIVATION** process that goes into forming chitosan allows the release of the primary amino groups, which in an acid environment are protonated, becoming positively charged.

This particular type of charged structure is **FUNCTIONAL TO THE DISGREGATION OF THE MEMBRANES OF BACTERIA AND YEASTS.**

One of the mechanisms by which chitosan acts is related to the fact that the outside of the cell wall for bacteria is negatively charged, and therefore acts, being positively charged, by charge complementarity. Yeasts, on the other hand, have no obvious negative charge, but incorporate chitosan into their wall during growth, causing it to break down. An alternative mechanism of action is due to the binding of chitosan with microbial DNA, which would effectively block its transcription and replication, clearly inhibiting the growth of microorganisms in this medium.



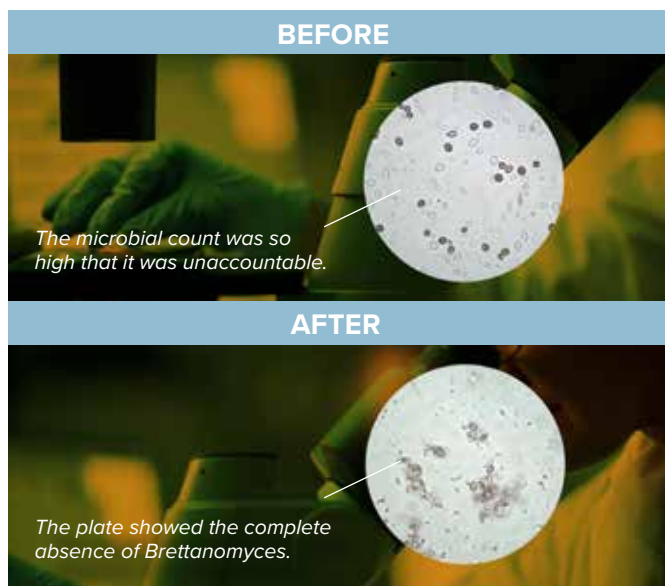
The breakdown of the yeast wall and the action of chitosan.

THE PRACTICAL TEST

From tests carried out in our R&D laboratories, it is easy to understand how chitosan works.

- 1 We added our product **CHITOCCEL** to a wine contaminated by *Brettanomyces* (dosage: 5 g/hL).
- 2 Even before the results of the microbial count, we verified under the microscope the destruction of *Brettanomyces* cell integrity.
- 3 Next, for the purpose of performing a plate count, we filtered a 50 mL aliquot of the solution onto a 0.2 micron porosity membrane and incubated it for 8 days at 30°C on *Brettanomyces* selective medium.

RESULTS UNDER THE MICROSCOPE



CHITOSAN vs BRETTANOMYCES

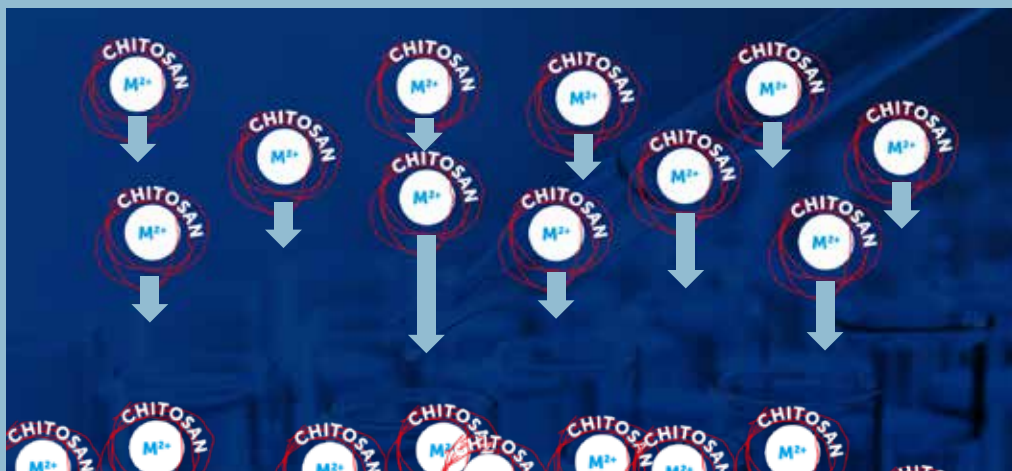
Brettanomyces bruxellensis is a **HIGHLY RESISTANT CONTAMINANT YEAST**, even at high ethanol contents, capable of catalysing the reduction of vinylphenols via the enzyme vinylphenol reductase.

This type of biocatalytic activity is at the origin of olfactory defects such as the smell of barn, leather or horse sweat, which can be traced back to ethylphenols.

Chitosan has an important antiseptic **action by inhibiting microbiological activity**. **It promotes clarification and hinders unwanted fermentation**, which would have a negative impact on the entire process.

CHITOSAN vs METALS

Chitosan acts by **chelating metal cations**. This type of action makes it possible on the one hand to **AVOID COPPERIC AND FERRIC CASES**, and on the other hand it exerts a further **DESTABILISING EFFECT ON THE MICROBIC WALL** by removing structural cations.



Graphic representation of the action of chitosan on metals.



CHITOSAN BASED STABILIZERS FROM AEB



CHITOCCEL

CHITOSAN-BASED ADSORBENT ADJUVANT

CHITOCCEL is a chitosan-based product, **active against acetic and lactic bacteria and yeasts in general, including *Brettanomyces***. Wines obtained after the addition of CHITOCCEL are therefore **clean to the nose and free of olfactory deviations of bacterial origin**.

Because of its **antimicrobial action**, **CHITOCCEL** is an **excellent alternative to SO₂** and makes it possible to obtain wines that are microbiologically stable and in line with market requirements. In wines with residual sugar, where SO₂ tends to combine more quickly than in dry wines, it acts in synergy with this additive.

CHITOCCEL is **widely used in wines to be aged in wood**; the porosity of this material represents an ideal place for the development and growth of micro-organisms, in particular *Brettanomyces*, which although present in small quantities could in the medium to long term give rise to unpleasant odours.



In musts or wines before or after alcoholic or malolactic fermentation.

CHITOCCEL Must

STABILISING TREATMENT AND DEFECT CORRECTOR FOR WHITE WINE MAKING

CHITOCCEL Must is a product based on chitosan, gall tannins and proanthocyanidins, yeast hulls and autolysates with naturally present glutathione. Gall tannin exerts its **antioxidant action** and, at the same time, removes O₂ that would favour the growth of indigenous flora. This product finds its application in **white wine making**. Its complex composition also includes glutathione from yeast derivatives, which aids the product's antioxidant action.

CHITOCCEL Must can also help **reduce the content of heavy metals** such as iron, lead, cadmium and copper, thus preventing ferric cases and copper cases. It also helps reduce possible contaminants such as ochratoxin thanks to its synergy with yeast hulls and tannins.

Finally, it **assists the action of clarifiers** thanks to the simultaneous and synergic presence of chitosan and tannins, while also counteracting protein instability.



In musts, mainly pre-fermentation.



CHITOSAN BASED STABILIZERS FROM AEB



CHITOCCEL Red

SPECIFIC STABILISING TREATMENT AND DEFECT CORRECTOR FOR RED WINE MAKING

CHITOCCEL Red is a product based on chitosan, proanthocyanidin tannins and yeast hulls, which finds its application in **red wine making**. Chitosan and proanthocyanidin work in synergy and exert the **same action as SO₂**, **CHITOCCEL Red**, due to its **antimicrobial action**, is an **excellent alternative to SO₂** and makes it possible to obtain **wines that are stable from a microbiological point of view** and in line with the demands of the market, which is increasingly looking for products with low sulphite values. In wines with residual sugar, where SO₂ tends to combine more quickly than in dry wines, it increases the effectiveness of this additive.

CHITOCCEL Red can also help **reduce the content of heavy metals** such as iron, lead, cadmium and copper, thus preventing ferric casse and copper casse and reducing possible contaminants such as ochratoxin thanks to the synergy with yeast cell walls and tannins.

Lastly, it **assists the action of clarifiers** helping protein instability thanks to the simultaneous and synergic presence of chitosan and tannins.



In musts, mainly during maceration.

CHITO-F

SPECIFIC COADIUVANT BASED ON FUMARIC ACID AND CHITOSAN

CHITO-F is a product in which the synergy of the components exerts an **antimicrobial, bacteriocidal and bacteriostatic, stabilising and clarifying action**. **CHITO-F** plays an important role in the **prevention and treatment of contamination from lactic acid bacteria**, facilitating work in the cellar. It also **avoids the spontaneous fermentation of malic acid**, favouring an antiseptic action that guarantees the absence of biogenic amines from unselected microorganisms.

Healthiness and sustainability are the results of its use. Thanks to its powerful antimicrobial action resulting from the synergy of its components, it allows the use of **less SO₂** while protecting wines, thus representing a **valid alternative to lysozyme**.

This product also does not interact with the colouring matter. Wines obtained after the addition of **CHITO-F** are clean to the nose and free of olfactory deviations of bacterial origin, as well as possessing a natural freshness, given by the acid component and the malic retention. **Chito-F** is **widely used in wines to be aged in wood, in red, white and rosé wines**. Its action lasts over time, more than 60 days after application.



In wines, depending on contamination.



CHITOSAN BASED STABILIZERS FROM AEB



ANTIBRETT 2.0

SPECIFIC TREATMENT FOR THE ELIMINATION OF *BRETTANOMYCES* AND ADSORPTION OF VOLATILE PHENOLS

ANTIBRETT 2.0 is an innovative product with an inhibiting **action against yeasts belonging to the *Brettanomyces* genus**. It also exhibits high **adsorptive properties against 4-ethylphenol and 4-ethylguaiacol**, compounds that impart unpleasant odours of horse sweat, medicine and plaster to wine.

Thanks to its antimicrobial efficacy, obtained through the joint action of chitosan and β -glucanasic enzyme, it **inhibits the production of vinyl reductase**, which participates in the transformation of cinnamic acids naturally present in wines, into the corresponding ethyl derivatives, responsible for the odours attributable to *Brettanomyces*.

ANTIBRETT 2.0 can be used for both curative and preventive purposes: in fact, *Brettanomyces* has a very long incubation time (3-8 months), during which no unpleasant odours appear. In addition, it is **effective against anomalous odours**, such as those of dirty barrels and mould that are often found in wines.

ANTIBRETT 2.0 is also used in **wines at the end of fermentation**.



Depending on the extent of product contamination.

HOW DOES CHITOSAN WORK?
WATCH THE VIDEO



DISCOVER AEB
CHITOSAN-BASED
PRODUCTS





CHITOSAN: A NATURAL ALTERNATIVE TO SULPHUR DIOXIDE

Our chitosan is of **fungal origin**. It is **free from GMOs and from all allergens**, like other similar products that exert, among other things, antimicrobial activity only on certain families of bacteria and may contribute to protein instability.

The effective antimicrobial action of chitosan makes it possible to **limit the use of sulphur dioxide**, in line with the growing market demand, which is increasingly oriented towards products with low sulphite contents. Furthermore, chitosan - thanks to its properties - allows the winery to **reduce the use of refrigerants** necessary for the proper microbiological maintenance of wines.



TARGETED, INNOVATIVE AND PREVENTIVE OENOLOGY

As AEB, we offer a **dedicated service** and perform a **thorough check** for the possible presence of contaminants. In fact, thanks to our **Icgene** equipment, based on modern DNA amplification techniques, we can **precisely check for microbial contamination**. All in **reduced time**.

The way **Icgene** works is based on the amplification of specific DNA sequences using the **LAMP** (Loop-Mediated Isothermal Amplification) **technique** applied directly to samples. This methodology allows the detection of *Brettanomyces bruxellensis* and is the ideal solution because it provides a **low-cost analysis that is easy and consistent**, allowing **each individual batch of wine to be controlled**.

Thanks to the results provided by **Icgene**, we are able to support the customer directly at the winery, for the **targeted use of chitosan** and the **resolution of possible contamination**.

