



### KEY BENEFITS

- Prevention of microbial contamination
- Freshness maintainance
- Clarification & color stabilization
- Reduced turbidity and protein haze
- Reduced heavy metal content
- Natural, clean-label processing-aid

### NATURAL ANTIMICROBIAL AND CLARIFICATION AGENT IN WINE APPLICATION

In recent years, there has been a surge in demand for plant-based food products driven by health consciousness, environmental concerns, and animal welfare considerations. This trend has paved the way for various natural alternatives for manufacturers, and an ingredient has gained significant attention which is chitosan. Chitosan offers a multitude of opportunities for manufacturers striving to create complete and authentic plant-based food products, particularly in the context of its application in the winemaking industry.

Chitoly™ AB is a plant-based chitosan derived from chitin, as a promising natural alternative for chemical and animal-origin preservatives. It is a natural acid-soluble fungal chitosan extracted from the cell walls of *Agaricus bisporus* and is used as a multifaceted anti-contaminant in alcoholic beverages. Chitoly™ AB meets consumers demands for clean-label antimicrobial alternative to chemical preservatives.

Moreover, Chitoly™ AB has been proven to have multiple effects of antimicrobial, antioxidation (anti-radical and anti-browning), clarification, and heavy metal reduction as a natural, friendly, allergen free processing aid.

	Chitoly™ AB
Code	0801
Registration Number	Clean Label
Organoleptic impact	No Impact
Source	Non-GMO, renewable
Thermal Stability	Up to 140°C
Applicable pH	2-5
Recommended dosage	0.1-0.5g/kg
Packing Size	500g, 10KG
Appearance	Slightly brown powder
Labelling	Chitosan
Solubility	Acid Soluble

### OUR BRANDS

#### CHITOLY™ AB Mushroom Chitosan



## CASE STUDIES: WINE YEAST CONTAMINANT CONTROL

Clarification of wine is a crucial step in the winemaking process to improve the wine's clarity, stability, and overall quality. During fermentation and aging, various solid particles and suspended substances, such as dead yeast cells, grape pulp, tannins, and proteins, can be present in the wine. These particles can make the wine hazy and cause undesirable flavors and aromas. Microbial spoilage is a key point throughout the life of a wine. One way to control the spoilage microbes is by preventing their development through bio protection, especially Brettanomyces yeast.

Sulphur Dioxide (SO<sub>2</sub>) is the most used method of clarification to control yeast, some strains of this contaminant exhibit resistance to SO<sub>2</sub>. It acts as an antioxidant and antimicrobial agent, protecting the wine from spoilage microorganisms and preserving its freshness.

To validate the anti-contamination effect of Chitoly™ AB, we simulated wine production to mimic the processes carried out in the industry. In the first sample, 0.1 gram of Chitoly™ AB was added per kg of the white wine. In the second sample, no preservative was added, characterized as control.

The graphs below show the results for yeast control (Fig. 1) in wine and the sensory profile of red wine (Fig.2). The study compares the difference in microbial population reduction and sensory profile change between control and treated (with 0.1g/kg Chitoly™ AB) samples at 24°C. After 5 days, the population of yeast detected was decrease to 0%, and the level was remained until 3 months later, no yeast growth was observed.

This study shows Chitoly™ AB is an effective natural clean-label solution to remove the microbial contamination while enhance the sensory profile in wine with a very low dosage.

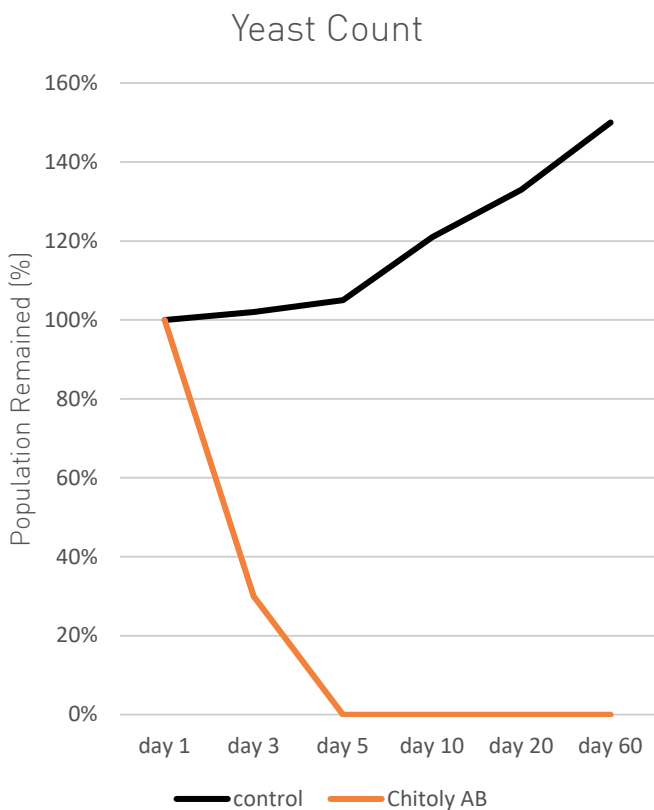


Fig. 1 Yeast Reduction In Wine

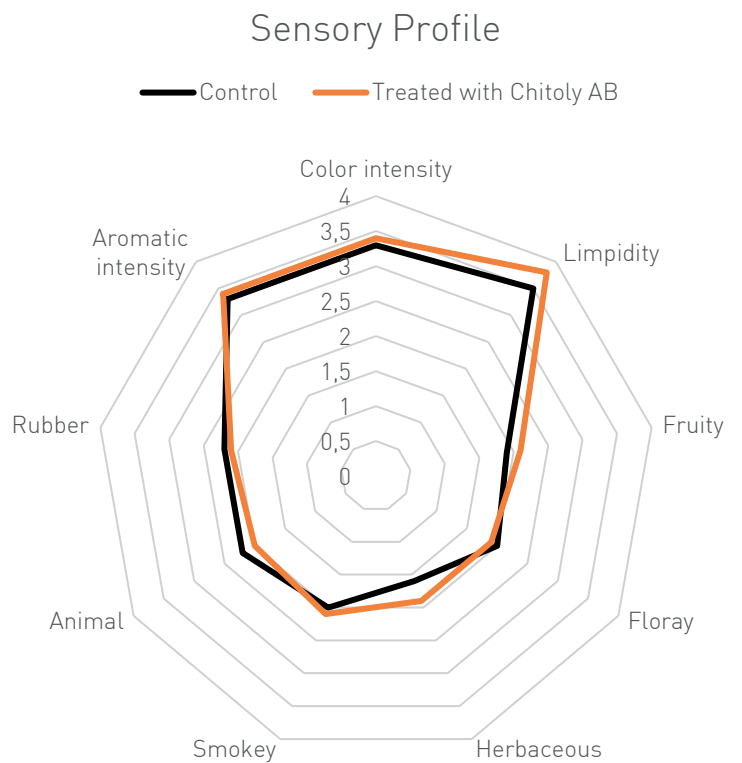


Fig. 2 Sensory Profile For Red Wine



# CASE STUDIES: COMPARISON STUDY OF CHITOSAN, PECTINASE, AND GELTATIN IN WINE CLARIFICATION

Distinct trials were carried out to find the best dosage of gelatin and pectinase for clarifying red wine. The effectiveness of clarification, encompassing aspects like clarity, clarification time, and post-clarification stability, was compared when using the optimal dosages of gelatin and pectinase against those of Chitoly™ AB. Additionally, alterations in the key constituents of the original wine resulting from these clarifying agents were compared to evaluate their influence on the wine's flavor.

Item	Chitoly™ AB	Pectinase	Gelatin
Dosage	0.04%	0.06%	0.08%
Reaction Time	2.5h	6h	8h
Dosage	No sediments within 6 months	Trace of sediments starts forming after 4 months	Slight sediments starts forming at 2 months

Chitoly™ AB serves as a positively charged coagulant suitable for clarification purposes in red wine. Its abilities encompass the coagulation of colloidal particles, binding with metal ions, and absorbing organic acids present in the wine. Following filtration, it significantly improves the wine's transparency and stability, elevates its flavor, and provides protection against wine-related issues. Chitoly™ AB proves to be an excellent choice as a clarifying agent specifically tailored for grape wine.

Item	Total Solids (g/L)	Reducing Sugars (g/L)	Alcohol by volume (%)	Total Acidity (g/L)	pH	Pectin
Before Clarification	20.7	3.6	11.2	7.05	3.56	Heavily Turbid (or cloudy)
Chitoly™ AB	20.4	3.6	11.2	6.07	3.64	No
Pectinase	20.3	3.6	11.2	7.08	3.58	No
Gelatine	20.4	3.6	11.2	7.05	3.58	Slightly Turbid (or cloudy)

Based on the data presented in the table, it is evident that the three types of clarifying agents have minimal impact on the levels of reducing sugars and total solids in the new wine during the clarification process. However, gelatin's performance in removing pectin is unsatisfactory, as it fails to completely eliminate pectin from the original wine, potentially causing pectin-related turbidity to reappear.

In contrast, both Chitoly™ AB and pectinase prove to be effective in removing pectin, albeit through different mechanisms. Pectinase functions by breaking down pectin, while chitosan operates through an adsorption process to eliminate pectin from the wine.

## CONCLUSION

Chitoly™ AB substitutes for wine products are relatively new, but their undeniable presence necessitates a keen focus on microbial safety.

The studies highlights Chitoly™ AB as an effective, natural, clean-label solution, to reduce contaminants in wine. This innovative approach allows the wine industry to confidently embrace plant-based chitosan's benefits, ensuring product safety and quality.





## APPLICATION GUIDELINE

The following guideline will assist you to get the optimum solution by using Chitoly™ AB to effectively and naturally extend the microbial stability and the shelf-life of wine.

### DIRECT ADDITION INTO FORMULATION

Follow the suggested dosages to apply Chitoly™ AB into wines applications

Ingredients	Application		Benefits	Dosage
Chitoly™ AB	Beverages	Wine	Clarification, Control Yeast contamination & Color Stabilizer	0.1-0.5 (g/Kg)

Chitoly™ AB's recommended dosages are carefully tailored to the final weight of the beverage/food product. To achieve the best results, incorporate the product into the standard production procedure, along with other custom wine formulation ingredients. The appropriate dosage of Chitoly™ AB, ranging from 0.1 to 0.5 g/kg (w/w), can be added based on the specific requirements of your process line. This ensures optimal performance and desired outcomes in your product.

### FRUIT SMOOTHIES MANUFACTURING PROCESS

Follow the representative production process flow chart of wine and the recommended stage of product incorporation to get the best efficiency for Chitoly™ AB application.

