Perfecting

enology

around the world

WINEMAKING

PRODUCTS CATALOG

2011-2012

enartis is a major Enology product line for the Esseco Group. The Enartis range inherits over 80 years of tradition and expertise that customers worldwide have come to expect from the Esseco Group. Enartis products were created and designed by specialists in winemaking who work dynamically through an international network of subsidiaries and industry-specific distributors. Meticulous details and extensive research continue to evolve and align with meeting the needs of the traditional, modern, and international consumer. The Enartis Range is the essential choice of products used by thousands of winemakers world-wide.

Each year Enartis continues to grow its international customer base and has made a significant impacts in Northern America with the acquisition and partnership of Vinquiry, Inc, in South Africa with the total acquisition of Winechem now Enartis South Africa and in Australia - New Zealand with the creation of Enartis Pacific. The collaborative team that makes up the many faces of Enartis belongs directly to the wine communities within the country and regions they operate. The Enartis team prides itself in knowing the unique diversity of the market, the geographic climate, and the multiple needs of local and global wine producers. This catalog is a contribution to all winemakers, enologists, and production workers who produce the finest wines that express and enhance all the subtleties of the different grape varieties.

www.enartis.com

Products List

Enzymes Enartis Zym

ENARTIS AND ENZYMES

In modern winemaking, the use of biotechnology allows a number of process and product goals to be achieved. The use of enzyme preparations is a good example of the soft technology approach. When used in good practice, enzymes contribute minimal interference in the process. Enartis has created a specific laboratory for enzyme technology. This is consistent with Enartis' service policy and commitment to anticipating market needs. The laboratory carries out both Quality Control and R&D activities. It defines and constantly checks the composition of each enzyme preparation according to the application for which the preparation will be used. This has enabled Enartis to make a complete range of winemaking enzymes where quality and the most recent results of scientific and applied research in the industry are gathered.

ENARTIS ZYM

All enzymes in the Enartis Zym range are obtained from selected cultures of Aspergillus niger or Trichoderma harzianum. They are free from pathogens, antibiotic activity, aflatoxin or ochratoxin A residues in accordance with the most restrictive international purity specifications. Enartis enzymes are not derived from GMOs (Genetically Modified Organisms). Constant monitoring by Enartis' ISO 9001:2008 certified Quality Program ensures that every batch complies with relevant specifications and standards. Enartis enzymes will maintain their activity for several years if stored in the original sealed package at temperatures lower than 10°C (50°F) away from sunlight.

More detailed information for each enzyme can be found on the data sheets available on the internet site at www.enartis.com.

Clarification

1000 S

PACKAGES 0.25 kg

An extremely pure and active powdered pectolytic enzyme preparation that is particularly useful for the cold settling of must. Enartis Zym 1000 S carries out a hydrolytic action on grape pectins, accelerating juice clarification.

Dosage: *1-2 g/100L (0.08-0.2 lb/1000gal)*

RS

PACKAGES 1 kg

Enartis Zym RS (rapid settling) was created to resolve fining problems in musts that are notoriously difficult to clarify, such as Muscat, Sauvignon Blanc, Verdejo and others. It has strong pectinolytic and hemicellulasic activities. In fact, this liquid enzyme has a very intense clarification action that takes place in a short amount of time. It can also be used to clarify musts that are particularly rich in pectins resulting from mechanical grape processing and high temperatures during harvest.

Dosage: *1-2 mL/100L (38-76 mL/1000gal)*

1000 SL

PACKAGES 25 kg

Enartis Zym 1000 SL is a highly purified liquid pectolytic enzyme that rapidly hydrolyzes grape pectins, accelerating the clarification and fining processes. This ready-for-use product decreases the time required for juice clarification and results in compacted lees. Enartis Zym 1000 SL's liquid state makes it particularly useful for automatic in-line dosing.

Dosage: *2-3 mL/100L (76-114 mL/1000gal)*

CLARIFYING ACTION OF ENARTIS ZYM RS:
ADDITION OF 2mL/100L, 20 MINUTES CONTACT

Flotation

QUICK

PACKAGES 1 kg • 25 Kg

Enartis Zym Quick is a liquid enzyme developed for juice clarification by flotation. Two basic requirements must be fulfilled for effective flotation: a quick decrease in juice viscosity and the formation of floccules that are large and light enough to move rapidly to the juice surface. For these reasons, the various pectolytic activities of Enartis Zym Quick (pectinlyase, polygalacturonase and pectinesterase) are present in different proportions compared to traditional fining enzymes in order to cause faster pectin hydrolysis.

Dosage: *0.5-2 mL/100L (19-76 mL/1000gal)*

Maceration White Grapes

EXTRA

PACKAGES 1 kg

Liquid pectolytic enzyme with cellulase and hemicellulase side activities specific for white grape maceration. When used during maceration, it causes an intense and rapid disruption of cell walls and membranes. This favors the extraction of aromatic precursors which strengthens varietal character, intensity and olfactory complexity of wine. During cryomaceration, it shortens contact time, which leads to more sensible refrigeration costs. During pressing, it leads to higher quality must as well as increased yields. Furthermore, Enartis Zym Extra's pectin degradation activity facilitates juice clarification - no additional enzyme additions are required.

Dosage: *20-50 mL/ton*

TARGET

PACKAGES 1 kg

A liquid enzyme with pectolytic and macerative activity, it can be used to clarify musts as well as for skin maceration of white grapes. Because it has high activity at low pHs (laboratory experiments have shown that at pH 2.8, over 50% of its clarification action is retained), it is recommended for the treatment of musts destined for the production of sparkling wine bases and musts from unripe grapes. When used during maceration, it increases extraction of aromatic precursors, which will enhance the varietal characteristics of the wine.

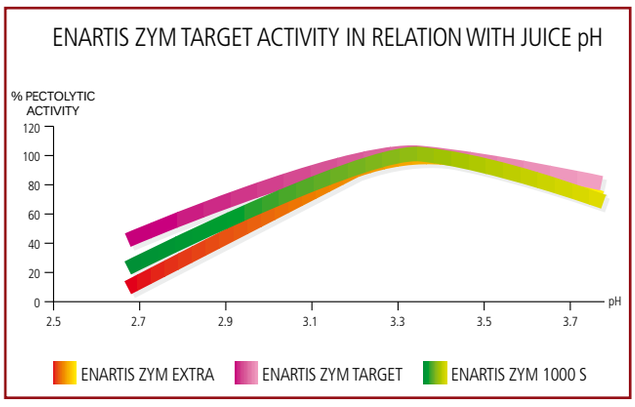
Dosage: *1-4 mL/100L (38-150 mL/1000gal) in juice clarification*
10-40 mL/ton in white grape maceration

CARACTÈRE

PACKAGES 0.25 kg

Powdered enzyme for maximizing juice yield and aroma expression. Its high concentrations of pectolytic and hemicellulase activities cause a rapid cell breakdown and reduction of juice viscosity, factors that are fundamental for high juice yields and good extraction of aroma precursors. Subsequently, the ß-glycosidase activity transforms these odorless glycosylated precursors into free aromatic compounds characteristic of the grape variety, thus allowing the production of more intense and complex wines. When used in the wine, Enartis Zym Caractère enhances aromatic intensity and improves clarification.

Dosage: *10-30 g/ton in maceration*
30-40 g/100L (2.5-3.4 lb/1000gal)



AROM MP

PACKAGES 0.25 kg • 1 kg

Enartis Zym Arom MP is a new micro granular preparation for the maceration of white and red grapes. The secondary hemicellulase and protease activities which it possesses aggressively degrade the cell walls and membranes of grape skins. This action results in the solubilization of not only aromatic precursors which are contained in the vacuoles, but also of those which are immobilized in the cell wall and membrane structure.

Wines treated with Enartis Zym Arom MP therefore, present an olfactory profile which is characterized by intense primary aromas of fruit which are complex and persistent. In white and rosé vinification, its protease activity contributes to protein stability and reduces bentonite usage.

Dosage: *20-30 g/ton*

Extraction

COULEUR

PACKAGES 0.25 kg • 25 kg (for the liquid form)

Powdered pectolytic enzyme with side activities specifically developed for the maceration of red grapes. It accelerates and intensifies the extraction of polyphenolic substances (anthocyanins and tannins in particular) contained in grape skins. Wines made with Enartis Zym Couleur are therefore richer in phenolic substances, more intense and fruity on the nose and more structured on the palate. Enartis Zym Couleur also enhances color stability and often color intensity. Also available in liquid form, it is recommended for the production of young red and rosè wines.

Dosage: *20-40 g/ton*

AROM MP

PACKAGES 0.25 kg • 1 kg

Enartis Zym Arom MP is a new micro granular preparation for the maceration of white and red grapes. The secondary hemicellulase and protease activities which it possesses, aggressively degrade the cell walls and membranes of grape skins. This action results in the solubilization of not only aromatic precursors which are contained in the vacuoles, but also of those which are immobilized in the cell wall and membrane structures. Wines treated with Enartis Zym Arom MP therefore, present an olfactory profile which is characterized by intense primary aromas of fruit which are complex and persistent. When used in red vinification, it enriches the wine with polysaccharides and polyphenolic substances which assures gustatory softness and color stability.

Dosage: *20-30 g/ton*

BALANCE

PACKAGES 0.25 kg

Enartis Zym Balance is the culmination of three years' experimentation conducted by the R&D Department of Enartis and has resulted in an optimal formulation for the maceration of red grapes. It is a powdered pectolytic enzyme containing a spectrum of complimentary activities. This product extracts polyphenolic substances from the skins, resulting in the stabilization of color compounds. Enartis Zym Balance allows for the production of wines which are not only richer in polyphenolic substances but possess greater antioxidant capacity as well. When evaluated, wines made with Enartis Zym Balance appear to have better color, aroma complexity, structure and balance. Enartis Zym Balance is recommended for the production of big red wines.

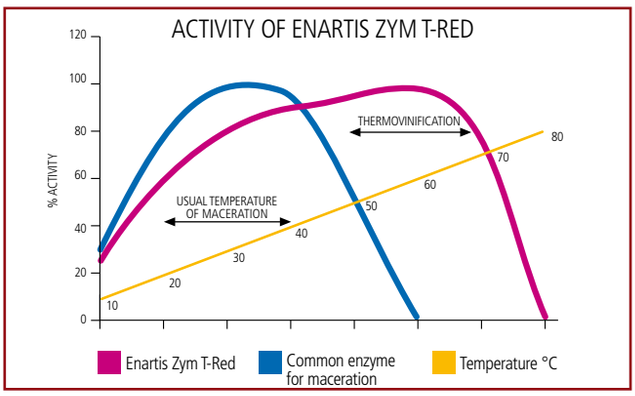
Dosage: *20-40 g/ton*

T-RED

PACKAGES 1 kg

This liquid enzyme possesses pectolytic and macerative activities and is resistant to temperatures in excess of 70°C (158°F). Therefore, it can be used in musts destined for thermovinification to improve extraction and stabilization of color substances as well as preserve the structure of wines produced with this technology. When used in either thermovinification or in classic maceration, it is very effective in improving clarification as well as the filterability of must and wine.

Dosage: *5-40 mL/ton*



Maturation

ÉLEVAGE

PACKAGES 0.25 kg

Enartis Zym Élevage is a powdered pectolytic enzyme that has significant ß-glucanase activity. It can accelerate yeast cell lysis and increase the mannoprotein content of wines matured *sur lies*. Recent research in various countries has demonstrated that the mannoproteins obtained following treatment with Enartis Zym Élevage give wine greater stability against tartrate precipitation, oxidation and poor color. In addition, the mannoproteins improve sensory properties by enhancing fullness. Enartis Zym Élevage is also effective in improving the filterability of wines obtained from moldy grapes.

Dosage: *2-5 g/100L (0.2-0.4 lb/1000gal)*

Lysozyme

LYSO

PACKAGES 1 kg

Enartis Zym Lyso is a purified, microgranulated preparation of lysozyme. When added to must or wine, it imparts an antibacterial activity specifically for the control of malolactic bacteria. It will not interfere with primary fermentation or the organoleptic profile of the wine. Enartis Zym Lyso can be added as an alternative to sulfur dioxide to control the development of malolactic bacteria, even at elevated pHs, while still maintaining its activity.

Dosage: *10-50 g/100L (0.8-4.2 lb/1000gal)*

ENARTIS ZYM QUICK REFERENCE CHART

PRODUCT	FORM	ACTIVITY	APPLICATION	ENOLOGICAL EFFECTS	DOSAGE
1000 S	POWDER	PECTINASE	• WHITE JUICE SETTLING	• RAPID CLARIFICATION OF JUICE	1-2 g/100L [0.08-0.2 lb/1000gal]
1000 SL	LIQUID	PECTINASE	• WHITE JUICE SETTLING	• RAPID CLARIFICATION OF JUICE	2-3 mL/100L [76-114 mL/1000gal]
RS	LIQUID	PECTINASE HEMICELLULASE	• DIFFICULT SETTLING • FLOTATION	• RAPID SETTLING AND CLARIFICATION • REDUCE THE TIME OF ENZYMATIC CONTACT	1-2 mL/100L [38-76 mL/1000gal]
QUICK	LIQUID	PECTINASE	• FLOTATION	• REDUCE THE TIME OF ENZYMATIC CONTACT • INCREASED FLOTATION CAPACITY • REDUCED VOLUME OF LEES	0.5-2 mL/100L [19-76 mL/1000gal]
TARGET	LIQUID	PECTINASE HEMICELLULASE	• SETTLING OF LOW pH WHITE JUICE • MACERATION OF WHITE GRAPES	• RAPID CLARIFICATION OF THE JUICE • INCREASED AROMATIC POTENTIAL	1-4 mL/100L [38-150 mL/1000gal] IN JUICE 10-40 mL/ton ON GRAPES
EXTRA	LIQUID	PECTINASE HEMICELLULASE	• MACERATION OF WHITE GRAPES	• INCREASED AROMATIC POTENTIAL • INCREASED PRESS YIELD	20-50 mL/ton
CARACTÈRE	POWDER	PECTINASE HEMICELLULASE β-GLUCOSIDASE	• MACERATION OF WHITE GRAPES • TREATMENT OF WINES	• TRANSFORMATION OF ODORLESS AROMATIC PRECURSORS INTO ACTIVE AROMATIC COMPOUNDS	10-30 g/ton
AROM MP	POWDER	PECTINASE CELLULASE HEMICELLULASE PROTEASE	• MACERATION OF WHITE AND RED GRAPES	• INCREASED FRUITY AROMATIC POTENTIAL • REDUCTION OF THE TREATMENT WITH BENTONITE • REDUCED WINE ASTRINGENCY	20-30 g/ton
COULEUR	POWDER LIQUID	PECTINASE HEMICELLULASE CELLULASE	• MACERATION OF RED GRAPES DESTINED FOR EARLY TO MARKET RED WINES	• IMPROVED COLOR STABILITY • INCREASED ORGANOLEPTIC BALANCE	20-40 g/ton
T-RED	LIQUID	PECTINASE HEMICELLULASE CELLULASE	• THERMOVINIFICATION AND MACERATION OF RED GRAPES DESTINED FOR EARLY TO MARKET RED WINES	• IMPROVED COLOR STABILITY • EASIER CLARIFICATION • INCREASED FILTRATION YIELD	5-40 mL/ton
BALANCE	POWDER	PECTINASE HEMICELLULASE CELLULASE	• MACERATION OF RED GRAPES DESTINED FOR GRAND RED WINES	• INCREASED STRUCTURE • INCREASED POLYPHENOLIC POTENTIAL • BETTER OLFACTORY COMPLEXITY • IMPROVED COLOR STABILITY	20-40 g/ton
ÉLEVAGE	POWDER	PECTINASE β-GLUCANASE	• YEAST CELL LYSIS AND CLARIFICATION OF *BOTRYTIS* AFFECTED WINES	• FASTER AND BIGGER EXTRACTION OF YEAST POLYSACCHARIDES AT THE *SUR LIES* PHASE • IMPROVEMENT OF CLARIFICATION AND FILTERABILITY OF *BOTRYTIS* AFFECTED WINES	2-5 g/100L [0.2-0.4 lb/1000 gal]
LYSO	POWDER	LYSOZYME	• PREVENTION AND DELAY OF THE MALOLACTIC FERMENTATION	• MANAGEMENT OF MALOLACTIC BACTERIA ACTIVITY	10-50 g/100L [0.8-4.2 lb/1000 gal]

know more ...About Enartis Zym Quick

ENZYME SPECIFIC FOR MUST FLOTATION

The technique of flotation is based on the physical law of Stokes:

$$v = \frac{D^2 * g}{18\,\eta}\,\Delta\rho$$

- v = flocs speed
- D = flocs diameter
- g = gravitational acceleration
- η = liquid viscosity
- $\Delta\rho$ = difference of density between liquid and solids

Factors influencing flotation are:
Viscosity: it must be reduced because it slows down flocs lift to the surface. Viscosity depends on
- temperature: higher the temperature, lower the viscosity. But attention: higher the temperature, lower gas solubility;
- pectins content.

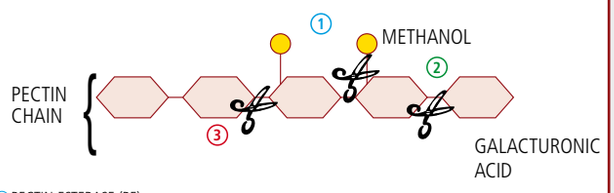
Solids: they must be < 10%

Flocs diameter: greater the dimension quicker the lift to the surface.

Difference of density: it depends on the gas capability to adhere to the flocs surface that means that it depends on the fining agents applied in flotation.

Fining agents:
- pectolytic enzymes
- gelatin
- bentonite
- silica sol

ACTION OF THE PECTINOLYTIC ACTIVITIES



① PECTIN-ESTERASE (PE)
② POLY-GALACTURONASE (PG)
③ PECTIN-LYASE (PL)

- **PL** quickly reduces juice viscosity.
- **PG** completely hydrolyzes pectins but only after that **PE** has eliminated methanol residues.

An enzyme specific for flotation should: **Quickly reduce juice viscosity** (the time of contact is often lower than 6 hours) therefore it should have a high PL content.

Be effective at quite low temperature (< 18°C)

Cause only a partial hydrolysis of pectins:
pectins must be hydrolyzed to reduce juice viscosity but they can keep a dimension of flocs that help their lift to the surface. This means that an enzyme specific for flotation must have a balanced PG and PE content.

Enartis Zym Quick contains more than 200 units PL/g while classic pectolytic enzymes contain only 70-90 units PL/g. Therefore, it allows you to obtain a clear juice very quickly. It helps the action of the fining agents (gelatin, silica sol and bentonite) and it guarantees the formation of compact lees perfectly separated from the clear juice.

FLOTATION TRIALS

20 ppm enzyme, 3 hours contact
+ 100 ppm Hydroclar 30, 250 ppm Sil Floc®,
500 ppm Bentolit

ENZYME	TURBIDITY (NTU)	VOLUME OF LEES
ENARTIS ZYM QUICK	74	270 ml
ENARTIS ZYM 1000 S	71	430 ml

HOW TO USE ENARTIS ZYM QUICK

Dosage: usually 0.5-2 ml/100L (19-76 mL/1000gal). It's recommended to do trials with a mini flotation equipment in order to evaluate the right dosage of enzyme and fining agents. At pH >3.8 flocs formation is difficult even after hydrolysis of pectins. In this case, reduce the pH if possible, or increase the dosage of enzyme.

know more ...About Extraction

EFFECT OF THE APPLICATON OF MACERATION ENZYMES ON RED WINE COLOUR STABILITY

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INTRODUCTION

It is known that the extraction of anthocyanins and tannins from red grapes takes place during fermentation on skins, and that the extent of extraction and the combination of these compounds determines the colour, structure and ageing potential of red wines.
Many oenologists have questioned the effectiveness of the use of pectolytic enzymes during the maceration of red grapes, especially when maceration times of 15-20 days are used. Castino (1988), Canal-Llauberes (1990), Gigliotti and Bucelli (1993), Ducruet et al. (1997), Nicolini and Mattivi (1997) and Chinnici et al. (2000) proposed the use of pectolytic enzymes to increase the extraction of coloured compounds, but the desired effect has not always been observed. Amrani Joutei and Glories (1994, 1995), Villettaz (1996) and Ducruet et al. (2000) proposed that extraction of the anthocyanins, which are located exclusively in skin cell vacuoles, is due to degradation of the proteinaceous portions of cellular membranes caused

by sulphur dioxide addition. Tannins found in vacuoles may be attached to the vacuolar membranes and to the polysaccharides of the cell wall. It is possible that pectinolytic enzymes might favour the extractability of upper-middle molecular weight tannins, thus improving the structure of the wine. The presence of side activities in pectolytic enzyme formulations, such as cellulases, hemicellulases and proteases, may also allow better extraction of grape polysaccharides, with positive effects on wine structure (Doco et. al., 1995).

Enartis and the Institute of Oenology at Gaiole in the Chianti region have conducted experiments using Sangiovese grapes to gain understanding of the role of maceration enzymes during the production of red wines. The following parameters were examined:

1. The effect on wine colour of four enzymatic preparations containing side activities. Two of the enzymes were commercially available products (Enartis Zym Couleur (UC) and Enartis Zym Balance (PB)), and two were experimental preparations.

2. The effect of enzymatic treatment during extended skin contact.

3. The development of colour and sensory characters over time during wine storage.

EXPERIMENTAL DESIGN AND METHODOLOGY

The formulations used are characterized by their enzymatic activity expressed in units per gram of product (u/g), as shown in Table 1.

ENZYME	PG	PE	PL	GAL	PAC+CEL
ENARTIS ZYM COULEUR	624	760	66	820	240
E2	5200	970	110	2250	315
ENARTIS ZYM BALANCE	3000	650	100	1750	510
E4	3500	760	120	2100	540

LEGEND
PG = Polygalacturonase
PL=Pectin-Lyase
GAL=Galactanase
PE=Pectinmethylesterase
PAC=Acid protease
CEL=Cellulase

TABLE 1 - ENZYMATIC ACTIVITY OF THE PREPARATIONS USED, EXPRESSED AS ACTIVITY PER GRAM (u/g)

Table 2 shows the enzyme additions that were made to each trial. Enzyme additions were made to 4 trial batches that were processed using 8 days of skin contact. A trial was also carried out using 20 days of skin contact with one enzyme preparation, Enartis Zym Couleur. Control batches with 8 and 20 days of skin contact to which no enzyme was added were also set up.

	SANGIOVESE		
		EXPERIMENTAL CODE	
ENZYME	DOSAGE g/100 kg grapes	8 DAYS MACERATION	20 DAYS MACERATION
CONTROL	NONE	T-8	T-20
ENARTIS ZYM COULEUR	2	UC-8	UC-20
E2	2	E2-8	NONE
ENARTIS ZYM BALANCE	2	PB-8	NONE
E4	2	E4-8	NONE

TABLE 2 - EXPERIMENTAL DESIGN

Each trial was conducted using 100 kg of Sangiovese grapes from a homogenously mixed batch of fruit. 50 ppm of sulphur dioxide was added to each portion of must after crushing. 300 ppm of selected yeast was added to each portion of must three hours after the addition of sulphur dioxide. Fermentation was carried out in 120 litre stainless steel tanks.

The caps in the fermenting wines were punched down twice per day. The skins were soft pressed and the press wine was blended with the free run wine. Selected malolactic bacteria were added to the wine after racking.

At the end of the malolactic fermentation, anthocyanins content and colour were measured. In particular, the following parameters were monitored, as described by Di Stefano et al. (1989; 1997) and Glories (1984):

1. Total polyphenols as (+) catechin (mg/L).

2. Optical density at 420, 520 and 620 nanometers (E420, E520, E620). Colour hue was determined by the ratio E420/E520 and the colour intensity was determined by adding the values obtained for E420 and E520.

3. Total anthocyanins index in mg/L and the monomeric anthocyanins index by elution from PVP with acidified ethanol.

4. The change in E520 reflecting the following components: dAI (monomeric anthocyanins), dAT (polymerized pigments decolorized by sulfur dioxide) and dTAT (polymerized pigments incapable of being decolorized by sulfur dioxide).

Sensory analyses were conducted after the wine had been in the bottle for 6 months, approximately 1.5 years after vinification. The tasting panel consisted of 8 expert judges. The Weiss non-structured tasting sheet was used. The results were subjected to the Friedman Test (Conover, 1980) and the minimum significant difference between wines was determined with p=0.05.

RESULTS AND DISCUSSION

During fermentation, the absorbance at 520 nm (E520) was monitored. The results are shown in Figure 1. The differences seen early in the maceration were small and not significant in all cases, except UC-8 at the end of fermentation. The same result occurred with the fermentations using 20 days of skin contact. These results confirm that enzymatic treatments do not significantly affect the extractability of anthocyanins during fermentation on skins.

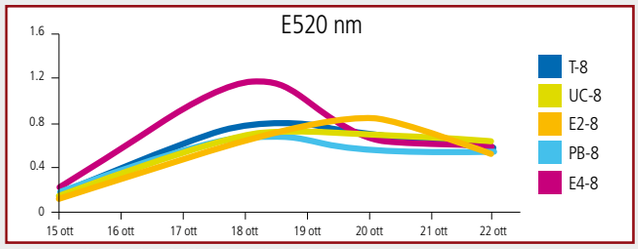

FIGURE 1 - EVOLUTION OF RED COLOR DURING MACERATION

However, the results of the trials show that enzymatic treatments are effective in maintaining colour stability during ageing, as indicated by colour hue and colour intensity. It appears that a prolonged maceration time also has a positive effect on these parameters. In this trial, the wines treated with enzymes and/or long maceration had 20% more colour intensity than the control wine after 18 months of storage (Fig 2). The enzymatic preparations that were added appear to have resulted in the formation of a larger amount of polymerized pigments, giving results similar to those obtained for wines subjected to prolonged maceration. Four years after vinification, the differences in colour intensity were reduced, but the colour intensity of the enzyme treated wines was still 10% higher than the control.

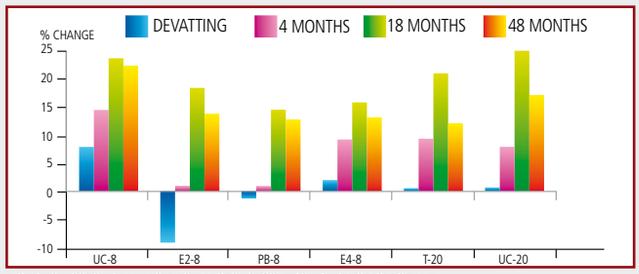

FIGURE 2 - COLOUR INTENSITY CHANGES VS. CONTROL DURING AGING TIME

Four months after vinification, the absorbance at 520 nm indicated that in all of the experimental wines, in excess of 50% of the pigment was affected by SO_2. A different picture emerged after 18 months in storage (Fig 3). Here, the absorbance at 520 nm shows that monomeric anthocyanins (dAI) are responsible for a small part of the colour and approximately 50% of the pigments are not affected by SO_2 (dTAT).

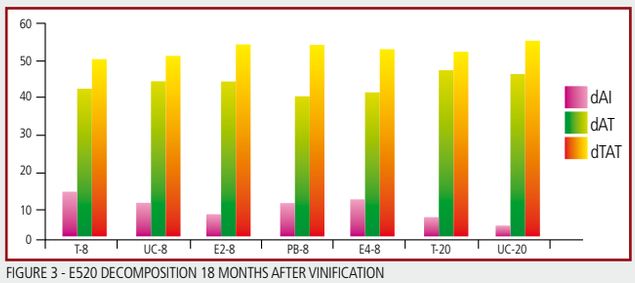

FIGURE 3 - E520 DECOMPOSITION 18 MONTHS AFTER VINIFICATION

As can be see in Figure 4, 48 months after vinification, the quantity of free anthocyanins is very low, and 80% of the colour is composed of stable pigments (dTAT).

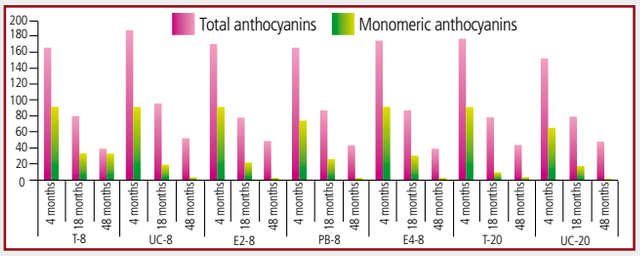

FIGURE 4 - EVOLUTION OF TOTAL AND MONOMERIC ANTHOCYANINS DURING WINE MATURATION

The hue of the enzyme treated wines (degree of brownness) was lower than the control (Fig. 5). Since the best conditions for colour after ageing result when the stable pigments are high and the hue is less than 1, wines made under UC-8, UC-20 and PB-8 conditions present the best colour characteristics. The use of enzymes gave an increase in total polyphenols up until 18 months, regardless of whether 8 or 20 days of maceration were used. After 48 months, the same phenol content was seen in both the control wines and wines treated with enzymes.

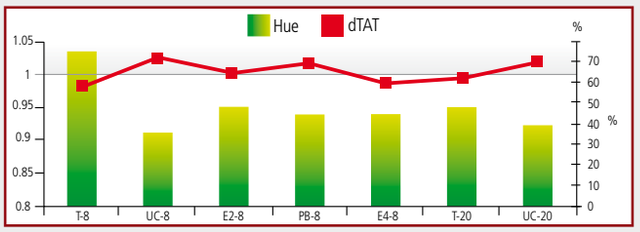

FIGURE 5 - HUE AND PERCENTAGE OF STABLE PIGMENTS AFTER 4 YEARS

SENSORY EVALUATION

The wines from all fermentations treated with enzymes were found to be better than the control (T-8). The control exhibited less structure, less delicacy, simple aroma notes and a dull hue (Fig 6) when compared to the enzyme treated wines. The wine made with Enartis Zym Balance (PB-8) exhibited a significant improvement in complexity and was judged the best overall. Lengthening of the maceration time also gave interesting results. Maceration time of 20 days (T-20) resulted in wines superior to those made using shorter times (T-8). The enzymatic treatment with Enartis Zym Couleur (UC-20) produced wines that are very structured and significantly superior to the control wine macerated for 20 days without enzymes.

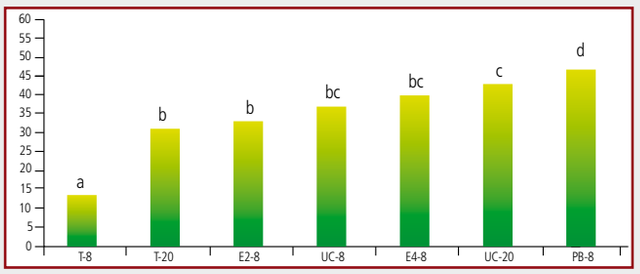

FIGURE 6 - EVALUATION OF WINE PREFERENCE BY FRIEDMAN TEST USING THE WEISS SHEET. SAMPLES WITH THE SAME LETTER PRESENT NO SIGNIFICANT DIFFERENCES WITH p=0,05

CONCLUSIONS

The most important effect of the addition of enzymatic preparations during maceration is increased colour stability, reflected by greater colour intensity and lower hue at 18 months after vinification. The addition of enzymes did not have a large influence on the quantity of anthocyanins extracted during fermentation. It appears, however, that the use of enzymes has allowed the extraction of greater quantities of tannins, thus leading to the formation of greater quantities of stable polymerized pigments.

The use of enzymes has produced wines with enhanced sensory properties, particularly in terms of structure, fullness, balance and aroma complexity. Lengthening of the maceration time to 20 days in the absence of enzymes yielded wines that were comparable in quality to those made using enzyme additions and 8 days of maceration. By using enzyme treatment, wines can be produced in a shorter period of time, with less cost, tank space, refrigeration and labour. The wine to which Enartis Zym Couleur (UC-20) was added was found to be better than the 20 day maceration control (T-20). This indicates that enzyme addition has a positive effect even when it is used with long maceration times.

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know more ...About Enartis Zym T-Red

USE OF ENZYMATIC PREPARATION IN RED WINE MACERATION AND ITS EFFECT ON WINE FILTRATION

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DARKO OBRADOVIC - Enartis, Esseco Group Australian Representative

It is well known that polysaccharides in grape juice and wine clog filters. This fact has repercussions in terms of cost and on the wine filtration process, especially in the case of young wine production. The polysaccharides that are clogging the filters, present in wine made with healthy grapes, are mostly pectins originated from the grape cell walls. The loss of colloidal properties is the consequence of hydrolysis catalyzed by enzymes like pectinases but also cellulases and hemicellulases.

During the 2006 harvest the enzymatic preparation Enartis Zym T-Red was tested in order to evaluate the effect of its application during red grape maceration on wine filterability.

EXPERIMENT DESIGN

The experiment was carried out at the "Il Tralcio srl" winery located at Bricherasio in Turin Province.

The enzyme used, Enartis Zym T-Red, is a pectolitic enzyme, with complementary cellulase and hemicellulase activities, recommended for maceration and thermal maceration of red grapes. In this trial, the enzyme addition during maceration has been evaluated in relation to its consequences on

- wine phenolic composition
- wine filterability
- wine organoleptic quality.

The fermenters used in the experiment have a capacity of 800 hL and are equipped with temperature control (max 30 °C). The samples collected during maceration have been frozen and stored until their analysis.

A test to determine ease of filtration was carried out with a depth filter with a filtration surface of 5 m^2. Filtration was applied as following:

- precoating: 10 kg of cellulose adjuvant
- accretion: 6 + 6 kg course diatomaceous earth
- filtered wine volume: 100 hL for each treatment

The experiment design is shown in Figure 1, meanwhile Table 1 summarizes the operation notebook.

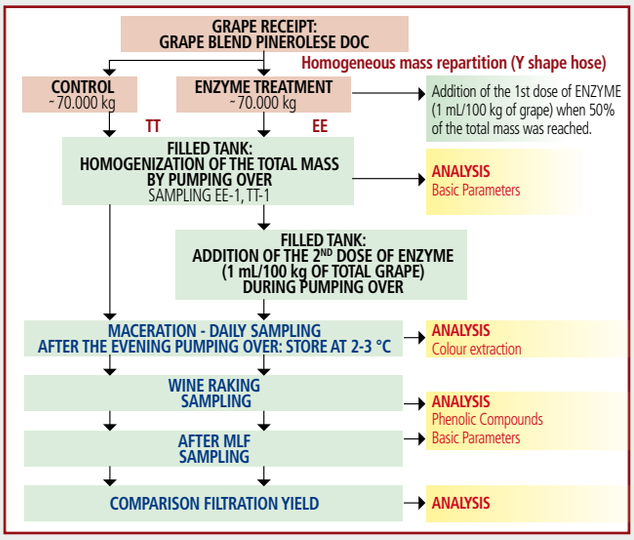


FIGURE 1 - EXPERIMENT DESIGN

TABLE 1 - OPERATIONS NOTEBOOK (dd.mm.yyyy)

DATE	HOUR	DESCRIPTION
29.09.2006	9.00	CRUSH BEGINS (PINEROLESE ROSSO DOC GRAPE BLEND WITH ABOUT 50% OF BARBERA GRAPE)
	15.00	+ 1 kg POTASSIUM METABISULFITE
	17.30	+ 5 kg ACTIVE DRY YEAST + 3 kg TANENOL ROUGE + 4 kg SUPERVIT
	18.30	+ 2 kg POTASSIUM METABISULFITE
	19.40	TREATMENT EE: + 700 mL ENARTIS ZYM T-RED
30.09.2006	10.00	+ 1 kg POTASSIUM METABISULFITE
	14.30	+ 5 kg ACTIVE DRY YEAST + 3 kg TANENOL ROUGE + 4 kg SUPERVIT
	17.30	+ 2 kg POTASSIUM METABISULFITE
	19.00	TOTAL MASS ABOUT 7 ton, TREATMENT EE: + 700 mL ENARTIS ZYM T-RED
01.10.2006	9.00	PUMPING OVER BEGINS (30 MIN EVERY 6 HOURS)
05.10.2006	20.00	PUMPING OVER ENDS
06.10.2006	16.00	RAKING, + 4 kg TANENOL ROUGE, SCALE DOWN TO 400 hL FOR EACH TREATMENT
08.10.2006		CHAPTALIZATION
21.11.2006		RAKING, + 50 mg/L POTASSIUM METABISULFITE
0 4.01.2007		RAKING, + 40 mg/L POTASSIUM METABISULFITE
15.02.2007		RAKING, + 30 mg/L POTASSIUM METABISULFITE
28.02.2007		FILTRATION

NOTES
TT= control; EE=enzyme addition
TANENOL ROUGE: preparation with hydrolysable and condensed tannins
SUPERVIT: yeast nutrient

RESULTS

Chemical and phenolic composition of wines

Alcoholic fermentation occurred regularly in the two treatments during skin maceration, as shown by the ethanol evolution in Figure 2. After chaptalization, carried out right after the first raking, the fermentation progression showed to be better in the TT treatment.

Total Anthocyans (AT) and non-anthocyanic flavonoids (FNA) extraction kinetics during maceration phase do not seem to highlight significant differences between treatments (Figures 3 and 4). The initial decrease observed for both parameters is most likely due to the non complete homogeneity of the mass, as a consequence of the time required for the grape reception (about 36 hours). The amount of total flavonoids reached at the drawing off (about 2550 mg/L in both treatments) are enough to assure a sufficient structure to the wine, suitable for a product essentially produced from Barbera grapes.

The major analytical parameters measured at racking and at the time of filtration are showed in Table 2. Malolactic fermentation has been completed one month after the drawing off. The two treatments seem slightly different in their total acidity.

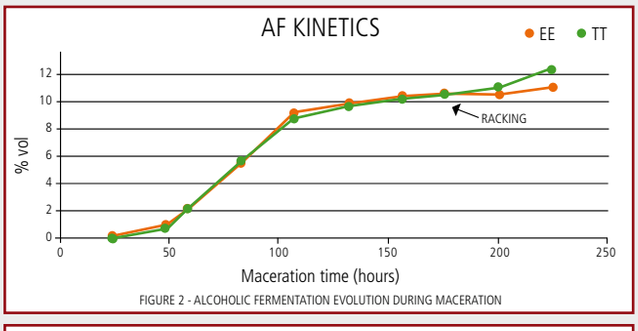


FIGURE 2 - ALCOHOLIC FERMENTATION EVOLUTION DURING MACERATION

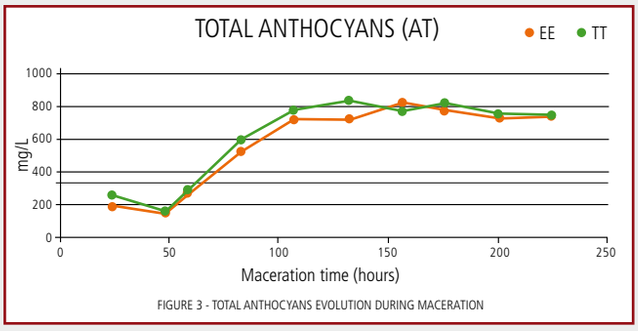


FIGURE 3 - TOTAL ANTHOCYANS EVOLUTION DURING MACERATION

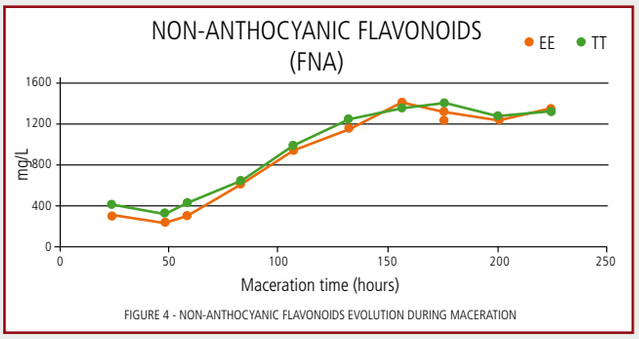


FIGURE 4 - NON-ANTHOCYANIC FLAVONOIDS EVOLUTION DURING MACERATION

ANALYTICAL PARAMETERS MEASURED AT DRAWING OFF AND AT FILTRATION

SAMPLE CODE	DATE	ALCOHOL %VOL	pH	TOTAL ACIDITY (g/L)	TARTARIC ACID (g/L)	MALIC ACID (g/L)	NOTES
EE-10	10-oct	11.0	3.35	7.9	3.7	1.6	Drawing off
EE-PF	28-feb	13.0	3.45	6.0	2.4	-	Before Filtration
EE-DF	28-feb	13.0	3.45	6.0	2.4	-	After Filtration
TT-10	10-oct	12.2	3.39	7.6	3.6	1.5	Drawing off
TT-PF	28-feb	12.8	3.46	5.5	2.2	-	Before Filtration
TT-DF	28-feb	12.8	3.44	5.4	2.3	-	After Filtration

TABLE 2

The data on the phenolic composition of the wines are resumed in Table 3.

PHENOLIC COMPOUND FROM DRAWING OFF TO FILTRATION

SAMPLE CODE	DATE	AT (mg/L)	AM (mg/L)	% AC	FT (mg/L)	FRV (mg/L)	PC (mg/L)	FRV/PC
EE-10	10-oct	745	342	54.1	2389	-	-	-
EE-11	21-nov	448	279	37.7	2117	-	-	-
EE-12	20-dic	461	264	42.7	1835	-	-	-
EE-before filtr.	28-feb	358	207	42.1	1813			
EE-after filtr.	28-feb	347	209	39.8	1776	795	2684	0.296
TT-10	10-oct	766	504	34.2	2401	-	-	-
TT-11	21-nov	480	329	31.4	2214	-	-	-
TT-12	20-dic	490	316	35.5	1936	-	-	-
TT-before filtr.	28-feb	401	247	38.4	1944	-	-	-
TT-after filtr.	28-feb	396	243	38.6	1930	829	2560	0.324

TABLE 3

AT= total anthocyans; AM= monomeric anthocyans; AC= bound anthocyans;
FT= total flavonoids; FRV= flavans reactive to vanillin; PC= proanthocyanidins

A notable reduction of the anthocyanic composition was recorded, about 50% of the initial content in just a little less than five months. The total anthocyans absolute values (AT) are slightly higher in the TT treatment but the fraction of combined anthocyans is higher in the treatment EE. After filtration, the analysis of the tannins in the samples is highlighting a higher content in proanthocyanidins (PC) and a lower content in flavans reactive to vanillin (FRV) in the EE treatment compared with the control. The corresponding value FRV/PC, inversely related to the average degree of polymerization is therefore slightly lower in the EE compared to the TT treatment. A low value of this corresponds to less aggressive astringent tannins.

Colour fraction index at pH 0 (Di Stefano et al., 1997) is providing information on the binding status of the pigments (Table 4). There is evidence that the enzymatic treatment, within even a few days after devatting, produces a higher concentration of polymerized fractions (dTAT) which remain stable during storage. After filtration a decrease of the dTAT' and PP values was observed. Due to retention of macromolecules of higher dimensions the polymerized fraction altogether (dAT' and dTAT') are greater in EE after filtration.

COLOUR CHARACTERISTICS: CIELAB AND GLORIES COLOUR INDEX BEFORE (PF) AND AFTER FILTRATION (DF)

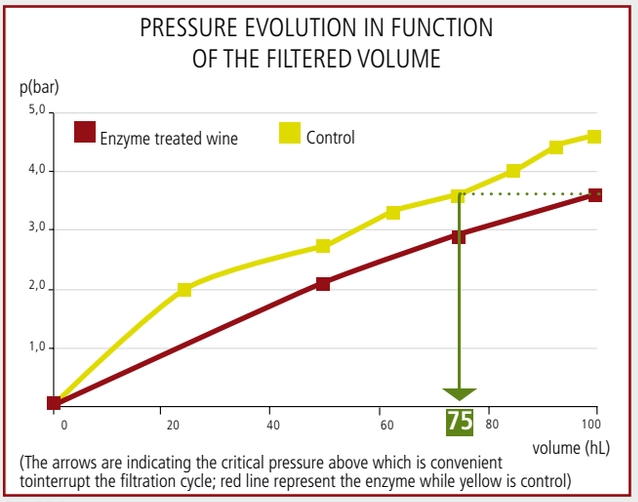
SAMPLE	L*	a*	b*	h*(°)	C*	IC (1cm)	TC	% yellow	% red	% blue
EE-PF	7.64	37.22	13.15	19.5	39.48	13.60	0.600	32.9	54.9	12.2
EE-DF	9.52	40.23	16.39	22.2	43.44	13.32	0.591	32.8	55.5	11.7
TT-PF	8.05	37.76	13.85	20.1	40.22	13.57	0.580	32.4	55.8	11.8
TT-10	10.39	41.38	17.87	23.4	45.08	13.12	0.570	32.2	56.5	11.2

TABLE 4

The colour evolution after 5 month from the draw off is summarized in Table 4 by the classical colour index of Glories (IC'and TC) and CIELAB. The colour intensity (IC') and the colour hue (TC) in the two treatments do not highlight significant differences. Moreover, it is possible to note how filtration caused a reduction of the Glories index values coherently with what was already observed for the polymeric pigments. Analysing the CIELAB results, it is possible to observe a prevalence of the yellow component (b*) in the TT treatment reflecting in the hue (h*) which appears less red than when the enzymatic preparation was used. Moreover the EE treatment showed lower L* (lightness) and also lower chroma (C*), inversely correlated with the colour intensity.

Filterability

The critical pressure above which it is convenient to interrupt the filtration cycle, as indicated by the filter operator, is about 3.6 bar. This value was reached after 75 hL of control wine were filtered, that is 25% lower than the EE wine with a similar pressure evolution. The duration of the filter cleaning cycle has been evaluated as much as 20 minutes. In an operative context, for a batch of 400hL, is reasonable to hypothesise that 5 cycles of filtration are necessary for a wine like the control wine whereas only 4 are necessary for a wine treated with the enzyme Enartis Zym T-Red. Therefore, with a similar flow, the operation time can be reduced by 20%. The cost difference is shown in Table 5. In this trial the technological operations have been carried out in parallel therefore the differences are essentially due to the use of enzymatic preparation, to the product and to the filtration time.



(The arrows are indicating the critical pressure above which is convenient tointerrupt the filtration cycle; red line represent the enzyme while yellow is control)

FIGURE 5

In reality other factors are contributing to the cost difference like the increment of the not easy to quantify maintenance and amortization quotes, due to the higher equipment usage. Finally, it is necessary to point out that the lower consumption of diatomaceous earth contributes to a sound working environment, a less tangible cost. The costs of enzyme treatment was reduced due to the lower amount of operations that have to be carried out.

COST DIFFERENCE BETWEEN CONTROL AND ENZYME TREATMENT BASED ON 400hL HYPOTHESIZING 5 CYCLES FOR TT AND 4 CYCLES FOR EE.

OPERATION/PRODUCT	AMOUNT	UNITARY COST (€)	CONTROL TREATMENT COST (€)	ENZYME TREATMENT COST (€)
Enzyme Enartis Zym T RED	0.8 L	78.90	-	63.12
Precoating	10 kg	2.01	20.10	-
Diatomaceous earth	12 kg	0.94	11.28	-
Wine loss (1.5 L/kg diatomaceous earth)	18 L	1.27 (bulk wine)	22.86	-
Operator	1.5 hours	18.00	27.00	-
Electricity			0.60	-
Diatomaceous earth waste treatment	22	0.50	11.00	-
		Total	92.84	63.12
			Difference (EE-TT)	**-29.72**
			Difference per hL	**-0.0743**

TABLE 5

The Duo-Trio has been used to highlight the sensory differences between treatments; the results are showed in Figure 6. A considerable number of judges who paired the sample in the correct way, attributed their answer to increased softness of enzyme treated wine

DUO-TRIO TEST RESULTS

JUDGES	38
CORRECT MATCHES	22
MINIMAL NUMBER OF CORRECT MATCHES (P = 0.05)	25

TABLE 6

CONCLUSIONS

In summary results indicate the following effects of Enartis Zym T-Red enzyme:

1. promotion of anthocyanins binding. This binding resulted in production of more stable colour. The colour stabilization was enhanced with the ageing;
2. shortened time needed for filtration;
3. enzyme treatment was more cost effective;
4. using Enartis Zym T-Red contributes to superior organoleptic quality of treated wines.

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know more ...About Enartis Zym Lyso

ENARTIS ZYM LYSO: MORE THAN A BRAKE ON MALOLACTIC FERMENTATION

Enartis Zym Lyso is a pure lysozyme-based preparation. Adding Enartis Zym Lyso to musts or wines can inhibit lactic acid bacteria development and help prevent malolactic fermentation. Moreover, an appropriate addition of Enartis Zym Lyso assures:

SAFE AND COMPLETE ALCOHOLIC FERMENTATIONS

The addition of Enartis Zym Lyso to must or wine during primary yeast fermentation reduces the malolactic bacteria population. This means that the onset of malolactic fermentation is avoided at the critical moment when bacterial metabolism can form volatile acidity. Volatile acidity production by bacteria during yeast fermentation can have dangerous consequences both for yeast development and wine quality.
Enartis Zym Lyso is particularly recommended for musts with high pH or must derived from grapes in poor condition, as well as any other application where the control of contamination by lactic acid bacteria is critical.

GREATER COLOUR INTENSITY AND STABILITY

When added in the last phases of the alcoholic fermentation, Enartis Zym Lyso prevents and slows the onset of malolactic fermentation. Consequently, the winemaker has the opportunity to apply microxygenation or other techniques in order to maximize color stabilization before malolactic fermentation starts. Enartis Zym Lyso is ideal for this application because, unlike sulfur dioxide, it doesn't affect the subsequent selected bacterial inoculation. It also doesn't react with anthocyanins, making these compounds available to form stable and colored complexes with tannins. As an inhibitor of malolactic bacteria, Enartis Zym Lyso can also partially replace SO_2 after malolactic fermentation. This allows lower SO_2 additions to be made, giving less anthocyanin bleaching and, consequently, better color intensity.

PRESERVATION OF WINE QUALITY

After the breakdown of malic acid is complete, malolactic bacteria can metabolize other compounds in wine, forming side products such as diacetyl which are not always desired by the winemaker. This depends on the bacterial strains present and the compounds available in the wine for bacterial metabolism. The formation of undesirable byproducts is more frequently found during spontaneous malolactic fermentation.
Another undesirable consequence of the spontaneous growth of malolactic bacteria is the production of biogenic amines, derived from the bacterial metabolism of amino acids. Wines that contain high levels of biogenic amines may be rejected by some customers.
The application of Enartis Zym Lyso after malic acid consumption is completed inhibits bacterial metabolism and maintains the original quality of the wine.

PRODUCTION OF HEALTHY WINES

Enartis Zym Lyso can partially replace SO_2 additions because of its activity against lactic acid bacteria. This allows the reduction of SO_2 additions, a move that is welcomed by the market.

Nutrients and Fermentation Aids

The positive effect of a successful fermentation on the quality of wine has been clearly demonstrated.
It is well known, however, that some treatments or conditions (such as fruit condition, fruit maturity and juice clarification) can have a negative impact on the progress of fermentation. The use of yeast nutrients allows these difficulties to be overcome, making up for nutrient deficiencies in juice and must. This facilitates a consistent and complete fermentation.

The management of yeast nutrition is a key element for the production of quality wines. Enartis operates a microbiological laboratory entirely dedicated to oenology. This ensures that Enartis has developed a range of nutrients that meet the needs generated by different varieties and wine making techniques. Optimal yeast nutrition leads to a consistent and complete fermentation. A cleaner aroma profile can also be obtained by limiting the production of sulfuric compounds.

NUTRIFERM ENERGY

PACKAGES 1 kg • 10 kg

Nutriferm Energy provides α-amino acids, trace elements and mineral salts naturally contained in the yeast cell. The addition of nutrients and vitamins are strategic in the initial phases of yeast multiplication, when external elements such as alcohol, sulfur dioxide and lack of oxygen have not intervened yet to modify yeast metabolism and its ability to select nutrients. That is why Nutriferm Energy is recommended during the preparation of the *pied de cuve* and at yeast inoculation. Because of its nutritional and energetic contributions, it shortens the lag phase, prevents the formation of hydrogen sulfide and acetic acid, and increases the production of glycerol and polysaccharides.

Dosage: *5-15 g/100L (0.4-1.2 lb/1000 gal)*

NUTRIFERM START

PACKAGES 10 kg

Nutriferm Start is a complex nutrient containing bibasic ammonium phosphate, cellulose and thiamine (vitamin B). Nutriferm Start enriches must with all the elements and nutrients necessary to promote yeast propagation and metabolism along with facilitating a rapid start to the fermentation process. Its use enables each yeast strain to display the physiological features for which it was chosen and prevents the biosynthesis of unwanted compounds. The cellulose contained in Nutriferm Start acts as a yeast support and plays a detoxicant role as it binds with medium chain fatty acids (C8, C10) and their esters. This feature is particularly useful for restarting sluggish or stuck fermentations.

Dosage: *20-35 g/100L (1.7-2.9 lb/1000 gal)*

NUTRIFERM SPECIAL

PACKAGES 1 kg • 10 kg

Nutriferm Special contains ammonium phosphate, thiamine and purified yeast cell walls. It is designed to facilitate the alcoholic fermentation and to prevent stuck fermentations. It gives the yeast all of the substances which it needs to avoid conditions of metabolic stress. It stimulates yeast metabolism, assuring the production of clean, intense aromas and prevents the formation of undesired odors.

Dosage: *30-50 g/100L (2.5-4.2 lb/1000gal)*

NUTRIFERM AROM

PACKAGES 1 kg • 10 kg

A nutrient 100% obtained from yeast derivatives. Nutriferm Arom provides high quantities of amino acids that can be used as precursors for the synthesis of aromatic compounds. In fact, when it's used in combination with a yeast that has the metabolic pathways necessary to exploit this aminoacidic heritage, Nutriferm Arom significantly increases the aromatic intensity and complexity of the wine.

Dosage: *20-30 g/100L (1.7-2.5 lb/1000 gal)*

NUTRIFERM ADVANCE

PACKAGES 1 kg • 10 kg

Alcohol and high temperatures are the main factors which are responsible for stuck fermentations. These factors cause degradation of the cellular membrane of the yeast which result in the loss of the ability to use sugar. The addition of Nutriferm Advance at 1/3 of the way into the fermentation prevents irregular kinetics while maintaining an efficient sugar transport system until the fermentation is complete. A complex additive made from yeast hulls, ammonium phosphate and cellulose, it helps the yeast with alcohol tolerance and exerts a detoxifying action, thus assuring optimal aroma cleanliness while preventing the formation of hydrogen sulfide.

Dosage: *20-30 g/100L (1.7-2.5 lb/1000 gal)*

SUPERLIS new

PACKAGES 1 kg • 25 kg

Biological coadjunct obtained from yeast hulls. When used during the alcoholic fermentation, Superlis prevents the appearance of reductive characters and acts as a detoxifying agent, removing substances that can slow yeast metabolism.

Dosage: *5-40 g/100L (0.4-3.3 lb/1000 gal)*

know more ...About Yeast Nutrients

A WIDE RANGE OF NUTRIENTS

ENARTIS has a wide range of nutrients. The reason for this assortment is to provide solutions to many differing must conditions, a result of grape variety, vintage conditions, cultural practices used in the vineyard, techniques used by the winery as well as nutritional requirements of yeast themselves. The ENARTIS nutrients have a known composition and are able to supply factors which may be deficient.

YEAST NUTRIENT	DOSAGE	LIMITING FACTORS	EFFECTS ON YEAST METABOLISM
THIAMINE	PROPORTIONAL TO THE QUANTITY OF NITROGEN IN THE MUST	• *BOTRYTIS CINEREA* • LONG PRE FERMENTATION PHASE • MICROBIOLOGICAL CONTAMINATION	• STIMULATES CELL GROWTH
NITROGEN	200-250 mg/L	• ADVANCED GRAPE MATURATION • *BOTRYTIS CINEREA* • LONG PRE-FERMENTATION PHASE • MICROBIOLOGICAL CONTAMINATION	• STIMULATES YEAST GROWTH • MAINTAINS YEAST CAPABILITY OF CONSUMING SUGAR
FATTY ACIDS C16-C18	PROPORTIONAL TO JUICE CLARITY	• CLEAN JUICE	• STIMULATE CELL GROWTH • LIMIT VOLATILE ACIDITY PRODUCTION • MAINTAIN THE RIGHT FLUIDITY OF THE CELL MEMBRANE
STEROLS	PROPORTIONAL TO SUGAR CONTENT AND JUICE TURBIDITY	• CLEAN JUICE • LACK OF OXYGEN AT HALF WAY THROUGH FERMENTATION	• IMPROVE YEAST RESISTANCE TO ALCOHOL
OXYGEN	10-20 mg/L	• CLEAN JUICE • REDUCTIVE WINEMAKING TECHNIQUE	• ALLOWS THE SYNTHESIS OF STEROLS • IMPROVES YEAST RESISTANCE TO ALCOHOL

The following table shows the composition of the various nutrients, the concentration (mg/L) of magnesium and yeast available nitrogen (YAN), the type of nitrogen supplied, the recommended applications and when the nutrient should be added. The table is based on the addition of 10 grams of nutrient per 100L of must (0.8 lb/1000 gal).

PRODUCT	COMPOSITION	CONTRIBUTION PER 100 ppm ADDITON OF NUTRIENT		TYPE OF NITROGEN	APPLICATIONS
		MAGNESIUM (mg/L)	YAN (mg/L)		
NUTRIFERM ENERGY	YEAST HULLS THIAMINE	2	13	ORGANIC	DIFFICULT CONDITIONS OF FERMENTATION PIED DE CUVE STUCK FERMENTATION
NUTRIFERM AROM	YEAST HULLS THIAMINE	2	13	ORGANIC	STIMULATING THE PRODUCTION OF FERMENTATION AROMAS
NUTRIFERM START	AMMONIUM PHOSPHATE CELLULOSE THIAMINE	/	16	INORGANIC	WHITE AND ROSÉ VINIFICATION
NUTRIFERM SPECIAL	AMMONIUM PHOSPHATE YEAST HULLS THIAMINE	0,8	16	ORGANIC INORGANIC	WHITE AND ROSÉ VINIFICATION STUCK FERMENTATION
NUTRIFERM ADVANCE	YEAST HULLS CELLULOSE AMMONIUM PHOSPHATE	0,8	15	ORGANIC INORGANIC	ASSURING A COMPLETE FERMENTATION PREVENTING THE PRODUCTION OF SULFUR COMPOUNDS STUCK FERMENTATION

To be added with the yeast
To be added at 1/3 sugar depletion

NUTRIFERM ENERGY & NUTRIFERM AROM

Ammonia, alcohol and oxygen influence yeast's capability of using amino acids as a nitrogen source for its metabolism. In fact, the presence of ammonia and alcohol in must, along with the absence of oxygen, inhibits the transport of amino acids inside the cell. That's why both Nutriferm Energy and Nutriferm Arom must be supplied at the same time as yeast when the environmental conditions favor the consumption of the organic nitrogen they provide. For the same reason, their addition must be done at least 24 hours before and separately from the application of ammonia.

HOW TO CHOOSE THE MOST SUITABLE NUTRIENT

The three key parameters which guide the selection of nutrients are turbidity, YAN content and potential alcohol content.

Turbidity is positively correlated with the content of fatty acids. Fatty acids are important growth factors for yeast which ensure the formation of healthy cell membranes, components which are vital to allow the yeast to utilize all of the sugar contained in the must. In general, a turbidity of 100 to 150 NTU is recommended. At lower values it is necessary to add fatty acids as well as solid substances to prevent fermentation problems.

YAN represents the amount of ammonia and amino acid nitrogen which is available to the yeast. Levels below 150 mg/l are considered insufficient to ensure the production of an adequate biomass.

Finally, the higher the sugar content, the higher the YAN needed by the yeast.

Moreover, scientific research has shown the value of adding amino acid nitrogen and aeration when the fermentation is 1/3 complete. This procedure will prevent fermentation problems as well as the production of undesirable sulfur-containing compounds.

Using all of this information, the following table has been constructed showing how to use the ENARTIS nutrients.

CLEAN WHITE AND ROSÉ JUICE (NTU<100)

POTENTIAL ALCOHOL	YAN	INOCULATION*	DOSAGE	1/3 FERMENTATION	DOSAGE
< 12%	< 150	**NUTRIFERM SPECIAL**	MAX 50 g/100L (4.2lb/1000 gal)	**NUTRIFERM ADVANCE**	MIN 30 g/100L (2.5lb/1000 gal)
	> 150	**NUTRIFERM SPECIAL**	MAX 50 g/100L (4.2lb/1000 gal)		MIN 20 g/100L (1.7lb/1000 gal)
> 12%	< 150	**NUTRIFERM ENERGY**	10 g/100L (0.8lb/1000 gal)		MIN 30 g/100L (2.5lb/1000 gal)
	> 150	**NUTRIFERM ENERGY**	5 g/100L (0.4lb/1000 gal)		MIN 20 g/100L (1.7lb/1000 gal)

CLOUDY WHITE AND ROSÉ JUICE (NTU>100)

POTENTIAL ALCOHOL	YAN	INOCULATION*	DOSAGE	1/3 FERMENTATION	DOSAGE
< 12%	< 150	**NUTRIFERM START**	MAX 30 g/100L (2.5lb/1000 gal)	**NUTRIFERM ADVANCE**	MIN 30 g/100L (2.5lb/1000 gal)
	> 150	**NUTRIFERM START**	MAX 30 g/100L (2.5lb/1000 gal)		MIN 20 g/100L (1.7lb/1000 gal)
> 12%	< 150	**NUTRIFERM ENERGY**	10 g/100L (0.8lb/1000 gal)		MIN 30 g/100L (2.5lb/1000 gal)
	> 150	**NUTRIFERM ENERGY**	5 g/100L (0.4lb/1000 gal)		MIN 20 g/100L (1.7lb/1000 gal)

RED MUST

POTENTIAL ALCOHOL	YAN	INOCULATION*	DOSAGE	1/3 FERMENTATION	DOSAGE
< 12%	< 150	**NUTRIFERM START**	MAX 300 g/ton	**NUTRIFERM ADVANCE**	MIN 300 g/ton
	> 150	**NUTRIFERM START**	MAX 300 g/ton		MIN 200 g/ton
> 12%	< 150	**NUTRIFERM ENERGY**	100 g/ton		MIN 300 g/ton
	> 150	**NUTRIFERM ENERGY**	50 g/ton		MIN 200 g/ton

*Nutriferm Arom can be used alternatively to all the nutrients recommended for the inoculation phase with the goal to enhance the production of fermentation esters. For the dosage to be used, refer to the TDS.

NB: When the maximum dosage allowed by the law is not sufficient to guarantee the right YAN content, different nutrients can be used together, for instance 10 g/hl Nutriferm Energy (at the yeast inoculation) + 30 g/hl Nutriferm Start (12 hours after the yeast inoculation).

Yeast Enartis Ferm

A successful fermentation is the first step in obtaining the levels of quality that all winemakers seek.
The Enartis Ferm range, produced by Enartis, is a series of yeast strains selected for enological properties that can enhance the sensory characteristics of wines made from grape varieties grown around the world.
The international experience gained with the Enartis Ferm line of yeast allows for a better understanding of the characteristics of each strain as well as the optimization of its use.

Strains for White Wines

ES 123

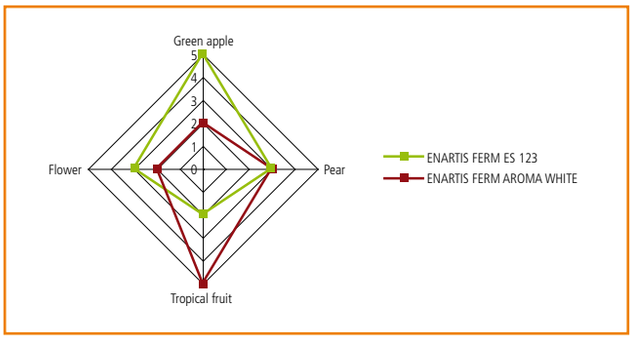
PACKAGES 0.5 kg

Saccharomyces cerevisiae

It produces very intense and fresh aromas of green apple, pear and flowers. These aromas are very stable over time, therefore it's recommended for the vinification of white wines obtained from neutral grapes and for the production of very aromatic wines destined for the production of spirits.

Application: - fruity white wines obtained from neutral grapes
- wines destined for the production of spirits.

Dosage: *20 g/100L (1.7 lb/1000 gal)*



LV

PACKAGES 0.5 kg

Saccharomyces cerevisiae ex ph. r. bayanus

Strain recommended for its fermentative vigor and its low production of volatile acidity. It tends to respect the characteristics of the grapes but with a good source of aminoacids, it produces some secondary aromas that enhances the aromatic complexity of the wine.

Application: - *white and rosé wines*
- *tank fermented frizzy wines.*

Dosage: *20 g/100L (1.7 lb/1000 gal)*

AROMA WHITE

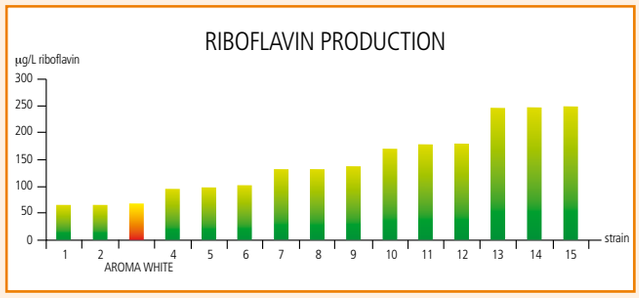
PACKAGES 0.5 kg

Saccharomyces cerevisiae

Aroma White is a large producer of fermentation aromas (tropical fruit, citrus, flowers, etc.), therefore it's recommended for the vinification of white and rosé wines obtained from neutral grapes. It also produces small amounts of riboflavin thus preventing the appearance of the light-struck defect.

Application: - *fruity white and rosé wines obtained from neutral grapes*
- *prevent the development of the light-struck defect in wines stored in bottles without UV protection.*

Dosage: *20 g/100L (1.7 lb/1000 gal)*



TOP ESSENCE

PACKAGES 0.5 kg

Saccharomyces cerevisiae

Yeast with good fermentation properties. It is suitable for the production of young white wines from grapes low in primary aromas in order to enhance the aromatic expression of pineapple, passion fruit, banana, grapefruit, etc.

Application: *fruity white wines obtained from neutral grapes.*

Dosage: *20 g/100L (1.7 lb/1000 gal)*

ES 181

PACKAGES 0.5 kg

Saccharomyces cerevisiae ex ph. r. bayanus

Ferments well at low temperatures and with adequate nutrition. Produces fermentation aromas which integrate without overshadowing varietal character. It possesses intense β-lyase activity, therefore it's recommended for the fermentation of aromatic varieties such as Sauvignon Blanc.

Application: *- fermentation at low temperature*
- reductive fermentation
- varietal white wines
- Sauvignon blanc.

Dosage: *20 g/100L (1.7 lb/1000 gal)*

VINTAGE WHITE

PACKAGES 0.5 kg

Saccharomyces cerevisiae

Increases varietal aromas and releases large quantities of polysaccharides during the *sur-lie stage*. Its tendency to form lightly compacted lees reduces the number of bâtonnage and pump-overs.

Application: *- white wines with varietal characteristics*
- fermentation and ageing in barrel
- wines with large volume on the palate.

Dosage: *20 g/100L (1.7 lb/1000 gal)*

Strains for Red Wines

HT

PACKAGES 0.5 kg

Saccharomyces cerevisiae

Vigorous strain with a good resistance to high temperatures. It easily dominates the fermentation without requiring many attention to its nutrition. It respects the varietal characteristics of the grape.

Application: *- rosé wines*
- young or moderately aged red wines.

Dosage: *200 g/ton*

TOP 20

PACKAGES 0.5 kg

Saccharomyces cerevisiae

A good fermenter, with adequate nutrition it produces fermentation esters that enhance the fruit character of the wine, while respecting the varietal characteristics of the grape. It is also able to remove a portion of malic acid (about 25%).

Application: *- rosé wines*
- young or moderately aged red wines.

Dosage: *200 g/ton*

RED FRUIT

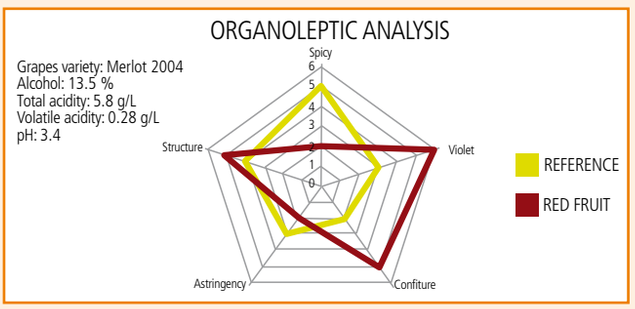
PACKAGES 0.5 kg

Saccharomyces cerevisiae

One of the best loved strains of the Enartis Ferm range! It produces very intense aromas of fruit and violets along with elevated quantities of glycerol and polysaccharides. The resulting wines are round on the palate and have good color and aroma.

Application:
- rosé wines
- specialty wines such as Beaujolais Nouveau
- fruity young or moderately aged red wines.

Dosage: *200 g/ton*



VINTAGE RED

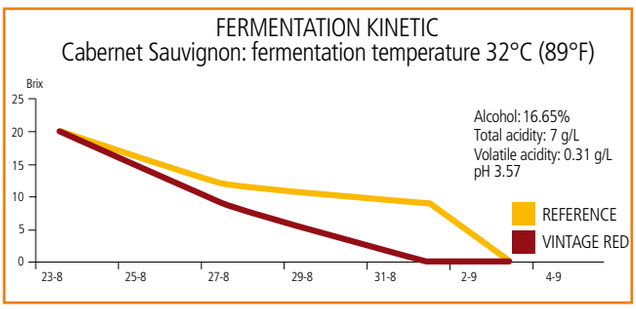
PACKAGES 0.5 kg

Saccharomyces cerevisiae

This strain is characterized by the production of good fruit and spicy aromas, along with its capacity to ferment within a wide temperature range (18-32°C, 64-90°F) and its low nutritional requirements. Because of these characteristics, it allows for the production of regal red wines even under difficult conditions.

Application: *- red wines of medium to long ageing times*
- grand red wines
- oak matured red wines.

Dosage: *200 g/ton*



ES 454

PACKAGES 0.5 kg

Saccharomyces cerevisiae

Yeast for the production of red wines destined for ageing. It gives the best results when fermenting very ripe and high quality grapes. It produces unique wines characterized by elegant, ripe fruit and spicy aromas and smooth mouth-feel.

Application: *- red wines of medium to long ageing*
- grand red wines.

Dosage: *200 g/ton*

ES 488

PACKAGES 0.5 kg

Saccharomyces cerevisiae

Wines produced with this strain are powerful on both the nose and palate and can satisfy the demands of international markets. ES 488 produces intense fruit aromas that are evident during the first stages following fermentation and remain persistent. Given its high extraction capacity, it results in wines with great structure and color. It also helps mask herbaceous notes in grape varieties that are rich in methoxypyrazines.

Application: *- red wines of medium to long ageing*
- new world style grand red wines.

Dosage: *200 g/ton*

Technological Strains

TOP 15

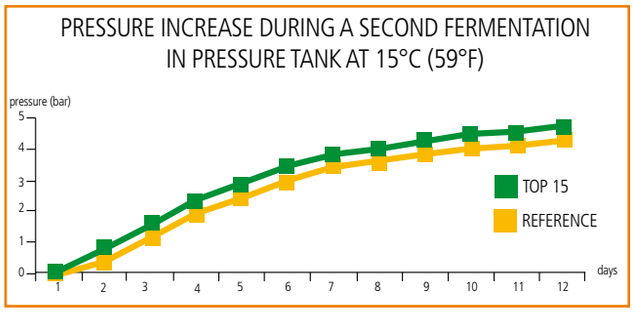
PACKAGES 0.5 kg

Saccharomyces cerevisiae ex ph. r. bayanus

A vigorous strain with high alcohol tolerance (17%), able to ferment at low temperatures. It can be used in the vinification of white, red and rosé wines as well as in the production of sparkling wine fermented in bottle and stainless steel tanks. It produces wines with very clean aromas that express the characteristics of the grape.

Application: *- white, red and rosé wines*
- sparkling wine.

Dosage: *20 g/hl (1.7 lb/1000 gal)*



EZ*FERM*

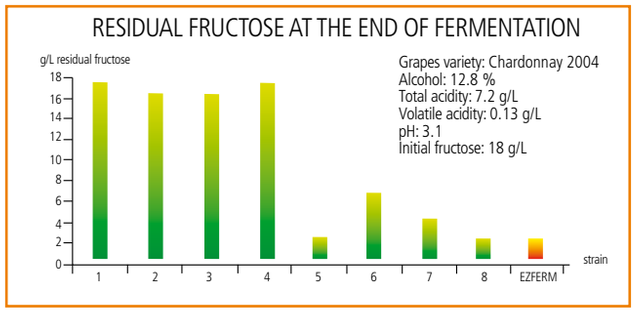
PACKAGES 0.5 kg

Saccharomyces cerevisiae + bayanus

This blend of two different strains is highly successful in preventing sluggish and stuck fermentations having high alcohol tolerance (16.5%), scarce nitrogen needs, large range of fermentation temperatures (12-34°C, 54-93°F), and a great capacity to dominate. It respects the varietal aromatic characteristics of the grape variety.

Application: *- prevention of sluggish and stuck fermentation*
- production of wines with high alcohol content
- production of late-harvest wines.

Dosage: *200-400 g/ton*



EZ*FERM* 44

PACKAGES 0.5 kg

Saccharomyces cerevisiae ex ph .r. bayanus

EZ Ferm improved! This strain combines high alcohol tolerance (17.5%), strong fermentation kinetics and scarce nutritional needs, with a strong predisposition to consume fructose. New to the Enartis Ferm range, EZ Ferm 44 is the recommended yeast to solve the problems of sluggish and stuck fermentations.

Application: *curing sluggish and stuck fermentations.*

Dosage: *400 g/ton or 40 g/hL (3.3 lb/1000 gal)*

FRUITY

PACKAGES 0.5 kg

Saccharomyces cerevisiae

Yeast for sparkling wine production by the Charmat or closed tank method. It favors the formation of a harmonic and intense flavor profile characterized by dominant fruity component that perfectly fits for both white and red sparkling wines.

Application: *tank fermented sparkling wines.*

Dosage: *20 g/100L (1.7lb/1000 gal)*

TOP FLORAL

PACKAGES 0.5 kg

Saccharomyces bayanus

A strain that produces intense floral aromas of white roses, hawthorn, etc. and of sweet white fruit such as pear and apricot. It is suitable for the fermentation of white wines as well as rosé and young red wines to enhance aromatic complexity.

Application: *fresh and easy to drink wines.*

Dosage: *20 g/100L (1.7lb/1000 gal)*

ES PERLAGE

PACKAGES 0.5 kg

Saccharomyces cerevisiae ex ph .r. bayanus

A strain selected for the production of traditional method sparkling wines. It produces wines with very elegant and clean aromas that express the characteristics of the grape variety and of the region. It is resistant to high sugar and alcohol concentrations, low pH and low temperatures. It allows for complete and quick sugar consumption and avoids the production of undesirable compounds. It can also be successfully used during the primary fermentation of white wines.

Application: *- fermentation of base wine for sparkling*
- varietal white wines
- bottle and tank fermented sparkling wines.

Dosage: *- 20 g/100L (1.7 lb/1000 gal) in the primary fermentation*
- 10-20 g/100L (0.8-1.7 lb/1000 gal) in the sparkling wine production

The Vinquiry Collection

Welcome to The Vinquiry Collection! Vinquiry has served the wine industry for over thirty years, beginning as a small, independent laboratory in California and growing to a major supplier of services throughout the U.S. Furthermore, it has continually supplied high value wine-

making products, having begun its yeast and bacteria collection in 1981. The Vinquiry Collection includes tried and true favorites as well as newly isolated yeast selections. Each has been chosen to provide superior enological attributes and enhancements to wine style.

VQ 10

PACKAGES 0.5 kg

Saccharomyces cerevisiae ex ph .r. bayanus

A white wine strain recommended for preserving varietal fruit character and contributing to mouthfeel. This strain is alcohol tolerant up to 17% and completes fermentations quickly. It also works well at the lower temperatures desired for white wine fermentations.

Application: *Chardonnay, Sauvignon Blanc, Gewürztraminer, Pinot Grigio, Riesling, Viognier.*

Dosage: *20 g/100L (1.7 lb/1000 gal)*

VQ ASSMANSHAUSEN

PACKAGES 0.5 kg

Saccharomyces cerevisiae

The most popular yeast for Pinot Noir production. With its desirable characteristics of long lag time and alcohol tolerance up to 15%, this yeast is perfect for enhancing spicy characteristics. It contributes excellent complexity and good structural enhancement. Because of its exceptional characteristics, VQ Assmanshausen is also a good choice for Zinfandel, Syrah, Sangiovese, Barbera, and some white wine varietals like Riesling and Gewürztraminer.

Application: *Pinot Noir, Barbera, Nebbiolo, Sangiovese, Syrah, Zinfandel, Riesling, Gewürztraminer.*

Dosage: *200 g/ton*

VQ 51

PACKAGES 0.5 kg

Saccharomyces cerevisiae

The classic Bordeaux isolate for high quality red wine production including Merlot, Zinfandel, Cabernet, Syrah, and other varietals. VQ 51 enhances varietal aromas and gives complexity by improving fruit notes. Thanks to the abundant release of mannoproteins, it contributes to color stability and increased mouthfeel.

Application: *Cabernet Sauvignon, Merlot, Syrah, Zinfandel, Cabernet Franc, Carignane, Grenache, Merlot, Nebbiolo, Sangiovese, Barbera, Gamay.*

Dosage: *200 g/ton*

ENARTIS FERM YEAST QUICK REFERENCE CHART

STRAIN	TEMPERATURE	LAG PHASE	FERMENTATION SPEED	ALCOHOL TOLLERANCE	KILLER FACTOR	NITROGEN DEMAND	OXYGEN DEMAND	SENSORY EFFECT	APPLICATIONS							
									YOUNG WHITE	WHITE TO BE AGED	ROSÉ	YOUNG RED	RED TO BE AGED	LATE HARVEST	SPARKLING	STUCK FERMENTATION
LV	15-30°C (59-86°F)	SHORT	HIGH	16%	NEUTRAL	LOW	LOW	ESTERS	★★★		★★★	★★★			★★	★
TOP ESSENCE	15-25°C (59-77°F)	SHORT	MEDIUM	15%	KILLER	MEDIUM	MEDIUM	ESTERS	★★★		★★			★★		
ES 123	15-25°C (59-77°F)	SHORT	MEDIUM	14%	KILLER	HIGH	MEDIUM	ESTERS	★★★		★★			★★		
AROMA WHITE	15-24°C (59-75°F)	MEDIUM	MEDIUM	15%	KILLER	MEDIUM-HIGH	MEDIUM	ESTERS	★★★		★★★	★★			★	
VINTAGE WHITE	14-24°C (57-75°F)	SHORT	MEDIUM	15.5%	KILLER	HIGH	MEDIUM-HIGH	ENHANCES VARIETAL CHARACTER	★★★	★★★				★★		
ES 181	10-20°C (50-68°F)	SHORT	HIGH	16.5%	KILLER	LOW	LOW-MEDIUM	ENHANCES VARIETAL CHARACTER	★★★	★★	★			★★		
HT	20-35°C (68-95°F)	SHORT	HIGH	15%	NEUTRAL	LOW	LOW	ESTERS	★★★		★★★	★★★			★★	★
TOP 20	15-30°C (68-95°F)	MEDIUM	MEDIUM	15%	NEUTRAL	MEDIUM-HIGH	MEDIUM	ESTERS			★★★	★★★	★			
RED FRUIT	14-34°C (57-93°F)	SHORT	HIGH	16%	KILLER	HIGH	HIGH	ESTERS			★★★	★★★	★★			
VINTAGE RED	18-32°C (64-90°F)	SHORT	MEDIUM	16%	NEUTRAL	MEDIUM	MEDIUM-HIGH	ENHANCES VARIETAL CHARACTER			★	★	★★★			
ES 454	18-30°C (64-86°F)	MEDIUM	MEDIUM	16%	SENSITIVE	MEDIUM	MEDIUM	ENHANCES VARIETAL CHARACTER			★	★★	★★★			
ES 488	15-28°C (59-82°F)	SHORT	MEDIUM	16%	KILLER	HIGH	HIGH	VARIETAL + ESTERS				★★	★★★			
TOP 15	10-28°C (50-82°F)	SHORT	HIGH	17%	KILLER	LOW	LOW	NEUTRAL	★★★	★★	★				★★★	★★
TOP FLORAL	10-25°C (50-77°F)	MEDIUM	MEDIUM	15%	NEUTRAL	MEDIUM	LOW-MEDIUM	ESTERS	★★★		★★★	★★★				
EZ FERM	12-34°C (54-93°F)	SHORT	HIGH	16.5%	NEUTRAL	LOW-MEDIUM	LOW	ENHANCES VARIETAL CHARACTER	★★	★★★		★★	★★★	★★★	★★	★★★
EZ FERM 44	15-30°C (59-86°F)	SHORT	MEDIUM	17.5%	NEUTRAL	LOW	LOW	NEUTRAL	★★	★★★		★★	★★★	★★★	★★	★★★
FRUITY	14 - 20°C (57-68°F)	SHORT	HIGH	15%	KILLER	MEDIUM	LOW	ESTERS							★★★★	
ES PERLAGE	10-30°C (50-86°F)	SHORT	MEDIUM HIGH	17%	KILLER	LOW	LOW	NEUTRAL	★★★	★★★	★★★				★★★	
VQ10	10-25°C (50-77°F)	SHORT	MEDIUM-HIGH	17%	KILLER	LOW	LOW	NEUTRAL	★★★	★★★	★★	★★				
VQ51	20-30°C (68-86°F)	SHORT	MEDIUM	16%	SENSITIVE	MEDIUM	MEDIUM-HIGH	VARIETAL			★	★★	★★★			
VQ ASSMANSHAUSEN	20-30°C (68-86°F)	LONG	SLOW	15%	NEUTRAL	MEDIUM	LOW	VARIETAL	★	★★	★	★★★	★★★			

know more ...About Stuck Fermentation

METHOD TO RE-START STUCK FERMENTATION

From Vinquiry's 30 years of expertise in microbiology, a new and easier to handle protocol for restarting stuck fermentation.

CAUSES OF STUCK FERMENTATIONS

The principal causes of stuck fermentations are:

- Nutrient deficiency (nitrogen and vitamins)
- Oxygen deficiency (necessary for synthesis of sterols)
- Deficiency of survival factors
- Presence of inhibitors (alcohol, low chain fatty acids, acetic acid)
- Uncontrolled temperature increase
- Presence of residual pesticides (especially in the case of dry summers)
- Incorrect yeast strain (little resistance to alcohol).

CONSEQUENCES

Sluggish or stuck fermentation kinetics involve two types of problems:

1. **Quality problems:** in a must or wine which is rich in sugar and poor in SO_2, indigenous strains of malolactic bacteria can develop and can degrade the residual sugars while producing elevated levels of lactic and acetic acids;
2. **Economic problems:** stuck fermentations can not only cause delays in production, but necessitate the use of extraordinary practices and procedures which result in increased costs.

For these reasons, it is preferable to act proactively and prevent the problem rather than be forced to cure it.

METHOD TO RESTART STUCK FERMENTATION

Pre-treatment of the stuck wine

In the case of a stuck fermentation, before re-inoculation the following pre-treatment steps are recommended:

1. Timely intervention to prevent the development of undesired bacteria by use of the following:
   - Filtration or racking
   - Sulfur dioxide addition to a maximum of 1 g/100L (0.08 lbs/1000 gal) (10ppm)
   - Add 30-40 g/100L (2.6-3.4 lbs/1000 gal) of Enartis Zym Lyso if there is a risk of malolactic fermentation onset.
2. Add 10-20 g/100L (1-2 lb/1000 gal) of yeast hulls or cellulose together with 5 g/100L (0.4 lb/1000 gal) of bentonite Bentolit Super. Yeast hulls and the cellulose will eliminate medium chain fatty acids and pesticide residues which may act as fermentation inhibitors while Bentolit Super will help the settling of the lees.

Allow yeast hulls or cellulose to act for 24 hours and then remove it by racking or filtration without worrying about clarity. Alternatively, the cellulose can be left in the must/wine; however, some of the fermentation aromas will be lost by adsorption onto the cellulose or yeast hulls. After this, inoculate with a yeast starter prepared as follows.

Selection and rehydration of the active dry yeast

1. Select a strain that is both alcohol tolerant and a vigorous fermenter, such as Enartis Ferm EZFerm 44 or Enartis Ferm Top 15.
2. Calculate the amount of yeast required for the total volume of stuck wine at 25-50 g/100L (2-4 lb/1000 gallons).
3. Rehydrate this amount of yeast in ten times its weight at 35-38°C (95-100°F) in clean water.
4. Allow 15 minutes to rehydrate then continue with the preparation of the starter.

Preparation of the starter

The nutrient content of the stuck fermentation will be low and unable to support adequate yeast growth. In addition, the culture will require adaptation to the alcohol content of the wine.

1. Prepare an initial mixture made by 50% of stuck wine and 50% of water. This solution must be 5% of the total volume of stuck wine.
2. Calculate the amount Nutriferm Energy required for the total volume of stuck wine at 10-15 g/hL (0.8-1.2 lb/1000 gal) and add it to the water/wine mixture.
3. Adjust the sugar content of the mixture wine/water up to 50 g/L (5° Brix) by adding concentrate, juice or sugar.

Start of the fermentation and addition of the stuck wine

1. Add the rehydrated yeast to the wine/water mix and maintain the temperature at 21-24°C (70°-75°F). Note: Avoid cold shock! The temperature difference between the yeast suspension and the wine/water solution must be less than 10°C (18°F).
2. Monitor the sugar level of the starter. Attention: never let the sugar drop to zero.
3. When the sugar level has dropped by half (<2.5°Brix), add 20% of stuck wine to the starter. Also add the amount of Nutriferm Advance required for the 20% of stuck wine at 25 g/hL (2 lb/1000 gal).
4. When the sugar has dropped by half, add another batch of 20% of the total stuck wine volume.
5. Repeat step 4, 3 more times. At every step check that the temperature between the starter and the stuck wine is lower than 10°C (18°F).

PRACTICAL EXAMPLES

EXAMPLE FOR 1000 GALLONS

1. Prepare the initial mixture with
   - 25 gal of stuck wine
   - 25 gal of water
   - 0.5 lb Nutriferm Energy
   - Sugar or concentrate juice in order to adjust the sugar level of this mixture to 5°Brix
2. Rehydrate 4 kg of yeast in 40 L (14,5 gal) of clean water at 35-38°C (95-100°F).
3. Wait 15 minutes. Stir and then add the yeast suspension to the initial mixture. Note: Avoid cold shock!
4. Monitor the sugar content of the starter. When the sugar has dropped by half, add
   - 200 gal of stuck wine
   - 0.3 lb of Nutriferm Advance
5. When the sugar has dropped by half, add other 200 gal of stuck wine.
6. Repeat Step 5, 3 more times.

EXAMPLE FOR 10000 L (100HL)

1. Prepare the initial mixture with
   - 250 L of stuck wine
   - 250 L of water
   - 1 kg Nutriferm Energy
   - Sugar or concentrate juice in order to adjust the sugar level of this mixture to 50 g/L (5°Brix)
2. Rehydrate 4 kg of yeast in 40 L of clean water at 35-38°C (95-100°F).
3. Wait 15 minutes. Stir and then add the yeast suspension to the initial mixture. Note: Avoid cold shock!
4. Monitor the sugar content of the starter. When the sugar has dropped by half, add
   - 2000 L of stuck wine
   - 500 g of Nutriferm Advance
5. When the sugar has dropped by half, add other 2000 L of stuck wine.
6. Repeat Step 5, 3 more times.

Tannins Enartis Tan

Many wines benefit from the addition of tannins, provided that the treatment is carried out at the most appropriate time. Since the different origins and properties of tannin can produce substantially different results, care must be taken to select the best tannin for each winemaking application.

In conjunction with the foremost research centers, Enartis has studied exogenous tannins and their effects for many years. These studies have enabled Enartis to select and produce a comprehensive range of the highest quality tannins for winemaking.

Crushing and Maceration

FP - granular

PACKAGES 15 kg

Enartis Tan FP is a mixture of condensed tannin and ellagitannin. When added to red grapes during the maceration phase, it acts in synergy with natural wine tannins to protect anthocyanins from oxidation while favoring the formation of stable color compounds. The ellagitannin fraction of Enartis Tan FP assures a good reaction with must proteins which favors the removal of oxidative enzymes (laccase) and facilitates the natural clarification process which occurs at the end of primary fermentation.

Dosage: *150-400 g/ton in maceration*

ROUGE - granular

PACKAGES 1 kg • 15 kg

Enartis Tan Rouge is a mixture of tannins designed specifically to favor the stabilization of red wine color. When added during maceration, it protects color molecules from oxidation and participates in the formation of tannin-anthocyanin complexes which are stable with time. Additionally, Enartis Tan Rouge reinforces the structure of the wine and imparts gustatory harmony because it is not astringent. It can be used in combination with protein clarifying agents to clarify wine without damaging its original structure.

Dosage: *100-400 g/ton in maceration*

RED FRUIT - granular

PACKAGES 1 kg

A blend of condensed tannins, many extracted from the wood of red fruit trees. These proanthocyanidinic tannins enrich wine with aromatic precursors that are responsible for notes of berries and red fruit. During primary fermentation these precursors can be liberated by yeast strains (Enartis Ferm Red Fruit, ES 488 and ES 454) with an intense ß-glycosidase activity. Because of their liberation, the wine is enriched with fruit forward aromas that integrate the varietal aromas and those produced during fermentation.

Dosage: *100-200 g/ton*

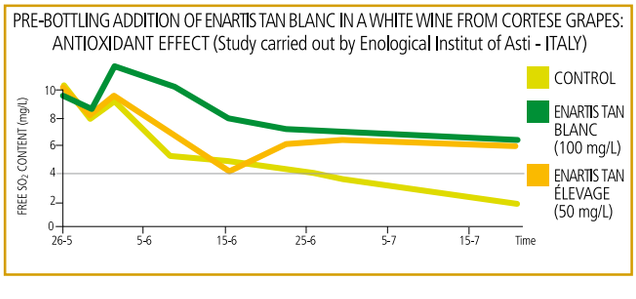
Fermentation of White Wines

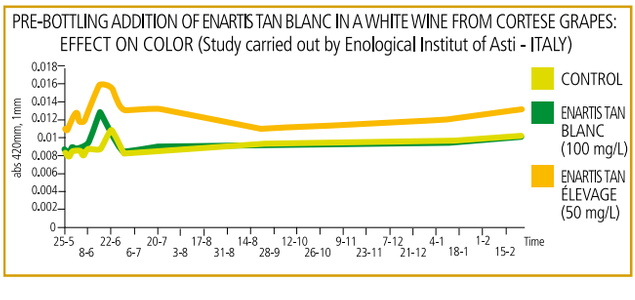
BLANC - granular

PACKAGES 1 kg • 12.5 kg

This pure gallotannin helps to fix and stabilize several aroma molecules in wine, reducing the risk of off-flavor formation and preventing the production of sulfide characters upon exposure to ultra violet light (light struck). The light color of Enartis Tan Blanc makes it particularly suitable for white wines. It can be used to improve the antimicrobial and antioxidant action of sulfur dioxide. It can also be useful in preventing copper and iron haze, due to its ability to sequester metals.

Dosage: *3-10 g/100L (0.25-0.8 lb/1000gal) in fermentation*
4-8 g/100L (0.3-0.7 lb/1000gal) in wine





Fining

CLAR - granular

PACKAGES 1 kg • 12.5 kg

Pure ellagic tannin with high protein removal action. Its chemical properties favor the natural action of endogenous tannins, enhancing structure, improving the fining process and balancing flavor. Enartis Tan Clar also helps to fix and stabilize color pigments during the vinification of red wines, and enhances antimicrobial and antioxidant action of sulfur dioxide.

Dosage: *3-6 g/100L (0.25-0.5 lb/1000gal) in juice*
4-10 g/100L (0.3-0.8 lb/1000gal) in wine

Structuring and Finishing

Oak Tannin Based Products

MAX NATURE

PACKAGES 1 kg • 10 kg

Enartis Tan Max Nature is a mixture of condensed and ellagic tannins formulated to enhance olfactory cleanliness and complexity of white and red wines. In particular, it removes reduction and herbaceous characteristics, while highlighting fruit and floral notes that are typical of young wines. Its moderate contribution to structure and absence of astringency makes Enartis Tan Max Nature the ideal tannin for treatment of wines where the natural characteristics of lightness and ease of consumption are desired.

Dosage: *3-15 g/100L (0.25-1.2 lb/1000gal)*

RICH - granular

PACKAGES 1 kg

Enartis Tan Rich is a mixture of condensed and oak tannins. In red wines, it protects against oxidation, favors the stabilization of color substances and contributes to organoleptic quality by enriching the bouquet with pleasant aromatic notes of wood while increasing structure. In white wines, in addition to improving organoleptic characteristics, Enartis Tan Rich favors protein stability and the natural clarification process.

Dosage: *5-20 g/100L (0.4-1.7 lb/1000gal)*

SUPEROAK

PACKAGES 1 kg

Enartis Tan Superoak is a tannin specifically designed for addition during maturation. Thanks to a balanced composition of oak tannins and condensed tannins, it is extremely efficient in color stabilization of red wines and is meant to be used during microxygenation. The organoleptic profile is characterized by distinct sensations of volume and softness as well as light olfactory notes of toasted wood. Enartis Tan Superoak is effective in releasing the aroma of wines that have been aged in barrels and to freshen light red and white wines.

Dosage: *5-20 g/100L (0.4-1.7 lb/1000gal)*

ÉLEVAGE - granular

PACKAGES 1 kg

Enartis Tan Élevage is extracted from oak staves which are aged in the open air. It can be used in white or red wines to increase structure and olfactory complexity because it provides elegant vanilla, caramel and licorice notes. The addition of Enartis Tan Élevage assures good antioxidant protection and prevents, as well as treats, the formation of reduced odors. Enartis Tan Élevage can be added during clarification and protein stabilization of high quality white wines.

Dosage: *2-15 g/100L (0.2-1.2 lb/1000gal)*

CŒUR DE CHÊNE - granular

PACKAGES 1 kg

A blend of ellagitannins extracted from the same wood used for making casks, i.e. oak staves, seasoned at length under natural conditions and then toasted. Therefore, Enartis Tan Cœur de Chêne can be used to prolong the life span of barrels. The product contributes a hint of vanilla and spice to wine, and produces a mellow and well balanced tannic structure.

Dosage: *3-10 g/100L (0.25-0.8 lb/1000gal)*

EXTRA

PACKAGES 1 kg

Enartis Tan Extra is a pure oak tannin specifically selected for the treatment of white and red wines during maturation. It is characterized by intense aromatic notes of vanilla, caramel, cocoa and toasted wood accompanied by distinct gustatory sensations of softness and sweetness. Enartis Tan Extra does not require long contact times and rapidly improves gustatory equilibrium and aromatic complexity.

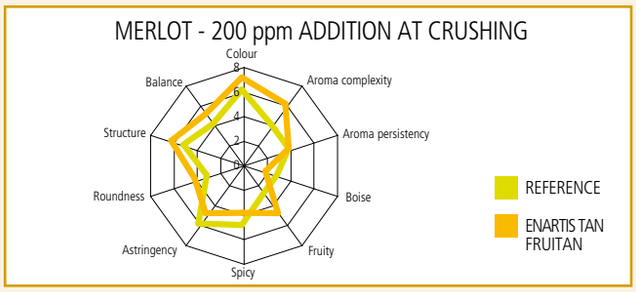
Dosage: *3-15 g/100L (0.25-1.2 lb/1000gal)*

FRUITAN - granular

PACKAGES 1 kg

A blend of condensed tannins, many extracted from fresh, physiologically ripe, white grape seeds. These proanthocyanidinic tannins interact with anthocyanins (the molecules responsible for color in red wines) binding and protecting them from oxidation. Its use during maceration, or immediately after primary fermentation, allows for better development and retention of color and improved color stability over time. When used in both red and white wine, it helps to eliminate herbaceous characters, enhance fruit characters and to freshen aroma.

Dosage: *100-200 g/ton in maceration*
3-10 g/100L (0.25-0.8 lb/1000gal) in wine



ELEGANCE - granular

PACKAGES 1 kg

Enartis Tan Elegance is a mixture of condensed tannins largely extracted from white grape skins. When used in white and rosé wines during fermentation and maturation, it possesses an intense antioxidant activity guaranteed to maintain long term color stability and aromatic freshness. On an organoleptic level, it enhances fruit and floral notes and increases structure and softness. It can be also used in red wines where fruitiness is to be enhanced without imparting astringency.

Dosage: *10-15 g/100L (0.8-1.2 lb/1000gal) during fermentation*
5-10 g/100L (0.4-0.8 lb/1000gal) in wine

SKIN - granular

PACKAGES 1 kg

A proanthocyanidinic extract obtained from the skin of pressed (not fermented) white grapes. Its addition to must or wine just after primary fermentation provides better color stability and prevents oxidation. In white wines, it can be used as a fining agent in combination with gelatin. Moreover, its addition improves the structure, mouthfeel and complexity of white, red and rosé wine, assisting the expression of fruit notes.

Dosage: *3-20 g/100L (0.25-1.7 lb/1000gal)*

UVA - granular

PACKAGES 1 kg

A proanthocyanidinic extract obtained from well-matured white grape seeds. Its addition to must or wine just after primary fermentation facilitates an earlier reaction between tannins and pigment molecules and better color fixation. In white wines, its ability to eliminate unstable proteins can reduce the quantity of bentonite necessary to achieve stability. Moreover, its addition improves the structure, mouthfeel and complexity of white, red and rosé wines, assisting in the expression of fruit notes. Additionally, it can mask astringency in some red wines, helping to avoid or to reduce the use of fining agents.

Dosage: *3-10 g/100L (0.25-0.8 lb/1000gal)*

UVASPEED - granular

PACKAGES 1 kg

Enartis Tan Uvaspeed is tannin extracted from non-fermented white grape skins specifically for the treatment of wines during the maturation phase. The speed at which the tannin is extracted helps prevent oxidation and microbial degradation. Enartis Tan Uvaspeed is able to immediately provide intense fruit notes as well as increased structure and softness which contribute to the gustatory equilibrium of wine. Due to its limited reactivity with proteins, it can be used immediately prior to bottling.

Dosage: *3-20 g/100L (0.25-1.7 lb/1000gal)*

Tannins for Micro-Oxygenation

MICROFRUIT new

PACKAGES 1 kg

This blend of condensed tannins is to be used in micro-oxygenation and every time the wine comes in contact with oxygen (rack-off, filtration, refrigeration etc.). In fact, its components are very reactive with oxygen and effective in promoting color stability, enhancing fruitiness and reducing astringency.

Dosage: *5-20 g/100L (0.4-1.7 lb/1000gal)*

Unico Range

Unicos are brand-new tannins entirely developed by Enartis which have a tremendous impact on wine sensory profiles and have no close matches in the market.

Why are Unicos different from the other tannins?
The raw material is selected by Enartis. Enartis is constantly looking for new botanical species and raw materials (wood, leaf, seed, etc) from which to obtain tannins with unique sensory characteristic that can be interesting for enological applications.

The unique production process, proprietary to Enartis, makes it possible to obtain tannins with enhanced characteristics of the desired flavors. In fact, the extraction as well as the spray-drying of the Unicos are made at low temperatures (approx 20°C or 68°F) and low pressure. This unique cold process makes it possible to preserve the flavors that are extracted from the raw material. At the same time, it prevents the loss of aromatic compounds and the formation of off-flavors caused by the high temperatures adopted in a standard production process. The combination of these two factors result in tannins with very intense, clean aromas that are soft and sweet on the palate because of their richness in polysaccharides, on top of the fact that they can be added in very small dosages.

UNICO #1

PACKAGES 0.25 kg

Unico #1 is extracted from toasted oak selected for the quality and richness of its aroma. Thanks to the low temperature and low pressure during the production process, these aromatic compounds are concentrated and captured in the final product. That is the reason why Unico #1 has the most intense vanilla-chocolate-toasted wood aromas that you can experience from a tannin. At the same time, it contributes body to wines and can be successfully used on both reds and whites.

Dosage: *1-15 g/100L (0.08-1.2 lb/1000gal)*

UNICO #2

PACKAGES 0.25 kg

Condensed tannin extracted from the wood of red fruit trees, Unico #2 will greatly enhance red-fruit aromas most winemakers look for, such as cherry and black currant. In fact, because of the special production process, Unico #2 contains some aromatic compounds that boost the natural fruitiness of the wine. It also provides wines with softness, structure and sweetness and reduces the sensation of harshness. It can be successfully utilized on both red and white wines.

Dosage: *1-10 g/100L (0.08-0.8 lb/1000gal)*

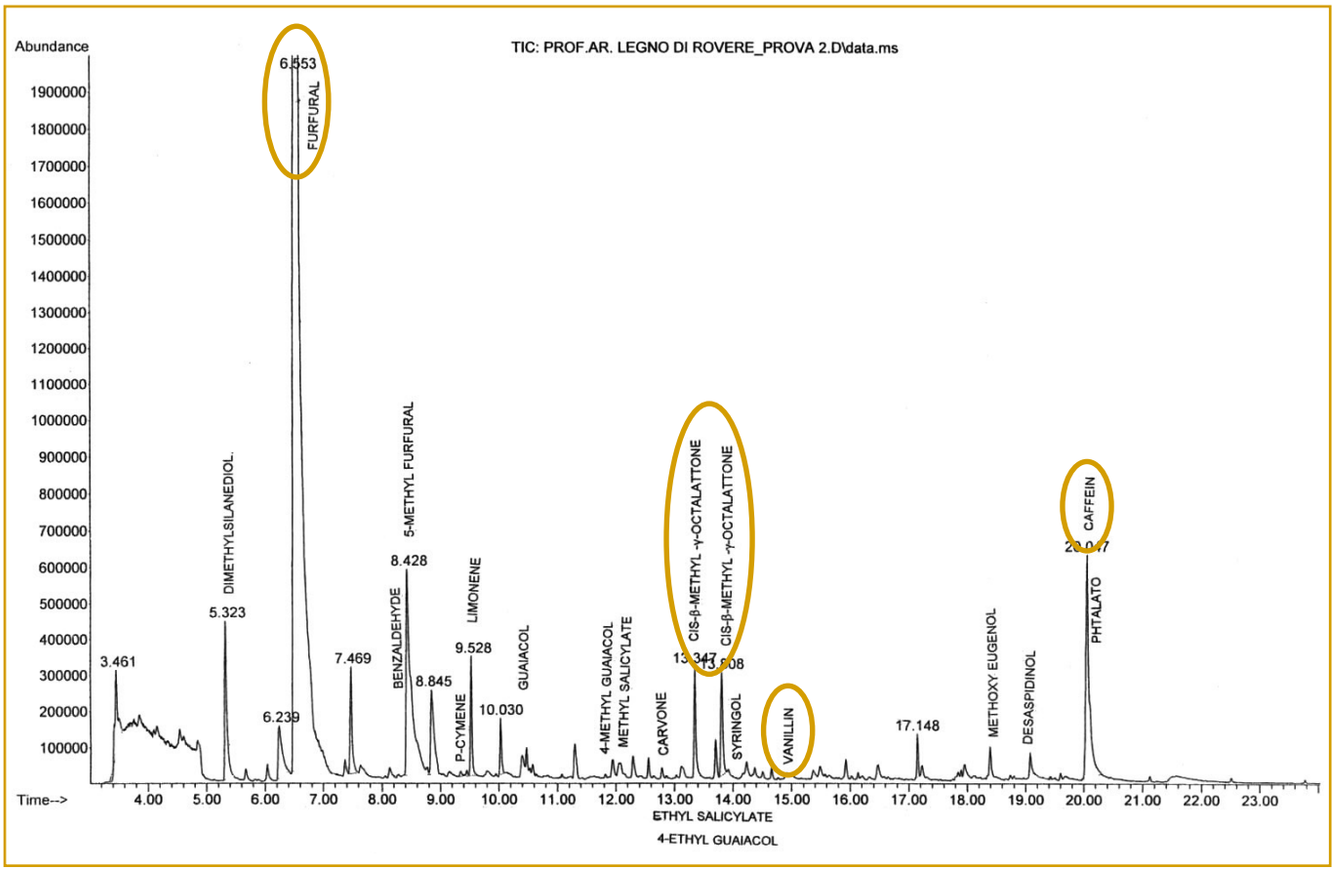
UNICO #3 new

PACKAGES 0.25 kg

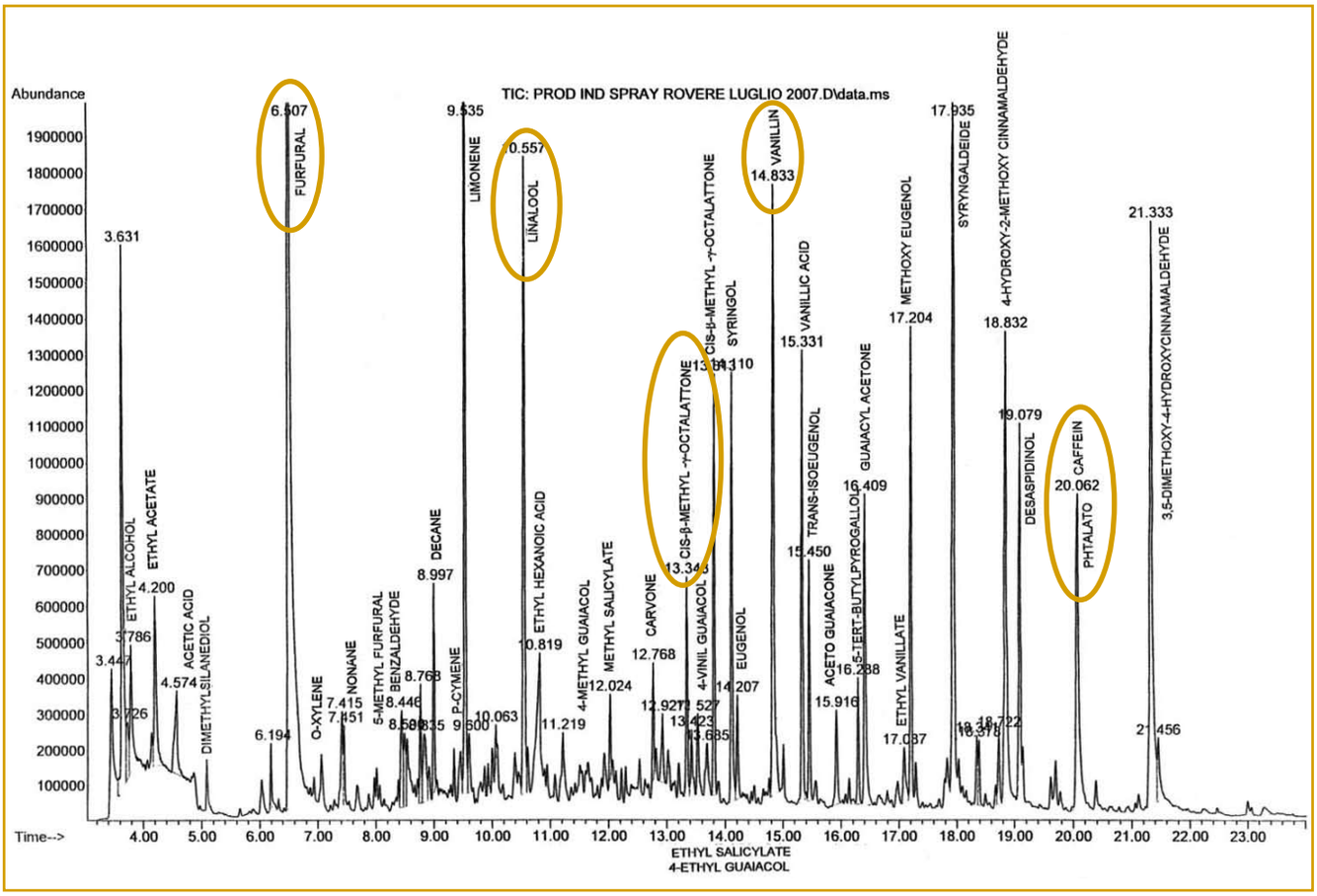
Another unique tannin created for enhancing white wine quality, Unico #3 is a blend of condensed and hydrolysable tannins extracted from herbal plants. Thanks to the unique production process and the distinctive origin of its components, Unico #3 is able to refresh wine aroma, increasing citrus and flower notes.

Dosage: *1-10 g/100L (0.08-0.8 lb/1000 gal)*

UNICO #1 RAW MATERIAL AROMATIC PROFILE (SPME)



UNICO #1 AROMATIC PROFILE (SPME)



know more ...About Enartis Tan Tannins

MATURATION ENARTIS TAN RANGE

Long experience with tannins, whether in Italy or abroad, shows that the use of the appropriate tannin at the precise concentration and at the opportune time will correct imperfections without lessening the quality as can happen during clarification. Tasting is the instrument which determines which tannin as well as how much tannin to use.

The maturation tannins of the ENARTIS TAN range, are made up of two large families of products; tannin preparations made from grape and tannin preparations made from oak. The large variety of composition allows the solution for any organoleptic or technological requirement.

ENARTIS TAN MADE FROM OAK TANNIN: ORGANOLEPTIC EFFECTS ON WINE

	STRUCTURE	ASTRINGENCY	SOFTNESS	AROMA	TYPES OF AROMAS
Max Nature	★	★	★★★★★	★	CHAMOMILE
Rich	★★	★★	★	★★	TOASTED WOOD, COFFEE, SPICES
Superoak	★★	★	★★	★★	VANILLA, CARAMEL, HAY
Élevage	★★★	★★★	★★	★★★	VANILLA, CARAMEL, TOASTED
Cœur de Chêne	★★	★★	★★★	★★★★	VANILLA, CARAMEL, COCOA
Extra	★★	★	★★★★	★★★★★	VANILLA, CARAMEL, COCOA, COFFEE

ENARTIS TAN MADE FROM GRAPE TANNINS: ORGANOLEPTIC EFFECTS ON WINE

	STRUCTURE	ASTRINGENCY	SOFTNESS	AROMA	TYPES OF AROMAS
Fruitan	★★★	★★★	★★★	★★★	RED FRUIT, SPICES
Elegance	★★	★	★★★★	★★★	FRUIT, WHITE FLOWERS
Uva	★★★	★★★★	★★	★★★	WHITE FRUIT
Skin	★★	★★	★★	★★★★	GRAPE, HAY, TEA
Uvaspeed	★★	★	★★★★★	★★★★	GRAPE, HONEY

ENARTIS TAN TANNINS: TECHNOLOGICAL EFFECTS

	COLOR STABILIZATION	ANTIOXIDANT EFFECT	INCREASE OF OLFACTORY CLEANLINESS	ELIMINATION OF UNSTABLE PROTEINS
MAX NATURE	★★★	★★	★★★★	★★
RICH	★★★	★★	★★★	★★
SUPEROAK	★★★	★★★	★★★	★★★★
ÉLEVAGE	★★	★★★	★★★	★★★★
CŒUR DE CHÊNE	★★	★★	★★	★
EXTRA	★★	★	★★	★
FRUITAN	★★★★	★★★★	★★★	★★★★
ELEGANCE	★★★★	★★★★	★★★	★★★★
UVA	★★★★	★★★	★★	★★★★
SKIN	★★★★	★★★	★★	★★★
UVASPEED	★★★★	★	★	★

HOW TO CHOOSE ENARTIS TAN TANNINS

When determining which ENARTIS TAN to use and which dosage to employ, it is important to know the organoleptic and technological characteristics and to perform preliminary tasting trials.
A simple and rapid method consists of dissolving 1 gram of ENARTIS TAN in 100 ml water containing 13% alcohol. This solution can be used for rapid taste tests knowing that 1 ml of this solution in 100 ml of wine corresponds to a dose of 10 grams of ENARTIS TAN per 100L (0.8 lb/1000 gal).

CONTACT TIME FOR ENARTIS TAN TANNINS

Some tannin preparations require time in order to express their qualities fully, while others give more immediate results.
In order to take advantage of Enartis Tan's numerous technological qualities - prevention of the appearance of abnormal smells, anti-oxidation, color stabilization, deprotination, clarifying and bacteriostatic action - is advisable to add these tannins to the wine as soon as possible, just at the end of the alcoholic and/or malolactic fermentations. It may, however, be necessary to use a late addition at the time of bottling. In this case one must choose tannins which exhibit a more immediate effect and also estimate the impact of tannin on the wines' colloidal stability to prevent filter plugging and precipitation in the bottle. Before performing a late addition, the selected tannin dose, plus an additional 20%, should be added to a bottle of wine to be treated and the bottle allowed to stand for 24 hours. At the end of this time, the filtration index, turbidity and presence of precipitate should be determined. If all of these parameters remain essentially unchanged, it is possible to proceed with tannin addition even 24-48 hours before bottling.

know more ...About Enartis Tan Elegance

EFFECTS OF ENARTIS TAN ELEGANCE IN WHITE WINE FERMENTATION

Enartis Tan Elegance is a condensed tannin largely extracted from white grape skins. Its application in the fermentation phase of white wines gives the best expression of its multiple effects which are:

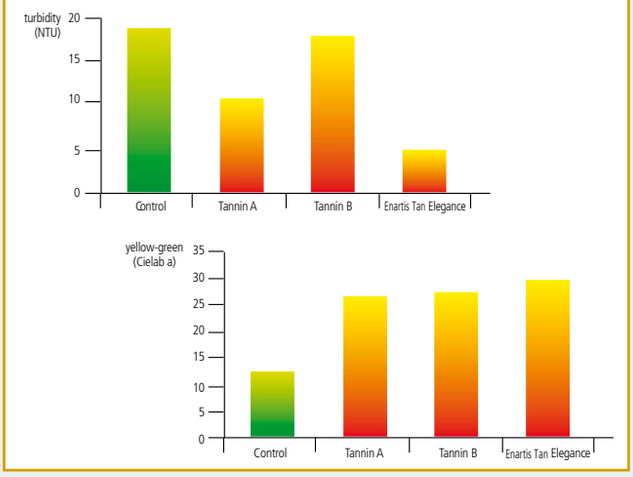
BETTER SPONTANEOUS CLARIFICATION

After alcoholic fermentation, better clarification of the wine is observed. This effect is evident not only when comparing wines with no tannin addition, but also wines treated with other tannins that are usually recommended for this phase of the winemaking process. This improved clarity is also evident in the juice when Enartis Tan Elegance is added at the same time as enzyme addition.

BETTER COLOR HUE

The wine has a tint that is generally fresher, younger and characterized by a green tone, all of which are maintained for long periods of time.

SAUVIGNON BLANC TO WHICH 100 ppm
OF ENARTIS TAN ELEGANCE WAS ADDED AT THE ENZYMATIC STAGE



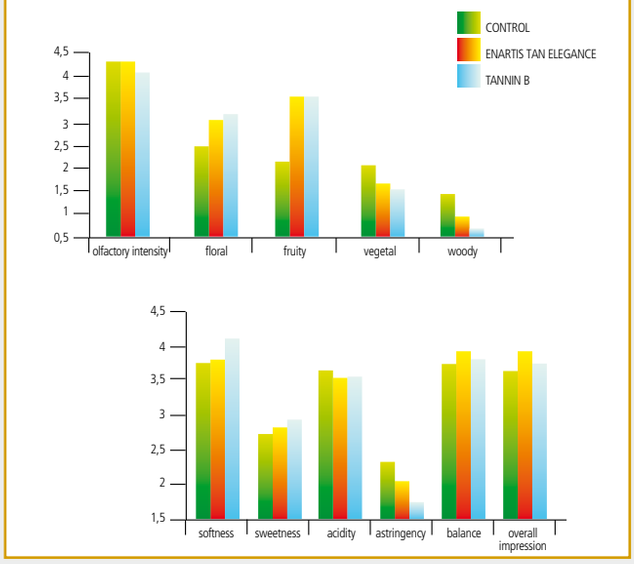
FRESHER, MORE INTENSE AND LASTING AROMAS

In particular, floral aromas and the aromas of white fruit which are evident in aromatic as well as neutral grapes, without interfering with the olfactory characteristics of the grape itself.

BETTER BALANCE

At the end of the alcoholic fermentation, the wine possesses good structure and equilibrium and is ready to be consumed without the use of excessive corrective actions.

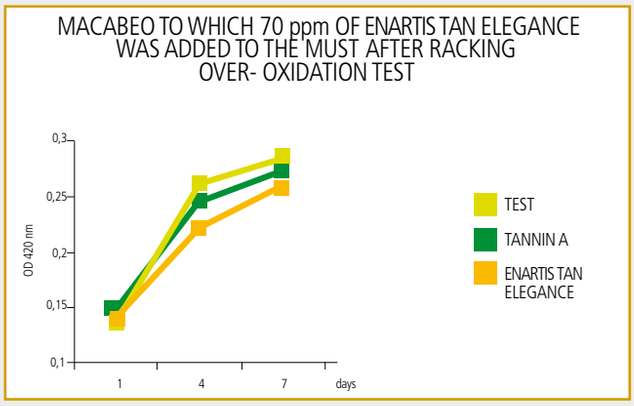
GRENACHE BLANC TO WHICH 100 ppm
OF ENARTIS TAN ELEGANCE WAS ADDED AFTER RACKING OF THE MUST



BETTER RESISTANCE TO OXIDATION

The antioxidant effect of tannins is expressed not only as an improvement in hue, but also as a tendency to minimize over oxidation.

MACABEO TO WHICH 70 ppm OF ENARTIS TAN ELEGANCE
WAS ADDED TO THE MUST AFTER RACKING
OVER- OXIDATION TEST



HOW OF USE

When: to the must, before or after racking
How much: 10-15 g/100L (0.8-1.2 lb/1000 gal)

Yeast & Grape Polysaccharides

Prolì and Surlì: Yeast & Grape Polysaccharides Based Products

Every day, more is known about the contribution made by polysaccharides to the stability and quality of wine. Many winemakers have adopted techniques such as prefermentation cold maceration, the use of macerating enzymes and sur lies ageing to enhance the content of polysaccharides and help make wines with better sensory characteristics and stability.
Unfortunately, factors such as time constraints, lack of tank space or off-aromas in the lees sometimes make these practices impossible. For those who cannot make use of the polysaccharides naturally contained in their own lees and grapes, Enartis offers Prolì and Surlì, yeast and grape polysaccharides preparations.

The use of Prolì and Surlì will contribute to:
- *Better color stability*
- *Better tartrate stability*
- *Better protein stability*

This means that it is possible to reduce fining and stabilization treatments. This will contribute to improvement in:
- *Structure*
- *Balance*
- *Aroma intensity*
- *Longevity*

Furthermore, the polysaccharides that are contained in Prolì and Surlì can make a direct contribution to wine quality:
- *Improving aroma complexity by the contribution of light hints of baked bread and yeast.*
- *Reducing natural astringency by the formation of stable complexes with tannins.*
- *Improving the mouth feel and the smoothness of wines.*

Fermentation

PROLÌ R

PACKAGES 2.5 kg • 25 Kg

A pure yeast derivative. When used during the fermentation of white and red grapes, it contributes great quantities of mannoproteins that help improve the sensation of volume. In the case of red wines, it also softens astringency and improves color stability.

Dosage: *30-50 g/100L (2.5-4.2 lb/1000gal)*

PROLÌ AROM

PACKAGES 2.5 kg

A yeast derivative obtained by the thermal treatment of a strain which is high in antioxidant peptides (1.5%). When used during the fermentation of white must, it assures elevated antioxidant protection and contributes great quantities of mannoproteins. At the end of fermentation, wines are fresher and have more intense aromatic profiles. Recommended for young white wines.

Dosage: *30-50 g/100L (2.5-4.2 lb/1000gal)*

PROLÌ BLANCO

PACKAGES 1 kg

A yeast derivative obtained by the thermal treatment of a strain which is very high in antioxidant peptides (3%). When used during the fermentation of white must, it assures elevated antioxidant protection and contributes great quantities of immediately free mannoproteins. At the end of fermentation, wines are fresher, have more intense and lasting aromas, are softer on the palate and are chemically more stable. Color is maintained for a longer period of time and the increased freshness improves the longevity of the wine. Recommended for big white and rosé wines.

Dosage: *10-30 g/100L (0.8-2.5 lb/1000gal)*

ANTIOXIDANT EFFECT OF PROLÌ BLANCO:
ROSÉ WINE ADDED WITH 200 ppm
OF PROLÌ BLANCO AT THE DRAINING

	CONTROL	PROLÌ BLANCO
VOLATILE ACIDITY	0.31	0.2
TOTAL POLYPHENOLS IND.	15.5	17.5
ANTHOCYANINS (ppm)	123	180
TANNINS (g/L)	0.45	0.58
COLOUR INTENSITY	1.67	1.91
COLOUR	0.56	0.47

PROLÌ TINTO

PACKAGES 1 kg

A fermentation coadjunct which is a mixture of cell wall polysaccharides high in soluble mannoproteins, grape seed tannins and ellagitannins. It is specifically designed to favor the condensation of anthocyanins/tannins during the maceration of red grapes. Wines treated with Prolì Tinto have vibrant color, more intense and persistent fruit aromas and are softer and better balanced. Particularly recommended to soften the astringency of grapes destined for the production of grand red wines.

Dosage: *150-400 g/ton*

PROLÌ ROUND

PACKAGES 2.5 kg

A mixture of cell walls with a high content of soluble mannoproteins and condensed and ellagic tannins, specifically designed for red grape maceration. Wines treated with Prolì Round have more vibrant and stable color, intense fruit aromas and a softer and well balanced profile. Recommended for rosé and young red wines, especially with high acidity and astringency.

Dosage: *150-500 g/ton*

Maturation

SURLÌ ONE

PACKAGES 2.5 kg

A polysaccharide complex made from yeast cell walls that have been enzymatically activated. When used in red, white and rosé wines, it contributes to protein, tartrate and polyphenol stabilization. In all wines, it enhances the natural sensation of volume and contributes to better aromatic complexity and longevity.

Dosage: *20-50 g/100L (1.7-4.2 lb/1000gal)*

SURLÌ NATURAL new

PACKAGES 25 kg

Yeast derivative with a high content of mannoproteins. Surlì Natural is a coadjunct to be used as alternative or in synergy with the natural lees in the sur lies phase. In only 6 weeks treatment, Surlì Natural enhances aroma persistency and mouthfeel, contributes to ageing potential, and chemical-physical stabilization.

Dosage: *20-50 g/100L (1.7-4.2 lb/1000gal)*

SURLÌ ROUND

PACKAGES 2.5 kg

A polysaccharide complex made from yeast cell walls and condensed and ellagic tannins, specific for red and rosé wines. It assures better color stability and enhances wine structure, balance and aromatic complexity. It reduces the herbaceous aroma.

Dosage: *20-40 g/100L (1.7-3.3 lb/1000gal)*

SURLÌ ELEVAGE

PACKAGES 1 kg

Surlì Elevage is a product made from cell wall polysaccharides with a high content of free and instantly available mannoproteins. In fact, Surlì Elevage has an immediate effect and can be successfully added with only 24-48 hours contact time. Wines treated with Surlì Elevage are softer on the palate, age well and are chemically stable. Moreover, the aroma cleanliness is improved while preserving the original fruit characteristics.

Dosage: *5-30 g/100L (0.4-2.5 lb/1000gal)*

SURLÌ VELVET new

PACKAGES 0.5 kg

A completely soluble polysaccharide complex, derived from yeast cells walls, designed to improve wine over-all quality and stability. Surlì Velvet can be added just before bottling for increasing aromatic complexity and intensity, increasing volume and persistency and in red wines for reducing astringency.

Dosage: *0.5-5 g/100L (0.04-0.4 lb/1000gal)*

SURLÌ VITIS

PACKAGES 1 kg

A polysaccharide complex made from the berries of *Vitis vinifera*. Completely soluble and filterable, it can be added to wine just before microfiltration for improving the organoleptic quality and stability of wine. In particular, Surlì Vitis is very effective for enhancing wine softness, volume, structure and perceived sweetness along with the reduction of bitter sensations and acidity. Moreover, it augments the antioxidant properties of wine.

Dosage: *2-15 g/100L (0.2-1.2 lb/1000gal)*

know more ...About Prolì

The first stage of vinification are critical for the quality of wine. Protecting the new wine from oxidation and stabilizing the aromatic and polyphenolic profile of the grapes prevents rapid ageing of color and aroma as well as the formation of unpleasant herbaceous and bitter qualities.

Enartis' biological coadjuncts, the Prolì range, supply mannoproteins and natural antioxidants that increase the stabilizing action of polysaccharides released from yeast during fermentation as well as the antioxidant action of sulfur dioxide. This results in wines with a longer shelf life, greater stability, and that posses better organoleptic qualities.

PROLÌ RANGE: CHARACTERISTICS AND APPLICATIONS

	PROLÌ R	PROLÌ AROM	PROLÌ BLANCO	PROLÌ ROUND	PROLÌ TINTO
COMPOSITION	YEAST DERIVATIVE	YEAST DERIVATIVE	YEAST DERIVATIVE	• YEAST DERIVATIVE • CONDENSED TANNINS • ELLAGIC TANNINS	• YEAST DERIVATIVE • GRAPE SEED TANNINS • ELLAGIC TANNINS
CONTRIBUTION TO THE WINE	MANNOPROTEINS	• MANNOPROTEINS • ANTIOXIDANT PEPTIDES 1.5%	• IMMEDIATELY FREE MANNOPROTEINS • ANTIOXIDANT PEPTIDES 3%	• MANNOPROTEINS • TANNINS	• IMMEDIATELY FREE MANNOPROTEINS • TANNINS
ENOLOGICAL EFFECT	• MOUTHFEEL • COLOR STABILIZATION • SOFTENING ASTRINGENCY	• AROMA PROTECTION • COLOR PROTECTION	• AROMA PROTECTION • COLOR PROTECTION • MOUTHFEEL	• AROMA PROTECTION • COLOR STABILIZATION • MOUTHFEEL	• AROMA PROTECTION • COLOR STABILIZATION • MOUTHFEEL • SOFTEN ASTRINGENCY
APPLICATION	• WHITE WINES • RED WINES	LIGHT WHITES	• STRUCTURED WHITES • ROSÉ WINES	• LIGHT REDS • ROSÉ WINES	• STRUCTURED REDS • ASTRINGENT REDS
HOW TO USE	ADDITION AT YEAST INOCULATION	ADDITION AT YEAST INOCULATION	ADDITION AT YEAST INOCULATION	ADDITION AT YEAST INOCULATION	ADDITION AT YEAST INOCULATION

know more ...About Surlì

SURLÌ: POLYSACCHARIDES FOR THE MATURATION PHASE

During the maturation phase, yeast and grape-derived polysaccharides can be used as a substitute for natural yeast-hulls or to amplify their effect. Enartis has generated a range of coadjuncts derived from yeast and grapes that are useful for specific applications.

	NATURAL	ONE	ROUND	ÉLEVAGE	VITIS	VELVET
COMPOSITION	Yeast derivative	Yeast derivative β-glucanase	Yeast derivative Condensed tannins Ellagic tannins	Yeast hulls rich in free mannoproteins	Grape polysaccharides	Yeast polysaccharides
CONTRIBUTION TO THE WINE	Mannoproteins	Mannoproteins	Mannoproteins Tannins	Immediatelly free mannoproteins	Grape polysaccharides	Readily soluble mannoproteins
ENOLOGICAL EFFECT	Mouthfeel Soften astringency Stability	Mouthfeel Soften astringency Stability	Mouthfeel Stability Structure Aromatic cleanliness	Mouthfeel Soften astringency	Mouthfeel Soften astringency Aromatic cleanliness	Mouthfeel Soften astringency Aromatic cleanliness Aromatic complexity
APPLICATION	**WHITES** **REDS** **ROSÉS**	**WHITES** **REDS** **ROSÉS**	**REDS** **ROSÉS**	**WHITES** **REDS** **ROSÉS**	**WHITES** **REDS** **ROSÉS**	**WHITES** **REDS** **ROSÉS**
HOW TO USE	Maturation phase	Maturation phase	Maturation phase	Pre-bottling	Pre-bottling	Pre-bottling
CONTACT TIME	6 weeks + filtration	3-4 weeks + filtration	3-4 weeks + filtration	24-48 h + filtration	Immediate	Immediate

HOW TO CHOOSE THE PROPER SURLÌ

In order to determine which Surlì to use and the appropriate dosage, it is possible to use the following rapid taste test. Rehydrate 1 gram of Surlì in 50 ml of water at 38°C (100°F) for 2 hours. In the meanwhile prepare 50 mL of solution with 13 mL alcohol 95% and 37 mL water At the completion of the 2 hours, add the 50 ml of a solution to the suspension and let it cool at room temperature with periodic mixing. The final solution must be kept at a temperature of at least 20 °C (68 °F) and mixed two or three times daily for at least three days. The solution is now ready to add directly to wine being treated knowing that 1 ml in 100 ml of wine corresponds to a dose of 10 grams of Surlì per 100L (0.85 lb/1000 gallons).

N.B.: Surlì Elevage, Surlì Vitis and Surlì Velvet can be simply dissolved in a water solution containing 13% alcohol (1 g of Surlì in 100 ml of water solution) and be used immediately.

A MORE APPEALING WINE STYLE: TANNINS AND POLYSACCHARIDES - NEW/OLD TOOLS FOR WINEMAKERS

If the wine is produced for its appeal to the consumer we must ask what appeals to the consumer. An answer can be: a wine without defects, possibly with some quality.

The absence of defects is a universal request. A wine which is oxidized, reduced, herbaceous, bitter, astringent or wines with burning sensation is not acceptable.

The wine must also be visually appealing and if the color is not vibrant, shining and crystal clear the consumer may not want it.

The expected quality can vary as a function of nationality, food habits, as well as local customs relating to the consumption of wine. A definition of quality can be found which will be satisfactory for the expert as well as for the occasional consumer. A wine which is fruity, soft and in equilibrium, or in other words - a wine easy to drink - is universally appreciated.

IF OUR OBJECTIVE IS TO PRODUCE A WINE WHICH IS FRUITY, SOFT AND IN EQUILIBRIUM, WHAT MUST WE DO?

Obviously, the most fundamental concern is obtaining good raw materials, i.e. good quality mature grapes. If, however, nature has not assisted us and we must make up for certain imperfections which will place our wine in the "interesting, but.." category instead of leaving it in the "appeals to me!" category, what can we do?

Normally in these situations the enologist resorts to the use of clarifying agents, correctors of acidity and physiochemical stabilization processes. Obviously these practices are effective, but they nearly always involve a loss of quality, along with a decrease in structure, volume, color and aroma.

In some situations, however, it is possible to use alternative tools which do not affect the quality of the wine: tannins and polysaccharides (mannoproteins and Gum Arabic).

We are speaking of enological tools that are not new, but that can be used in a non-conventional manner. Traditionally, tannins are used as antioxidants, for clarification and color stabilization, while mannoproteins, which are extracted from the yeast used in the *sur lie* process, and Gum Arabics are used mainly for their stabilizing action.

HOW CAN TANNINS AND POLYSACCHARIDES IMPROVE THE QUALITY OF WINE?

The use of the correct tannin at the correct dosage can, in some cases, eliminate reduced, oxidized and herbaceous olfactory characters. It can increase fruity aromas, structure, and palate equilibrium, while reducing astringency, bitterness and burning taste sensations.

Gum Arabic and mannoproteins increase the palate volume of wine and, like tannins, reduce perception of alcohol, astringency and bitterness.

The additions of tannins and/or polysaccharides can, in some cases, replace clarification, with added advantage that the organoleptic deficiencies are cured without negative consequences for wine quality.

HOW ARE TANNINS AND POLYSACCHARIDES USED?

They can be used in a preventative and also in a curative method. It is generally felt that the sooner they are used (fermentation and early stages of ageing) the better they are in preventing defects. During ageing, they can be used also in a curative mode.

Their use during fermentation requires technical support from the supplier to determine the proper type and dose of tannin and polysaccharide to use. Tasting of the must/wine during the process is a very important analytical function and the experience gained during grape harvests will determine operating parameters.

Their use during ageing is easier because laboratory tests can be conducted to determine the type and amounts to be used. This is important, because tannins and polysaccharides obtained from different raw materials or from different production process will impart different sensory effects. If your results so far were unsatisfactory, don't reject the general idea and try new tannins and polysaccharides, there is good chance that you will be happy with new products.

In addition to qualitative advantages, the use of tannins and polysaccharides offer three significant practical advantages:

- Easy to conduct the trials in your wines and verify the results.
- Possibility to significantly reduce the labor costs. Without a doubt, the preparation of tannin or polysaccharide is significantly faster than for other coadjuncts and if granulated or liquid products are available, they can be added directly to wine. Introduction into the wine is simple and fast and at last, we can enter into modern times and avoid rackings and filtrations.
- No wine losses.

In conclusion, "Is it not worth the pain of trying"?

DESIRED EFFECT	TANNINS ENARTIS TAN & UNICO RANGES	YEAST POLYSACCHARIDES SURLÍ RANGE	GUM ARABIC
Strengthening fruity notes	FRUITAN • ÉLEGANCE • UVA • SKIN UVASPEED • MAX NATURE • UNICO #2 UNICO #3 • MICROFRUIT	VITIS • VELVET	AROMAGUM
Strengthening woody notes	RICH • SUPEROAK • ÉLEVAGE CŒUR DE CHÊNE • EXTRA • UNICO #1		
Increase olfactory cleanliness	FRUITAN • ÉLEGANCE • MAX NATURE RICH • SUPEROAK	NATURAL • ONE • ROUND VITIS • VELVET	AROMAGUM
Increase olfactory persistence	FRUITAN • ÉLEGANCE • SKIN CŒUR DE CHÊNE • EXTRA	ONE • ÉLEVAGE	AROMAGUM
Attenuation of astringency	ÉLEGANCE • UVASPEED CŒUR DE CHÊNE • EXTRA	NATURAL • ONE • ÉLEVAGE VITIS • VELVET	CITROGUM
Increase softness	ÉLEGANCE • UVASPEED • SUPEROAK MAX NATURE • EXTRA • UNICO #2 MICROFRUIT	NATURAL • ONE • ROUND ÉLEVAGE • VELVET • VITIS	CITROGUM AROMAGUM
Increase structure	FRUITAN • UVA • SKIN RICH • ÉLEVAGE • UNICO #1	ROUND • VITIS	AROMAGUM MAXIGUM
Attenuation of bitterness	ÉLEGANCE • UVASPEED • SUPEROAK CŒUR DE CHÊNE • EXTRA • MICROFRUIT	ONE • ÉLEVAGE VITIS • VELVET	
Augmentation of antioxidant properties	FRUITAN • ÉLEGANCE SKIN • SUPEROAK • ÉLEVAGE • UNICO #3	ONE • ROUND • ÉLEVAGE VITIS	
Stabilize color	FRUITAN • UVA • RICH SUPEROAK • ÉLEVAGE	ONE • ROUND • NATURAL	CITROGUM MAXIGUM
Micro-oxygenation	FRUITAN • UVA • RICH SUPEROAK • ÉLEVAGE • MICROFRUIT	NATURAL • ONE • ROUND	
Protein stabilization	ÉLEGANCE • UVA SKIN • ÉLEVAGE	ONE • NATURAL	

Malolactic Fermentation

Properly conducted malolactic fermentations are not only synonymous with good organoleptic quality, but also provide the consumer with a measure of security. Because of this, it is important to use selected and guaranteed bacterial strains which have the ability to dominate the fermentation.

ENARTIS ML ONE

PACKAGES doses designed for volumes of 250L (66 gal), 2500L (660 gal), 25000L (6600 gal).

This strain of *Oenococcus oeni* guarantees a fast and complete malolactic fermentation in red and white wines. It produces clean and fruit forward aromas and helps to reduce the impact of the herbaceous notes that are sometimes present in red wines.

ENARTIS ML SILVER

PACKAGES doses designed for volumes of 2500L (660 gal), 25000L (6600 gal) and 100000L (26400 gal).

A strain of *Oenococcus oeni* isolated from the Sonoma area of California. It was chosen among hundreds of different strains from wines all over the world. Enartis ML Silver assures the progress of malolactic fermentation even under difficult conditions due to high alcohol (>15%) and polyphenol content. It respects the aromatic characteristics of the wine and does not produce biogenic amines.

NUTRIFERM ML

PACKAGES 1 kg

Nutriferm ML is a nutrient specifically for malolactic bacteria. Increasing nutrients in wine stimulates the growth of bacteria at inoculation and improves cell division. Nutriferm ML provides polysaccharides, amino acids, co-factors and vitamins. The cellulose contained in the preparation acts as a support for bacteria cells and absorbs compounds that may inhibit cell growth. The combined effect of Nutriferm ML components ensures the domination of the inoculated strain over natural flora and dramatically reduces the length of malolactic fermentation. It's particularly recommended to promote malolactic fermentation in difficult wines.

Dosage: *20-30 g/100L (1.7-2.5 lb/1000gal)*

FOR MALOLACTIC FERMENTATION IN DIFFICULT CONDITION

In order to get successful malolactic fermentation in difficult wines (low pH, high alcohol content) or to speed up the fermentation in normal conditions, we suggest to prepare a *pied de cuve* as following.

Example for 10000L wine

1. Rehydrate 4 doses for 25 hL each of **Enartis ML One** (wines with alcohol content <14%, pH > 3.2) or **Enartis ML Silver** (wines with alcohol content >15%, pH > 3.1) as indicated in the technical data sheet.
2. Prepare a blend with
   - 50 L water
   - 50 L wine
   - 1 kg **Nutriferm ML**
3. Adjust the blend pH > 3.3 if necessary.
4. Inoculate the blend with the rehydrated bacteria. Keep it at 18-20°C (64-68°F).
5. At 1/2 - 2/3 malic acid depletion, add 200L of wine and 1 kg ***Nutriferm* ML** into the *pied de cuve* in fermentation. Keep it at 18-20°C (64-68°F).
6. At 1/2 - 2/3 of malic acid depletion, use the *pied de cuve* to inoculate the remaining wine. Keep the wine at 18-20°C (64-68°F) till the end of the fermentation.

Filter Aids

Precoats

FILTROBRIL HM

PACKAGES 10 kg

Dry precoat with a cellulose base for filtering cloudy wines.

Dosage: *As a precoat: 700-1000 g/m² of filter surface*
As bodyfeed: 50-100 g/100L (4.2-8.3 lb/1000gal)

FILTROBRIL HS

PACKAGES 10 kg

Dry precoat with a cellulose base for the polishing filtration of wines.

Dosage: *As a precoat: 800-1000 g/m² of filter surface*
As bodyfeed: 50-100 g/100L (4.2-8.3 lb/1000gal)

Filter Aids with Stabilizing Effect

FILTROSTABYL W

PACKAGES 10 kg

Filtering coadjunct that consists of PVPP, activated carbon, potassium caseinate and perlite. It's recommended for the filtration of white wines.

It also acts as stabilizing agent eliminating the compounds that can cause haze, browning and bitterness.

Dosage: *60-150 g/100L (5-12.6 lb/1000gal)*

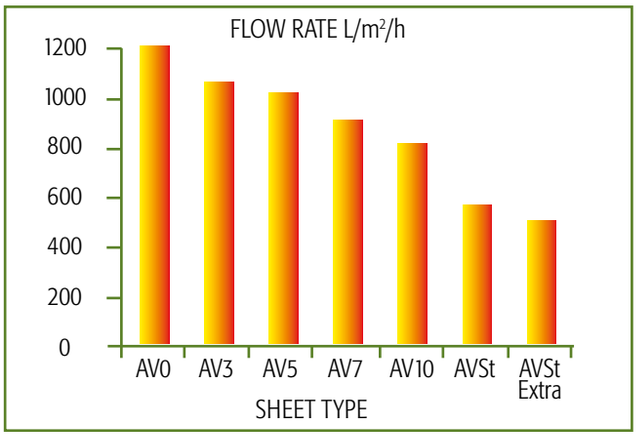
Filter Sheets

ENARTIS FILTRA AV new

PACKAGES 40cm x 40cm sheets in box of 100 sheets

Full range of innovative filter sheets to satisfy any need. The ENARTIS Filtra AV range can be used to filter wines, musts, juices, beers, spirits and other beverages. It is ideal to obtain a physico-chemical and microbiologically stable filtrate while respecting the organoleptic features of the original product, including colour.

SHEET	FILTRATION	POROSITY (micron)
AV 0	Coarse Filtration - Very Large	3-5
AV 3	Coarse Filtration - Large	2- 3
AV 5	Coarse Filtration - Tight	1.5-2
AV 7	Fine Filtration - Large	1.25-1.5
AV 10	Fine Filtration - Tight	0.6-0.8
AV St	Sterile	0.25-0.45
AV St Extra	Super Sterile	0.15-0.2



Fining Agents

The fining process is mainly aimed at improving the clarity and organoleptic features of the treated wine or juice. While various physical methods, such as centrifugation and filtration, can be applied to clarify juice and wine, the reduction or elimination of the compounds responsible for wine instability or taste imbalance is often best achieved by using fining agents.

The fining process is therefore a crucial stage in the production of all wine types.
Enartis is constantly at the forefront of applied research in the field of winemaking products, offering solutions tailored to the specific needs of winemakers that assist them to produce wines with a modern and distinctive style well suited to the global market.

Allergen Free Fining Agents

The directive - 2007/68/EC - foresees that all wines produced and/or marketed in the European Union must declare on the label when they have been treated with coadjuncts derived from milk or eggs. Enartis has created a product line of Allergen Free fining agents that offers the advantage of not containing ingredients which must be declared on the label and that are suitable for the production of juices and wines destined for consumption by vegetarians and vegans.

Alternatives to Casein and Potassium Caseinate

The experience developed over many experiments indicates that the use of blends ensures more constant results as compared to the use of pure coadjuncts.

Because of this, Enartis has developed a series of complex products suitable to replace casein and potassium caseinate for the treatment of musts and wines.

PROTOMIX AF

PACKAGES 10 kg

Complex containing bentonite, PVPP, plant protein and cellulose. The best use for Protomix AF is for the clarification of must because it assures good clearing action while simultaneously removing oxidized and oxidizable polyphenolic substances as well as the proteins responsible for wine instability. It can also be used during primary fermentation to detoxify must and favor the metabolic activity of yeast.

Dosage: *50-150 g/100L (4.2-12.6 lb/1000gal) in juice and fermentation*
30-100 g/100L (2.5-8.3 lb/1000gal) in wine

CLARIL AF

PACKAGES 1 kg • 10 kg

A blend containing bentonite, PVPP, plant protein and amorphous silica. Claril AF is recommended for the elimination of phenolic compounds responsible for oxidation at the expense of color and aroma, followed by the appearance of bitterness. The presence of bentonite in the formulation increases protein stability and guarantees good clarification.

Dosage: *50-150 g/100L (4.2-12.6 lb/1000gal) in juice*
30-80 g/100L (2.5-6.7 lb/1000gal) in wine

COMBISTAB AF

PACKAGES 1 kg • 10 kg

A complex containing PVPP, plant protein and amorphous silica. It is very effective in the prevention and cure of oxidation, pinking and the reduction of bitter sensations. Combistab AF is designed for those who prefer to manage the use of bentonite separately.

Dosage: *10-50 g/100L (0.8-4.2 lb/1000gal)*

PLANTIS AF

PACKAGES 15 kg

A pure, gluten free plant protein. Plantis AF has the ability to remove catechins and short chain-length polyphenols which are responsible for oxidation and the onset of bitterness. It can be used alone in wine clarification, or better yet, in combination with other clarifying agents, such as bentonite.

Dosage: *10-30 g/100L (0.8-2.5 lb/1000gal)*

Alternatives to Egg Albumin

GOLDENCLAR

PACKAGES 1 kg

As shown in studies conducted on the interaction of animal gelatin with the phenolic component of wine, Goldenclar appears to act on the same tannin fractions that are removed by egg albumin. The use of Goldenclar is therefore recommended in the treatment of aged red wines to reduce astringency without modifying the gustatory equilibrium. It is also very effective for the clarification of all wine.

Dosage: *2-4 g/100L (0.2-0.3 lb/1000gal) in white wines*
6-10 g/100L (0.5-0.8 lb/1000gal) in red wines

Albumin

BLANCOLL

PACKAGES 1 kg

Pure powder egg albumin for softening and refining the structure of red wines. It eliminates excessive astringency by flocculating a wide spectrum of tannin fractions. Blancoll is particularly recommended for its quality: it rounds off the structure without causing an imbalance, and maintains the aroma and original features of wine.

Dosage: *5-10g/100L (0.4-0.8 lb/1000gal)*

Gelatin

APPLICATIONS OF ENARTIS GELATINS

	ATOCLAR	HYDROCLAR 45	HYDROCLAR 30	CLARGEL	PULVICLAR S	GOLDENCLAR
JUICE			Flotation Clarification with silica sol or bentonite	Flotation Clarification with silica sol or bentonite	Clarification with silica sol or bentonite	
WHITE AND ROSÉ WINES			Clarification with silica sol, bentonite or tannin	Clarification with silica sol, bentonite or tannin	Clarification with silica sol, bentonite or tannin	Clarification with silica sol, bentonite or tannin
PRESSED WINES	Decrease of astringency Clarification	Decrease of astringency Clarification				
YOUNG RED WINES			Decrease of astringency Clarification	Decrease of astringency Clarification		
AGED RED WINES				Decrease of astringency Clarification	Decrease of astringency Clarification	Decrease of astringency Clarification

HYDROCLAR 30

PACKAGES 25 kg • 1000 kg

A 30% liquid solution of food grade gelatin. This medium hydrolyzed gelatin can be successfully used for the clarification of juice and wine and for removing excessive astringency. It is particularly effective in reducing the sensations of dryness and astringency that can be felt at the middle-end of the palate. It is also ideal for clarification of white juice by flotation.

Dosage: *15-40 mL/100L (0.6-1.5 L/1000gal) in juice*
10-20 mL/100L (378-757 mL/1000gal) in white wines
30-60 mL/100L (1.1-2.3L/1000gal) in red wines

HYDROCLAR 45

PACKAGES 25 kg • 1000 kg

A 45% liquid solution of food grade gelatin. This extremely hydrolyzed gelatin has a powerful tannin reducing effect. It is highly effective in removing undesirable tannins at the front of the palate. It is therefore particularly suitable for softening pressed and young red wines.

Dosage: *10-25 mL/100L (378-950 mL/1000gal) in juice*
7-15 mL/100L (265-950 mL/1000gal) in white wines
20-40 mL/100L (0.75-1.5L/1000gal) in red wines

ATOCLAR

PACKAGES 20 kg

An atomized food grade gelatin easily soluble in cold water. It is ideal for softening pressed wines and young red wines that have excessive astringency at the front of the palate.

Dosage: *2-4 g/100L (0.2-0.3 lb/1000gal) in white wines*
8-15 g/100L (0.7-1.2 lb/1000gal) in red wines

PULVICLAR S

PACKAGES 1 kg • 20 kg

Pulviclar S is an ultra-pure, food grade, warm soluble, granulated gelatin, characterized by low hydrolysis and high charge density. Pulviclar S is a highly effective clarifier and stabilizer. It's recommended for clarifying white juice and wine in conjunction with Sil Floc, Pluxbenton N, Bentolit Super and Tanenol Clar. In quality red wines, Pulviclar S improves balance by eliminating excess astringency at the end of the palate without reducing structure.

Dosage: *4-10 g/100L (0.3-0.8 lb/1000gal) in juice and white wines*
6-15 g/100L (0.5-1.2 lb/1000 gal) in red wines

GOLDENCLAR

PACKAGES 1 kg

High molecular weight gelatin in the form of dry sheets. As shown in studies conducted on the interaction of animal gelatin with the phenolic component of wine, Goldenclar appears to act on the same tannin fractions that are removed by egg albumin. The use of Goldenclar is therefore recommended in the treatment of aged red wines to reduce astringency without modifying the gustatory equilibrium. It is also very effective for the clarification of all wine.

Dosage: *2-4 g/100L (0.2-0.3 lb/1000gal) in white wines*
6-10 g/100L (0.5-0.8 lb/1000gal) in red wines

CLARGEL

PACKAGES 25 kg

A new gelatin with a high molecular weight in a liquid solution. It is very effective in clarifying both juice and wine. In high quality red wines, it improves balance by eliminating excessive astringency without reducing the wine's structure.

Dosage: *40-150 mL/100L (1.5-5.7 L/1000gal) in juice*
20-50 mL/100L (0.75-1.9 L/1000gal) in white wines
50-150mL/100L (0.75-5.7 L/1000gal) in red wines

Fish Gelatin

FINEGEL

PACKAGES 20 kg

Finegel is a concentrated solution containing 200 g/L of high quality fish gelatin. Because the amino acid composition is similar to bovine and porcine gelatin, Finegel can be used for the clarification of wines for markets which prohibit treatment with substances of bovine or porcine origin. In white wines, it's very effective in reducing oxidative and vegetal characteristics. In red wines, Finegel eliminates hard tannins and improves finesse, roundness and fruit aromas. It's also helpful in color stabilization.

Dosage: *20-100mL/100L (0.75-3.8 L/1000gal)*

Caseinate

PROTOCLAR®

PACKAGES 25 kg

Pure potassium caseinate containing over 90% protein. Manufactured using a special method designed to produce a product meeting the specific requirements of the wine industry, Protoclar® dissolves readily in water, without forming lumps and causing minimal foaming.

Dosage: *20-100 g/100L (1.7-8.3 lb/1000gal)*

Isinglass

FINECOLL

PACKAGES 1 kg

Finecoll is a granular isinglass which is soluble in cold water. It is useful for the clarification of all wines (red, white, and rosé) when the reduction of bitterness as well as oxidative and herbaceous characteristics are desired without adversely affecting the structure of the wine. Moreover, because it is scarcely affected by colloids, Finecoll improves brilliance and filterability of wines which are difficult to filter, particularly those derived from inferior or poor quality grapes which have been affected by *Botrytis* or those which have been subjected to strong mechanical treatment.

Dosage: *1-4 g/100L (0.08-0.3 lb/1000gal)*

Plantis

Clarifying Agents based on Proteins of Plant Origins

PLANTIS IS A RANGE OF INNOVATIVE CLARIFICATION PRODUCTS WHICH HAVE BEEN OBTAINED FROM **PLANT PROTEINS EXTRACTED FROM WHEAT AND PEA**

It is the result of eight years of research and experimentation involving the main European research centers, as well as the collaboration of numerous Italian wineries, with over 500000 L (132.000 gal) of wine and musts treated on a commercial scale.
The coadjuncts of the PLANTIS range have specifically been selected and tested for the application on wine and must. Their unique properties include a high clarifying capacity, an increase in the filtration capacity, a reduced volume of lees and respect for color components.
The plant origins of the PLANTIS coadjuncts give technical experts **an alternative to traditional proteinaceous clarifying agents**, in particular gelatin, casein and egg albumin, capable of:
• **satisfying** the demand for wines not treated with substances of animal origins (organic, vegetarian, vegan wines, etc.)
• **guaranteeing food safety** for consumers by preventing the risk of spreading diseases, related to the use of coadjuncts of animal origins (BSE, bird flu, etc.)
• **mantaining the natural integrity** of the wine by offering an adjuvant which has the same nature of the food for which it is intended.

THE RANGE

The Plantis coadjuncts are in powder form, in a color which varies from yellow to beige (of variable intensity) and with a light and characteristic smell of dry legumes.
Their dosage rates are similar to those used for animal gelatin, upon dispersion in water at room temperature. Because plant proteins are not completely soluble, the suspension has to be kept in motion during its introduction into the liquid being treated. It is good practice to introduce Plantis in the must or wine via a dosing pump or Venturi tube, during a pump-over which ensures the contact between the clarifying agent and most of the volume to be clarified.

PLANTIS CLAR

PACKAGES 15 kg

COMPOSITION: clarifying agent obtained from hydrolyzed gluten.
APPLICATIONS: for the static clarification and flotation of must.

Dosage: *10-30 g/100L (0.8-2.5 lb/1000gal)*

PLANTIS ELEGANCE

PACKAGES 15 kg

COMPOSITION: clarifying agent obtained from hydrolyzed gluten and pea protein.
APPLICATIONS: to diminish the astringency and bitterness of red wines.

Dosage: *5-50 g/100L (0.4-4.2 lb/1000gal)*

PLANTIS FINE

PACKAGES 15 kg

COMPOSITION: clarifying obtained from hydrolyzed gluten and pea protein.
APPLICATIONS: for the clarification of white wines, reducing oxidation, and for cleaning up of red wines where the intent is to maintain an unchanged taste balance.

Dosage: *5-30 g/100L (0.4-2.5 lb/1000gal)*

PLANTIS AF (GLUTEN FREE)

PACKAGES 15 kg

COMPOSITION: pure, allergen free plant protein.
APPLICATIONS: to remove catechins and short chain polyphenols which are responsible for oxidation and bitterness. It can be used as alternative to the casein.

Dosage: *10-30 g/100L (0.8-2.5 lb/1000gal)*

APPLICATION ADVANTAGES

PLANTIS GUARANTEES
- Optimal clarifying capacity
- Reduction of astringent and bitter sensations
- Little removal of color compounds
- Reduced loss of liquid thanks to the production of low volumes of lees
- No risk of contamination deriving from coadjuncts of animal origins
- No substances obtained through genetically modified organisms
- Conformity to Codex Alimentarius
- Conformity to Codex Oenologique
- Safety for the consumer: only the Plantis clarifying agents are accompanied by a toxicological study which reasonably shows the absence of allergenic residue in treated wines and musts

PVPP

STABYL

PACKAGES 1 kg • 30 kg

A pure polyvinyl-polypyrrolidone, Stabyl is highly effective in removing oxidized and oxidizable polyphenols. Thus, it is recommended to prevent and treat oxidation in all types of wine. Stabyl can also be successfully used to reduce bitterness.

Dosage: *5-50 g/100L (0.4-4.2 lb/1000gal)*

Blends

PROTOMIX G

PACKAGES 15 kg

A blend of bentonite, potassium caseinate and cellulose particularly suited for the clarification of juice and white wine. Protomix G enhances white wine quality through the elimination of oxidized polyphenols. When added during fermentation, it also provides a support for yeast, helping their metabolism.

Dosage: *50-100 g/100L (4.2-8.3 lb/1000gal) in fermentation*
30-100 g/100L (2.5-8.3 lb/1000gal) in wine

CLARIL SP

PACKAGES 10 kg

Claril SP is a complex clarifying agent consisting of bentonite, PVPP, potassium caseinate and silica. It is recommended for the prevention and correction of the oxidative phenomena associated with phenolic components of must and wine. Wines treated with Claril SP have a more intense and elegant nose and age better. Claril SP can also be used to increase clarity and reduce bitterness.

Dosage: *50-150 g/100L (4.2-12.6 lb/1000gal) in juice*
30-80 g/100L (2.5-6.7 lb/1000gal) in wine

NEOCLAR AF

PACKAGES 25 kg

A new allergen free formula! A blend of bentonite, gelatin and activated carbon, it can be used to treat white, rosé and red wines as well as juice. Neoclar AF ensures fast and thorough clarification, and minimal amounts of lees. The combination of several organic clarifiers improves the organoleptic features of wine while the bentonite ensures proper protein stability. The product gives red wines remarkable stability, without affecting color. Particularly effective in reducing herbaceous characters, it also facilitates wine filtration.

Dosage: *100-150 g/100L (8.3-12.6 lb/1000gal) in juice*
40–100 g/100L (3.3-8.3 lb/1000gal) in wine

Bentonite

BENTOLIT SUPER

PACKAGES 25 kg

Activated sodium powder bentonite. Bentolit Super combines excellent clarification with good protein removal. It can also be used in flotation.

Dosage: *20-120 g/100L (1.7-10 lb/1000gal)*

PLUXCOMPACT

PACKAGES 20 kg

A bentonite obtained by a special procedure. Its activation rate is designed to produce protein removal efficiency comparable to that of sodium bentonite with a lees volume creation similar to that of calcium bentonite. Therefore, even when used at low doses, Pluxcompact combines excellent fining and protein removal properties with limited amounts of lees.

Dosage: *20-120 g/100L (1.7-10 lb/1000gal)*

PLUXBENTON N

PACKAGES 1 kg • 20 kg

Granular sodium bentonite. Pluxbenton N combines good clarification with excellent protein removal. Pluxbenton N is also very effective in reducing riboflavin, the molecule responsible for the “light struck” defect in white wines.

Dosage: *20-120 g/100L (1.7-10 lb/1000gal)*

Silica

SIL FLOC

PACKAGES 10 • 25 • 1000 kg

A stable pure silicon dioxide in aqueous dispersion. Sil Floc contains homogeneous, negatively charged particles of silicon dioxide. The ultra-fine size offers a large contact surface and consequently acts as a co-fining agent with protein fining agents. Solution pH 9.0-9.5.

Dosage: *40-100 mL/100L (1.5-3.8 L/1000gal) in juice*
25-75 mL/100L (0.95-2.8 L/1000gal) in wine

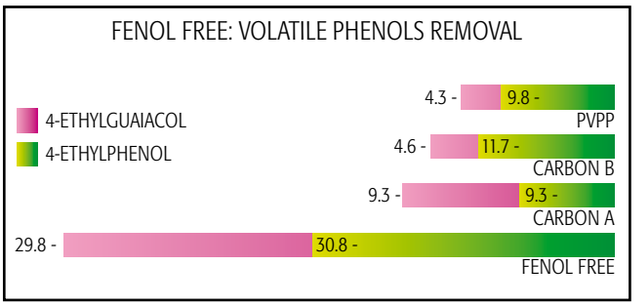
Corrective Fining Agents

FENOL FREE

PACKAGES 10 kg

This activated carbon is extremely effective in the correction of wines which present evident defects caused by *Brettanomyces/Dekkera*. Minimal additions are proven to significantly reduce the volatile phenols content, resulting in an over-all improved wine aroma without spoiling color.

Dosage: *20-40 g/100L (1.7-3.3 lb/1000gal)*



REVELAROM

PACKAGES 1 kg

Granulated fining complex containing copper. Revelarom cures and prevents the appearance of the reductive character. When it's used to cure the reduction, it immediately eliminates the bad flavors produced by mercaptans and H_2S thus making the fruitiness come out again. When added before bottling, it prevents the appearance of reduction and light-struck in the bottled wine.

Dosage: *5-20 g/100L (0.4-1.7 lb/1000gal)*

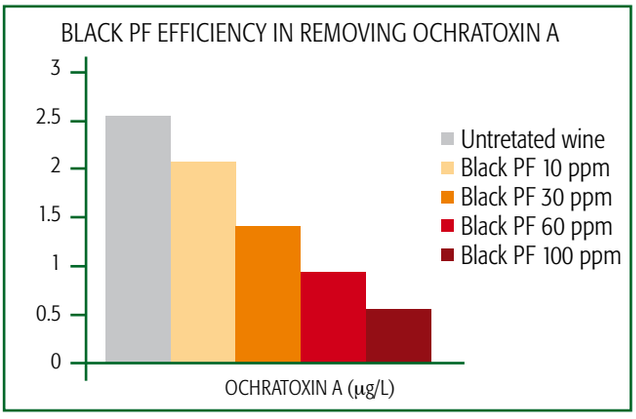
Carbon

BLACK PF

PACKAGES 15 kg

Enological activated carbon in damp form. Very effective in decolorizing wines and juice and in removing ochratoxin A (OTA). The controlled moisture present in Black PF greatly reduces the spread of carbon dust in the atmosphere and makes it easier to use.

Dosage: *20-100 g/100L (1.7-8.3 lb/1000gal)*



know more ...About Allergens Declarations on Labels

WHAT ARE THE ALTERNATIVES?

The growing recognition of food allergies and intolerances which many individuals suffer from has lead to a revision of the legislation controlling the labeling of food products.
The health of individuals that have these problems can actually be gravely compromised if they mistakenly consume substances to which they are sensitive due to a lack of information on food composition.
The European Directive 2000/13/EC defines the substances that are recognized as being the source of the most diffused forms of food allergies and intolerances. The presence of these substances must be declared on the label when they are found in food as ingredients, additives, ingredients of ingredients, additives of ingredients or technological coadjuncts. The wine industry does not evade this frank regulation. Since 2002 in Australia, it has been mandatory to state on wine labels if milk, egg or fish derivatives were used during the production process.
In Europe, the Directive 2007/68/EC requires the label declaration of the following substances used in winemaking:

- cereals containing gluten and derived products;
- eggs and egg based products;
- milk and milk based products;
- sulfur dioxide and sulfites at concentrations greater than 10 mg/kg or 10 mg/L expressed as SO_2.

In order to bypass these labeling regulations, Enartis has researched and developed fining agents free of allergenic substances as alternatives to potassium caseinate and egg albumin.

ALTERNATIVES TO POTASSIUM CASEINATE

Potassium caseinate is produced from casein, a milk protein. This form of the protein is easy to use because it easily dissolves in water.
Potassium caseinate (from this point forward this term will be used, however casein has an analogous use and effect) is used in winemaking as a fining agent. In particular, it is used for its capacity to:

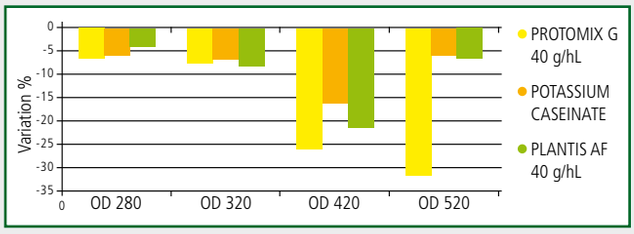
- remove phenolic substances, in particular those involved in oxidation;
- reduce bitterness;
- complex ferric iron and copper;
- eliminate unpleasant odors and tastes.

Potassium caseinate flocculates in wine and must due to acid pH and, on one hand, reduces the risk of over-fining, but on the other hand, makes it difficult to use. To guarantee maximum effectiveness, potassium caseinate must first be dissolved in water, and then added to the liquid to be treated in a slow and continuous manner using Venturi Tubes or dosing pumps. This allows for maximum contact between the fining agent and the liquid. If the application is not completed as such, the clarifying action is limited to only part of the liquid and the results may not be satisfactory.
During the search for allergen free alternatives, fining agents which, at least in part, had similar actions to caseinate were evaluated in comparison to potassium caseinate.
During this first laboratory screening, the pure compounds and blended fining agents were examined for their effects on color and total polyphenol content. All were applied at average dosages regularly used in winemaking (Table 1).

PRODUCT	COMPOSITION	DOSAGE (g/100L)	VARIATION % OD 280 (TOTAL POLYPHENOLS)	VARIATION % OD 280 (TOTAL POLYPHENOLS)	VARIATION % OD 280 (TOTAL POLYPHENOLS)
Protoclar	Potassium caseinate	15	-1.15	-1.54	1.76
Protomix G	Blend of bentonite, potassium caseinate, cellulose	50	-3.34	-5.43	-1.96
Protomix G	Blend of bentonite, potassium caseinate, cellulose	100	-5.07	-10.08	-5.88
Claril SP	Blend of bentonite, potassium caseinate, PVPP	50	-6.11	-9.30	-15.69
Claril SP	Blend of bentonite, potassium caseinate, PVPP	100	-8.65	-13.18	-19.61
Pluxbenton N	Sodium bentonite	50	-5.65	-3.10	-7.84
PVPP		15	-6.57	-17.05	-13.73
Black PF	Carbon	10	-6.81	-10.85	-19.61
Black PF	Carbon	20	-18.92	-29.46	-29.41
Plantis AF	Allergen Free Plant Protein	15	-3.00	-9.30	-5.88

TABLE 1: IMPACT OF DIFFERENT FINING AGENTS ON A WHITE WINE - PHENOLS CONTENT & COLOR

The results once again show application difficulties linked with the rapid coagulation of potassium caseinate at acid pH, which consequently reduces its effectiveness: it is more effective to use a blend (Protomix G) which contains some potassium caseinate rather than the pure product (Graph 1).



GRAPH 1 - OD 280, 320, 420 AND 520 nm OF WINES TREATED WITH DIFFERENT FINING AGENTS: VARIATION IN COMPARISON WITH THE REFERENCE WINE

Furthermore, using blends gives an aromatic result which is closer to that following the application of potassium caseinate alone. In fact, for example, PVPP is very effective at removing phenolic substances involved in oxidation and is easier to use than potassium caseinate. However when used alone and at high dosages, it can yield certain unpleasant taste sensations associated with the loss of structure and a dry aftertaste.
Given the results of these first trials, further study was dedicated to product blends, particularly blends with a PVPP, bentonite and plant protein composition.
After further laboratory trials 3 blends were formulated:

- Protomix AF is a fining agent with a bentonite, PVPP, plant protein and cellulose composition recommended for use in must during sedimentation or fermentation;
- Claril AF is a fining agent with a bentonite, PVPP, plant protein and amorphous silica composition used for the clarification of must or wine;
- Combistab AF is a fining agent with a PVPP, plant protein and amorphous silica composition for the clarification of wine.

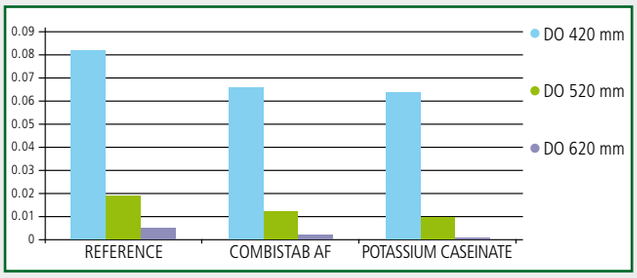
From the results obtained on white wines produced from Verdelho grapes, it is possible to see that at equal dosages, Protomix AF and Claril AF have a better clarification capacity than potassium caseinate, since they are more efficient at reducing yellow (OD at 420 nm), total polyphenol content (OD at 280 nm), pinking potential and catechin content (Table 2).

	REFERENCE	POTASSIUM CASEINATE	CLARIL AF	PROTOMIX AF
TURBIDITY (NTU)	13.4	16.4	11.4	8.3
OD 420 nm	0.182	0.176	0.155	0.181
OD 520 nm	0.697	0.808	0.686	0.765
SUSCEPTIBILITY TO PINKING	1.8	1.8	0.7	0.8
CATECHINS (mg/L)	6	5.7	5.1	5.3

TABLE 2 - TURBIDITY, COLOR, SUSCEPTIBILITY TO PINKING AND CATECHINS CONTENT IN WINES TREATED WITH DIFFERENT FINING AGENTS.

As for Combistab AF, a product which was formulated for those that prefer to manage bentonite use separately, it shows levels of color and polyphenol substance removal comparable to that of potassium caseinate (Graph 2 and 3).

Furthermore, for iron removal capacity, these allergen free compounds give very similar results to potassium caseinate (Table 3). In particular, Plantis AF, a gluten-free, pure plant protein, shows greater efficiency.



GRAPH 2: COLOR VARIATION IN A TOCAI WHITE WINE TREATED WITH 200 ppm OF FINING AGENTS.

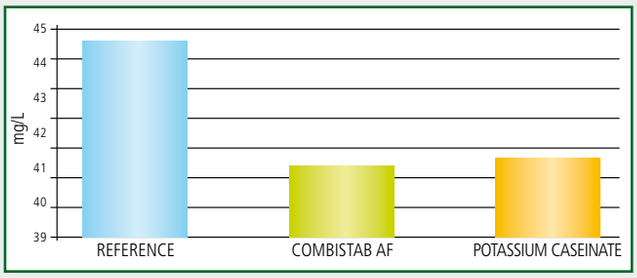


FIGURE 3: CATECHINS CONTENT OF A RED WINE AFTER TREATMENT WITH 200 ppm OF FINING AGENTS.

	REFERENCE	CLARIL AF	PROTOMIX AF	COMBISTAB AF	PLANTIS AF	POTASSIUM COMBINATE
DOSAGE		440 ppm	440 ppm	440 ppm	440 ppm	440 ppm
IRON mg/L	22.40	14.53	14.54	13.57	13.26	13.22
REDUCTION % Fe	.....	-35%	-35%	-39.4%	-40.8%	-41%

TABLE 3: IRON (Fe) REMOVAL CAPACITY OF THE ALLERGEN FREE FINING AGENTS IN COMPARISON WITH POTASSIUM CASEINATE.

ALTERNATIVES TO EGG ALBUMIN

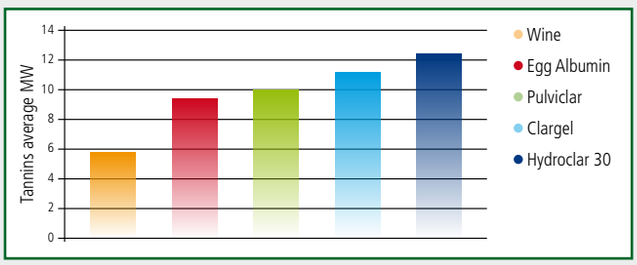
Egg albumin consists mainly of a protein, globulin, contained in the albumin. In winemaking it is used either directly as fresh or frozen egg whites or in a dehydrated albumin form. It is used for its capacity to:

- reduce astringency
- improve the clarity of the wine
- remove instable color.

The fining agent which most resembles the action of egg albumin is animal gelatin.

Animal gelatin precipitates large and strongly galloylated tannins.

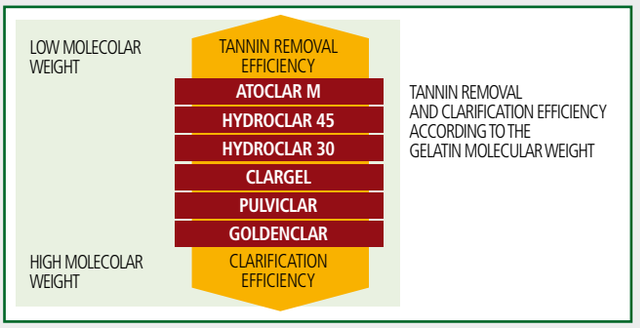
It was observed that when its molecular dimension decreases, the quantity of precipitated tannins is greater and it is more selective toward tannins with high molecular weights (Graph 4).



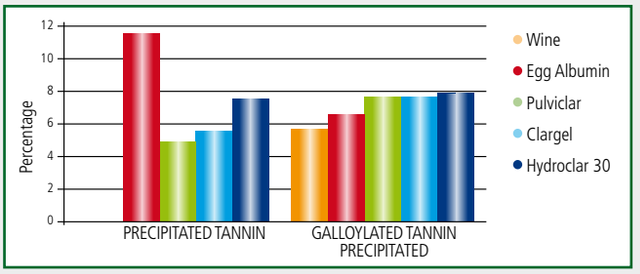
GRAPH 4: AVERAGE MOLECULAR WEIGHT OF THE TANNINS PRECIPITATED BY DIFFERENT FINING AGENTS ADDED AT THE DOSAGE RATE OF 100 ppm.

The hydrolysis process likely has a double effect of both increasing the number of sites accessible for interaction with polyphenol compounds and increasing the flexibility of the molecule which then can bind to polymers of greater dimensions. These results can justify why in practice atomized gelatin and liquid gelatin at high concentrations are the most efficient in the treatment of very astringent wines.

As for improving the clarity on the other hand, the greater the molecular weight of the gelatin, the greater its clarification efficiency.



Egg albumin has a very high tannin removal capacity in quantitative terms and at equivalent dosages, is superior to that of gelatin. However, it precipitates tannins without distinction or selectivity at a qualitative level, therefore it acts as a fining agent with a large spectrum of action (Graph 5).



GRAPH 5: TYPE AND QUANTITY OF TANNINS PRECIPITATED BY DIFFERENT FINING AGENTS ADDED AT 100 ppm.

In practice, egg albumin is considered as a finishing fining agent that respects wine characteristics and is reserved for quality wines and those aged in wood. If used in an attempt to correct overly expressed defects, it is not effective.

The practical and scientific results can be justified if it can be hypothesized that an unselective fining agent that does not modify the relationships between the tannin fractions can simply lower wine astringency without disrupting the taste balance already obtained during maturation.

Following this logic and while waiting for the results of the research in progress, the most immediate solution as a substitute for egg albumin is the use of gelatin with a high molecular weight. That is, among the gelatins available, those which are less selective in their tannin removal actions.

In fact, during the numerous trials completed with the aim of using allergen free fining agents, often gelatin with high molecular weights (liquid gelatin at low concentration, heat soluble gelatin, and gelatin in dry sheets) have given similar results, and often even better results than egg albumin. This choice is further justified by the experiences of many producers that regularly use leaf gelatin during the final clarification of aged red wines.

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Maury C., Sarni-Manchado P., Lefebvre S., Cheynier V., Moutounet M.: "Influence of fining with different molecular weight gelatins on proanthocyanidins composition and perception of wines" Am. J. Enol. Vitic.52:2 (2001)

know more ...About Plantis

HISTORY OF A PROJECT

INTRODUCTION

The purpose of clarification is to decrease suspended solids of the treated liquid as well as influence its organoleptic characteristics. While alternatives of a physical nature are available to improve clarity (centrifugation and filtration), the reduction or removal of compounds which are responsible for instability or taste imbalance of certain wines can only be obtained through the utilization of adjuvants for clarification. Among the adjuvants for clarification, the ones of a proteinaceous nature bear a particular importance since they act selectively on the phenolic fraction of wine and must, by reducing astringent and bitter sensations. The proteinaceous clarifying adjuvants currently used are solely of animal origins (egg albumin, bovine or pork gelatin, milk casein, isinglass) and gelatins occupy a first rate position thanks to their optimal effectiveness together with a treating cost which is affordable for wines of every price range. However, worldwide the demand for proteinaceous clarifying agents of plant origin is strong. For example, Japan and England have been demanding for several years wines for which it is possible to certify the absence of treatments with adjuvants of animal origins. The main reasons for such request are due to:

- the appearance of diseases which can be transmitted to humans through the contact or the consumption of products of animal origins (for instance BSE, bird flu, etc.);
- image issues, as the consumer barely accepts that a product of plant origins is treated with substances of animal origins;
- the increased importance of markets which, due to religious or cultural issues request wines which have not been treated with products of animal origins (kosher, vegetarian, vegan wines, etc.).

In order to respond to this need, in 1997 Esseco began a research project aimed to find, among proteins of plant origins, clarifying adjuvants which were alternative to animal gelatins.

TECHNICAL DEVELOPMENT

1997 - 2002 TESTING IN LAB AND EXPERIMENTAL WINERY

The technical project was developed following the course described hereafter:

- **Gathering** of more than a hundred protein compounds of plant origins for food purposes in accordance with the Codex Alimentarius rules and non GMOs.
- **Lab screening** to evaluate clarifying capacity and organoleptic effect.
- **Selection** of 8 compounds of different botanical origins suitable for oenological application.
- **Experimentation by:**
  - INRA - ENSAM of Montpellier (France), research team of Dr. Moutounet;
  - INCAVI of Vilafranca del Penedes (Spain), research team of Dr. Minguez;
  - Istituto Sperimentale per l'Enologia di Asti, research team of Dr. Bosso; to study in depth the interaction mechanisms of plant proteins with wine compounds and in particular with polyphenolic substances.
- **Collaborations in:**
  - France with ITV and Chambre d'Agriculture de Bordeaux;
  - Spain with CIDA (Rioja research) and EVENA (Navarra research);
  - Germany with the Treviri Institute of Viticultural and Oenological research;
  - Luxemburg with the Moselle Viticultural and Oenological Institute;
  - Portugal with the Lisbone University;
  - Switzerland with the Federal Station of Changins;

in order to confirm the effectiveness of these compounds on a great number of wines from different geographical regions and with different quality characteristics.

2000 - 2003 EXPERIMENTATION IN THE WINERY

In 2000 in France and Italy, the respective Agricultural Ministries authorized the experimentation in the winery, in accordance with section 46 of European Regulation 1493/99.
In Italy, the task of carrying out the experiments was assigned to the Istituto Sperimentale of Asti and, in two years, 5370 hL of white and red wines and musts were treated.

RESULTS

From the experiments carried out in the lab as well as in the winery, it emerged that:

- the selected plant proteins have a clarifying capacity which is comparable with that of animal gelatin;
- they generally form a lesser volume of lees in comparison with gelatin, thereby reducing filtration work and liquid losses;
- they are not very active on anthocyanins (color compounds of red wines) and consequently they respect the original color of wine;
- like gelatin, they act upon condensed and more galloylated tannins (compounds which are responsible for astringent and bitter sensations) (5; 9);
- at tasting, wines treated with plant proteins are not discernible in comparison with wines treated with gelatin (10).

From what precedes, it is possible to conclude that plant proteins can be utilized as oenological clarifying agents as an alternative to animal gelatin.

AUTHORISATION OF THE OFFICE INTERNATIONAL DE LA VIGNE E DU VIN

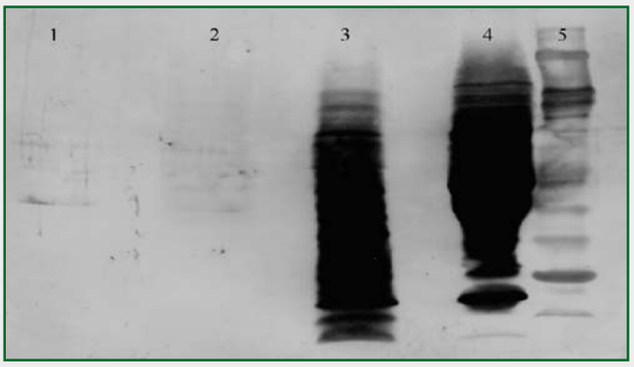
In 1999, Esseco began the authorization procedure to use plant proteins in the oenological sector. During the 5 years which were necessary to complete the procedure, they produced the technical results obtained in Italy, France and Spain on musts and white and red wines which had been clarified with plant proteins of various botanical origins.
Upon a request by the Food Safety Commission, in 2001 Esseco began collaborating with Prof. Patrizia Restani of the Department of Pharmacological Sciences at the University of Milan in order to formulate a method of analysis which could be applied in the research of potential residual immunoreaction in wines and musts which had been treated with plant proteins. The results relate to 15 wines of the most widespread varieties of grapes in the world, treated with gluten and plant proteins of lupin and pea with a maximum dose of 50 g/hL, with and without complement adjuvants (tannin, bentonite, silica sol). During three years of studies, more than 150 samples of must and wine were analyzed, representing all of the possible uses of plant proteins.The results produced by Prof. Restani demonstrate the absence of immunoreactive residues in musts and wines treated with plant proteins from wheat and pea. The fact that it is impossible to find serum of individuals who are allergic to lupin (not a very widespread allergy) does not allow confirmation of the presence of allergenic residues, which emerge in animal antibodies, in certain samples of must treated with such protein. Cautious that lupin may be dangerous when utilized on must, the Food Safety Commission decided to allow the utilization of wheat and pea, but to suspend that of lupin. At the General Assembly in July 2004, OIV definitely approved the utilization of gluten and pea proteins for the clarification of musts and wines, with a maximum dose of 50 g/hL.

TOXICOLOGICAL STUDY

In 2001 Esseco began collaborating with the research team led by Prof. Patrizia Restani - Department of Pharmacological Sciences at the University of Milan - in order to carry out a toxicological study of musts and wines treated with proteins of plant origins.
The work involved the formulation of a method of analysis which would be suitable to identify residual immunoreaction in wines and musts which had been treated with plant proteins.
The presence of antigens capable of producing allergic reactions in susceptible individuals is revealed by the use of antibodies produced by animals as well as by human antibodies which have been extracted from the serum of allergic individuals.
Three years of research and the analysis of more than 150 wines demonstrated that the plant proteins of wheat and pea selected by Enartis, utilized in the doses and the ways referred to by OIV, do not represent a danger for human health and on the contrary prevent the danger of transmission to humans of diseases transported by products of animal origins.

Would you like to receive further documentation on these issues? Write to vino@enartis.it

Residual immunoreactivity in a red wine Bonarda treated with 50g/hL of gluten.



(1) Wine as it is;
(2) Clarified wine;
(3) Hydrolyzed gluten;
(4) Vital gluten;
(5) Reference marker.

EUROPEAN AUTHORISATION

The European Regulation (EC) no. 2165/2005 of the European Council dated December 20, 2005, which modified European Regulation (EC) no. 1493/1999 in relation to the common organization of the wine growing and producing market came into effect on December 28,2005. Such an amendment made the "use of proteinaceous substances of plant origins" possible for the clarification treatments of musts and wines.

know more ...About Riboflavin

EVALUATION OF THE EFFECT OF BENTONITE ON THE RIBOFLAVIN CONTENT OF WINES

INTRODUCTION

Riboflavin is a vitamin that is often present in wine. When exposed to sunlight, riboflavin undergoes a chemical modification which causes the "light-struck" effect. This deffect gives wine a distinctive sulfide - like aroma and causes a reduction in quality. Bentonite is unique among winemaking materials in that it can reduce the concentration of riboflavin in wine. A study has been carried out to evaluate the effect of different bentonites on riboflavin concentration and to evaluate the relationship between bentonite dosage and riboflavin removal. The following summary of the study provides practical information that can be used in the cellar.

MATERIALS AND METHOD

Twenty bentonites were used in this trial. All of these bentonites are commercially available for winemaking. Enartis bentonites were included in the study:

- Enartis bentonite:
  - PLUXBENTON N
  - BENTOLIT SUPER
  - PLUXCOMPACT
- Market bentonites, classified in alphabetical order.

The wine used for the study was obtained by blending Soave and Chardonnay. Riboflavin was added to this wine to give an initial concentration of 300 micrograms/liter.
The effect of all the bentonites on riboflavin concentration was initially tested at a bentonite dosage rate of 100 g/100L (8.3 lb/1000 gal). This high dose was intentionally added to ensure that the properties of each product were clearly shown. In a second trial, the ENARTIS bentonites were added at different levels to evaluate the relationship between dosage and riboflavin removal effect. The bentonites were prepared by addition to water 24 hours before use. For the preparation of a standard solution, 7.2 g of riboflavin was diluted and made up to volume in a 250 mL flask with a solution of 20% acetonitrile and 80% of phosphate buffer (0.05 M of NaH_2PO_4 at pH 3 with H_3PO_4).
The treated wine remained in contact with the bentonite for 24 hours. After this time, the wines were microfiltered and analyzed for riboflavin using HPLC.

RESULTS

The following tables show the results for riboflavin concentration found in the samples of wine treated with different bentonites.

TABLE 1: BENTONITE TREATMENT 100 g/100L (8.3 lb/1000 gal)

TREATMENT	ORIGIN	RIBOFLAVIN (micrograms/liter)	REDUCTION %
REFERENCE WINE		26	
REFERENCE WINE + RIBOFLAVIN TEST		306	
PLUXBENTON N	**ENARTIS**	**120**	**61**
PLUXCOMPACT	**ENARTIS**	**153**	**50**
BENTOLIT	ENARTIS	195	
BENTONITE A	HUNGARY	226	
BENTONITE B	ITALY	223	
BENTONITE C	ITALY	238	
BENTONITE D	ITALY	243	
BENTONITE E	**ITALY**	**179**	**42**
BENTONITE F	ITALY	212	
BENTONITE G	ITALY	239	
BENTONITE H	GERMANY	214	
BENTONITE I	TURKEY	232	
BENTONITE L	TURKEY	224	
BENTONITE M	TURKEY	219	
BENTONITE N	TURKEY	225	
BENTONITE P	ITALY	218	
BENTONITE R	**ITALY**	**181**	**41**
BENTONITE S	**GERMANY**	**166**	**45**
BENTONITE T	FRANCE	221	

There are differences in performance among the bentonites. The bentonites that gave the best results are shown in red. The most effective removal was achieved with PLUXBENTON N. PLUXCOMPACT and bentonites E, R and S also demonstrated good riboflavin removal properties. In the second test, three dosages of each of the ENARTIS bentonites were added to the riboflavin-enriched wine to investigate the relationship between dosage and riboflavin reduction. Bentonite was added at 10 g/100L (0.8 lb/1000 gal), 20 g/100L (1.7 lb/1000 gal) and 50 g/100L (4.2 lb/1000 gal).The following tables show the concentrations of riboflavin found in the wines treated with the different amounts of bentonite and the % reduction in riboflavin level.
This study shows that there is a direct relationship between bentonite dosage and the reduction of the riboflavin content. The limit of riboflavin concentration at which the "light-struck" effect does not occur is not well defined.

TABLE 2: TREATMENT WITH 10 g/100L (0.8 lb/1000 gal)

TREATMENT	RIBOFLAVIN (micrograms/liter)	REDUCTION %
WINE + RIBOFLAVIN ADDITION	316	
PLUXBENTON N	297	6.6
PLUXCOMPACT	288	9.4
BENTOLIT SUPER	291	8.5

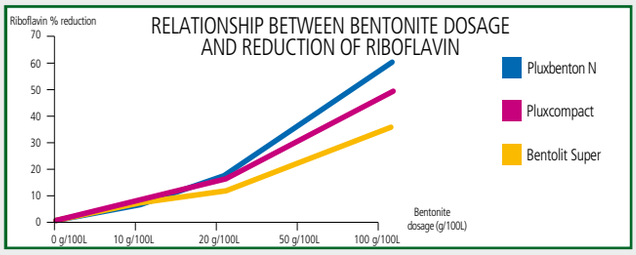
TABLE 3: TREATMENT WITH 20 g/100L (1.7 lb/1000 gal)

TREATMENT	RIBOFLAVIN (micrograms/liter)	REDUCTION %
WINE + RIBOFLAVIN ADDITION	316	
PLUXBENTON N	257	19.2
PLUXCOMPACT	267	16.0
BENTOLIT SUPER	279	12.3

TABLE 4: TREATMENT WITH 50 g/100L (4.2 lb/1000 gal)

TREATMENT	RIBOFLAVIN (micrograms/liter)	REDUCTION %
WINE + RIBOFLAVIN ADDITION	316	
PLUXBENTON N	192	39.6
PLUXCOMPACT	215	32.4
BENTOLIT SUPER	240	24.5

It is clear that a bentonite dosage of 20-50 g/100L (1.4-4.2 lb/1000 gal) is needed to give a significant reduction of riboflavin.
When used at a low dosage, all three ENARTIS bentonites show similar riboflavin removal properties.
At higher doses, PLUXBENTON N and PLUXCOMPACT are more effective. A graph of the results is shown below to illustrate the relationships between dose and effect:



CONCLUSIONS

The tests showed that the most effective bentonite for reducing riboflavin was PLUXBENTON N. At a dosage rate of 100 g/100L (8.3 lb/1000 gal), this bentonite can reduce the content of riboflavin in wine by more than 60%. Furthermore, the tests show that the reduction of riboflavin content is proportional to the dosage of bentonite that is used. This knowledge can be used to achieve targeted quantities of residual riboflavin in wine. Our sales support team is at your service to supply further details and studies.

know more ...About Fining

THE FINING MECHANISM

The complex mechanisms involved in fining can be grouped into two separate events: flocculation (the aggregation of two or more macromolecules) and sedimentation (when the flocculated materials settle to the bottom of the tank or vat). Research on interactions between tannin and gelatin shows that two factors are important in flocculation and sedimentation. Particles with opposite electrical charges are attracted to each other by electrostatic interaction. The dehydration phenomena that takes place on the outer surface of the aggregated particles (or micelles) also plays a part. This effect, which is influenced by metal ions and alcohol, allows hydrophobic interactions to occur between the particles, aiding sedimentation.

ENARTIS FINING PRODUCTS

Products used for fining wine are generally known as fining agents. They may have very different origins and completely different chemical compositions. When added to wine, fining agents usually form a colloidal dispersion. Depending on the electrical charge of the fining agent molecules when dispersed in wine, the colloids may be classified as being either electropositive (e.g. protein fining agents such as gelatin) or electronegative (e.g. tannin, bentonite, silica sol).
Fining agents can also be classified in the following manner:

ORGANIC FINING AGENTS		
GELATIN	HIGH HYDROLYSIS	**ATOCLAR M - HYDROCLAR 45**
	MEDIUM HYDROLYSIS	**HYDROCLAR 30**
	LOW HYDROLYSIS	**CLARGEL**
		PULVICLAR S - GOLDENCLAR
FISH GELATIN		**FINEGEL**
EGG ALBUMIN		**BLANCOLL**
ISINGLASS		**FINECOLL**
CASEINATE		**PROTOCLAR**
PLANTIS PROTEINS		**PLANTIS CLAR - PLANTIS FINE**
		PLANTIS ELEGANCE - PLANTIS AF
PVPP		**STABYL**
TANNINS		**TANENOL CLAR**
INORGANIC FINING AGENTS		
BENTONITE	NATURAL SODIUM BENTONITE	**PLUXBENTON N**
	ACTIVATED CALCIUM BENTONITE	**BENTOLIT SUPER**
	NATURAL CALCIUM BENTONITE	**PLUXCOMPACT**
SILICA SOL		**SIL FLOC**
COMPLEXES		
EFFECTIVE MAINLY IN CLARIFICATION		**NEOCLAR AF**
POLYPHENOL REMOVAL		**CLARIL SP - PROTOMIX G**
		CLARIL AF - PROTOMIX AF
		COMBISTAB AF

HOW FINING AGENTS ACT

Fining is carried out for three main purposes:

1 immediate clarification

2 stabilizing wine against future haze and deposit formation

3 improving organoleptic properties

ACTION	PRODUCT	EFFECT
Reduce astringency	ATOCLAR M, HYDROCLAR 45	Foretaste ●●●●
	HYDROCLAR 30, FINEGEL	●●●
	PULVICLAR S, PLANTIS AF, CLARGEL	Aftertaste ●●
	BLANCOLL, GOLDENCLAR,	Total tannic sensation ●●●
	PLANTIS ELEGANCE	
Reduce bitter taste	PROTOCLAR, COMBISTAB AF, STABYL	●●●
	FINECOLL, CLARIL	●●
	PLANTIS ELEGANCE, PLANTIS AF	
Clarification	PULVICLAR S, GOLDENCLAR, PLANTIS FINE, CLARGEL	●●●●
	HYDROCLAR 30, PLANTIS CLAR	●●
	ATOCLAR M, HYDROCLAR 45	●
	FINECOLL, FINEGEL	●●●
Remove polyphenols	ATOCLAR M, HYDROCLAR 45	●●●
	BLANCOLL, FINEGEL	
	PULVICLAR S, CLARGEL	●●
	FINECOLL	●
	STABYL	●●●●
Remove protein haze	PLUXBENTON N	●●●●
	PLUXCOMPACT	●●●
	BENTOLIT SUPER	●●●
	CLARIL, PROTOMIX	●●
	TANENOL CLAR	●
Multipurpose	NEOCLAR	●●●●
	PROTOMIX G, CLARIL	●●
Remove oxidized and/or oxidizable compounds	PROTOCLAR, PLANTIS AF, PLANTIS FINE CLARIL	●●●
	STABYL, COMBISTAB AF	●●●●
	PROTOMIX	●●
Remove iron	PROTOCLAR, PLANTIS AF, CLARIL	●●
Stabilize colour	BLANCOLL, GOLDENCLAR	●●
	PLUXBENTON N	●●●
Stabilize colloids	PULVICLAR S	●●●
	GOLDENCLAR	●●●●
Remove riboflavin	PLUXBENTON N	●●●●
	PLUXCOMPACT	●●●
	PLANTIS FINE	●●

APPLICATIONS FOR FINING AGENTS

FLOCCULATION AIDS

When used in white and rosé wines, some protein-based fining agents (particularly gelatine and isinglass), which form colloids with a positive electric charge, require the addition of negatively charged colloids in order to ensure complete flocculation and, eventually, precipitation. Such negatively charged flocculation aids include: tannin, silica sol and bentonite.

ROSÉ WINE PRODUCTION

WHEN	WHY	WHICH PRODUCT	FLOCCULATION AID
MUST	Fining, combined with a pectolytic enzyme: Enartis Zym 1000 S or SL	**HYDROCLAR 30**	**SIL FLOC TANENOL CLAR**
	Fining and organoleptic improvement, combined with a pectolytic enzyme: Enartis Zym 1000 S or SL	**PULVICLAR S CLARGEL**	**SIL FLOC TANENOL CLAR**
OXIDIZED MUST	Fining and organoleptic improvement, combined with a pectolytic enzyme: Enartis Zym 1000 S or SL	**CLARIL**	
		HYDROCLAR 30 PROTOCLAR	**SIL FLOC**
FERMENTATION	Protein and polyphenol stability	**PROTOMIX**	
WINE	Fining	**PULVICLAR S FINEGEL CLARGEL**	**SIL FLOC**
		PLANTIS FINE	
	Fining and taste improvement to eliminate bitterness	**FINECOLL STABYL COMBISTAB AF**	**SIL FLOC**
	Fining and protein stability	**NEOCLAR AF**	
	Correcting oxidized color	**PROTOCLAR K COMBISTAB AF STABYL CLARIL**	

SPARKLING WINES

WHEN	WHY	WHICH PRODUCT	FLOCCULATION AID
FREE RUN MUST	Fining, in combination with a pectolytic enzyme: Enartis Zym 1000 S or SL	**PULVICLAR S**	**TANENOL CLAR**
		PLANTIS CLAR	**PLUXBENTON**
	Fining and organoleptic improvement, combined with a pectolytic enzyme: Enartis Zym 1000 S or SL	**FINECOLL**	**SIL FLOC**
PRESSED MUST	Fining, in combination with a pectolytic enzyme: Enartis Zym 1000 S or SL	**PULVICLAR S CLARGEL**	**SIL FLOC**
OXIDIZED MUST	Fining and organoleptic improvement, combined with a pectolytic enzyme: Enartis Zym 1000 S or SL	**HYDROCLAR 30 PULVICLAR CLARGEL**	**SIL FLOC**
		CLARIL	
MUST	Protein removal	**PLUXBENTON**	
BASE WINE	Fining	**PULVICLAR S FINEGEL CLARGEL**	**SIL FLOC TANENOL CLAR**
		PLANTIS FINE	**PLUXCOMPACT**
	Protein stability	**PLUXCOMPACT**	
	Fining and taste improvement to remove bitterness	**FINECOLL PROTOCLAR COMBISTAB AF**	**SIL FLOC**
	Correcting oxidized colors	**PROTOCLAR COMBISTAB AF STABYL CLARIL**	

WHITE WINE PRODUCTION

WHEN	WHY	WHICH PRODUCT	FLOCCULATION AID
FREE RUN MUST	Fining, combined with a pectolytic enzyme: Enartis Zym 1000 S or SL	**CLARGEL PULVICLAR S HYDROCLAR 30**	**SIL FLOC TANENOL CLAR**
		PLANTIS CLAR	**BENTOLIT**
	Fining plus organoleptic improvement, combined with a pectolytic enzyme: Enartis Zym 1000 S or SL	**CLARGEL PULVICLAR S FINECOLL**	**SIL FLOC TANENOL CLAR**
PRESSED MUST	Fining, combined with a pectolytic enzyme: Enartis Zym 1000 S or SL	**CLARGEL HYDROCLAR 30 HYDROCLAR 45**	**SIL FLOC**
OXIDIZED MUST	Fining plus organoleptic improvement, combined with a pectolytic enzyme: Enartis Zym 1000 S or SL	**CLARGEL HYDROCLAR 30 PULVICLAR S CLARIL**	**SIL FLOC**
MUST	Protein removal	**PLUXBENTON BENTOLIT SUPER**	
	Flotation, combined with a pectolytic enzyme: Enartis Zym Quick	**CLARGEL**	**SIL FLOC PLUXBENTON**
FERMENTATION	Protein and polyphenol stability	**PROTOMIX**	
WINE	Fining	**CLARGEL PULVICLAR S FINECOLL FINEGEL**	**SIL FLOC TANENOL CLAR PLUXBENTON**
	Protein stability	**BENTOLIT PLUXBENTON PLUXCOMPACT**	
	Fining and protein stability	**NEOCLAR**	
	Fining and taste improvement to remove bitterness	**FINECOLL PROTOCLAR K COMBISTAB AF STABYL**	**SIL FLOC**
	Correcting oxidized colors	**PROTOCLAR K COMBISTAB AF STABYL CLARIL**	
	Preventing light-struck flavor	**PLUXBENTON PLUXCOMPACT**	

RED WINE PRODUCTION

WHEN	WHY	WHICH PRODUCT
FREE RUN WINE	Remove astringency	**HYDROCLAR 30**
PRESSED WINE	Remove astringency	**ATOCLAR M** **HYDROCLAR 45**
TABLE WINE	Remove pigment in the unstable colloidal state	**BENTOLIT**
	Fining and protein stability	**NEOCLAR AF**
	Fining and correcting oxidized color	**CLARIL**
QUALITY WINE	Remove pigment in the unstable colloidal state	**PLUXCOMPACT**
WINE	Fining and pigment stability	**PLUXBENTON** **PLANTIS FINE** **CLARGEL** **PULVICLAR S** **GOLDENCLAR** **BLANCOLL**
	Taste improvement to remove bitterness	**FINECOLL** **PROTOCLAR K** **COMBISTAB AF** **STABYL**
	Correcting oxidized color	**STABYL** **CLARIL**
READY WINE (pre-bottling)	Remove astringency	**CLARGEL** **PULVICLAR S** **FINEGEL** **PLANTIS ELEGANCE** **BLANCOLL** **GOLDENCLAR**

PRODUCT	SOLVENT	RATIO PRODUCT/WATER	TIME OF HYDRATATION	NOTES
GOLDENCLAR	Water 40°C (104°F)	1:20		Stir constantly during addition
PULVICLAR S	Water 40°C (104°F)	1:20		Stir constantly during addition
ATOCLAR M	Cold water	1:10		Stir constantly during addition
PROTOCLAR K	Cold water	1:20		
BLANCOLL	Cold water	1:20		Stir minimizing foam formation
FINECOLL	Cold water	1:100	1-2 h	
BENTOLIT SUPER	Cold water	1:20	3-6 h	
PLUXBENTON N	Cold water	1:20	3-6 h	
PLUXCOMPACT	Cold water	1:10	3-6 h	
STABYL	Water 40°C (104°F)	1:5	1 h	
TANENOL CLAR	Cold water	1:10		
NEOCLAR AF	Cold water	1:10		
PROTOMIX G & AF	Cold water	1:10		
CLARIL SP & AF	Cold water	1:10	3-6 h	
COMBISTAB AF	Cold water	1:10	1 h	
PLANTIS	Cold water	1:10		Add 2-4 g/L of citric acid in the water

PREPARATION OF FINING AGENTS

Liquid fining products are ready to use, while products in powder form must be dissolved in water prior to addition to wine. Never use wine to dissolve fining agents. The procedure used to dissolve dry fining agents is critical for effective performance. In all cases, it is essential that the fining agent is added to the water, not vice versa.

HOW TO USE FINING AGENTS

SOME HINTS

All fining agents must be added very evenly to the volume of wine (or must) that is being treated. Systems to aid complete dispersal are essential. If possible, incorporate finings using a Venturi tube or dosing pump during pump over or racking.

Avoid prolonged use of mechanical stirrers, which can delay the flocculation process.

When flocculation aids are used, the following order of addition should be used: tannin must always be added before gelatin, if possible one day earlier; bentonite and silica sol should be added before protein fining agents when treating free run must and wine, and after protein fining agents when treating pressed must and wine.

If there is a risk of overfining with protein fining agents, always end the sequence with bentonite.

Always allow one or two hours to elapse between additions.

Fining solutions must be used immediately after preparation (allowing only for swelling times, if applicable).

If solutions need to be used over two or more days, add 2 g/L of potassium metabisulphite to the solution to inhibit microbial growth. Never store prepared solutions for more than one week.

Protein fining agents should not remain in the wine for more than 10-15 days in the case of gelatin, casein and egg albumin, and 3-4 weeks in the case of isinglass.

Avoid temperature differentials in tanks to which fining agents have been added - these create convective movements within the tank that delay the settling of lees.

Protein fining agents work best at low temperatures: 10°C (50°F) for gelatin and up to 5°C (41°F) for isinglass.

Bentonite works best at temperatures higher than 10°C (50°F)

CHECKING THE RESULTS

In order to obtain the best results, it is necessary to carry out fining trials in the laboratory, using samples of the wine or juice to be treated. The fining agents and concentration ranges used in the trial can be selected on the basis of the change that is desired in the wine.

How are the results evaluated?

There are several tests that winemakers can use to check the success of fining. The simple equipment required for this purpose is indispensable in the laboratory of a modern winery.

For finings designed to modify the organoleptic status of the product, the most important test of all is a properly conducted tasting of fined samples against an untreated control.

ANALYTICAL EVALUATION

PARAMETER	TYPE OF ANALYSIS
CLARITY	TURBIDIMETER OR NAKED EYE
COLOR	OD 420, 520, 620 nm (COLOR INTENSITY, TINT)
POLYPHENOLS	OD 280 nm
FILTERABILITY	FOULING INDEX AND/OR V.max
PROTEIN STABILITY	BENTOTEST, PROTOCHECK
	HEAT TEST (WITH OR WITHOUT TANNIN)
	TRICHLOROACETIC ACID TEST
OVERFINING	ADDITION OF TANNIN
DEPOSIT	CONES OR CYLINDERS

ORGANOLEPTIC EVALUATION

PARAMETER	RECOMMENDED ACTION
REDUCTION OF TANNIN CONTEN	GELATIN, ALBUMIN, PLANT PROTEINS
BITTERNESS	ISINGLASS, POTASSIUM CASEINATE, PVPP, CASEINATE ALTERNATIVES
OXIDIZED NOTES	CASEINATE, PVPP, CASEINATE ALTERNATIVES
IMPROVEMENT OF COLOR	CASEINATE, PVPP, CASEINATE ALTERNATIVES
HARMONIZATION	PROTEIN FINING AGENTS IN GENERAL

Stabilizing

ENOCRISTAL SUPERATTIVO

PACKAGES 1 kg • 15 kg

Rapid crystallizer for cold stabilization of tartrates, Enocristal Superattivo is a balanced mixture containing neutral and acid potassium tartrates and filtering aids, which accelerates precipitation of potassium bitartrate in wines during cooling, without affecting wine acidity.

Dosage: *30-40 g/100L (2.5-3.3 lb/1000gal)*

Gum Arabic

Gum Arabic is a natural gum material derived from *Acacia spp*. trees. It is used extensively in foods, drinks and pharmaceuticals, assisting in the formation and stabilization of emulsions and in the encapsulation of flavors. The major application of Gum Arabic in winemaking is to stabilize young red wines against color pigment precipitation. This is an important attribute in today's global wine industry, when the time between vintage and sale for red wines is becoming shorter, new stabilizing and maturation techniques are being adopted and new consumers are expecting to buy wines that maintain clarity and freedom from deposits. Gum Arabic also has organoleptic effects modifying the nose, palate and mouthfeel of wine. Notably, it can impart palate softness, which leads to wines that are increasingly more in line with modern consumer tastes. Gum Arabic produced from different botanic origins, in different ways can have different properties. In keeping with its philosophy of meeting different winemaking needs with appropriate and specific products, Enartis has developed a complete range of Gum Arabic preparations for winemaking use. By carefully choosing raw materials and production processes, Enartis has come up with several different products able to meet all winemaking needs.

AROMAGUM

PACKAGES 10 kg • 25 kg • 1000 kg

A liquid solution of Gum Arabic for the stabilization of wine aroma. During the production of Aromagum, the hydrolysis process is controlled in such a manner as to obtain a gum which is very active in intensifying the perception of fruit aromas and maintaining the fresh characteristic for one year or more after bottling. When used at the recommended dosages, it has a modest blocking effect upon filtration membranes and it can be added to wine before microfiltration.

Dosage: *0.5-1 ml/L (1.9-3.8 L/1000gal)*

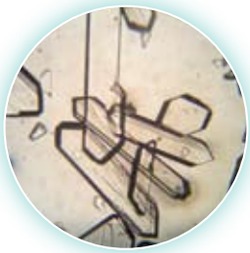
CITROGUM®

PACKAGES 10 kg •25 kg • 200 kg • 1000 kg

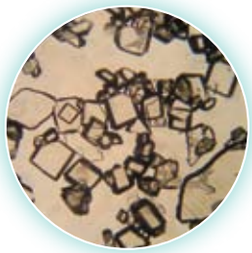
The technique used to produce Citrogum®, the result of Enartis' experience and technology in the field of Gum Arabic and the careful selection of raw materials, resulted in a clear, almost colorless product, with a very low calcium content. Citrogum® is recommended for the stabilization of wines ready for bottling and preventing the precipitation of colloids, pigments and tartrates. Furthermore, it integrates the colloidal content of wine, thus improving its balance and organoleptic features. In particular it enhances aromas, reduces bitterness and astringency, and increases softness and body. Citrogum®'s low membrane blocking capacity (it's the most filterable gum in the market!), purity and microbial stability ensure that it can be added with confidence at any stage of preparation for bottling. The sulfur dioxide in the preparation gives the product a long shelf life and enables direct addition to wine even after microfiltration without any risk of microbial contamination.

Dosage: *0.5-2 ml/L (1.9-7.6L/1000gal)*

CITROGUM®: TARTRATE STABILIZATION MECHANISM
Prevention of crystal growth by competing with K and tartrates ions.



MODEL SOLUTION WITH 13% ALCOHOL



MODEL SOLUTION WITH 13% ALCOHOL + 2 mL/L CITROGUM

CITROGUM® DRY

PACKAGES 15 kg

Citrogum® Dry is the granulated form of Citrogum®. The special granulation process allows this impurity-free Gum Arabic to dissolve quickly both in water and wine without forming lumps. When dissolved, the properties of Citrogum® Dry (low calcium content, solution clarity, sensory and stabilizing characteristics, filterability) are similar to liquid Citrogum®. The applications are therefore the same.

Dosage: *10-100 g/100L (0.8-8.3 lb/1000gal)*

MAXIGUM

PACKAGES 10 kg • 25 Kg • 200 Kg • 1000 kg

Maxigum is a liquid solution of Gum Arabic obtained from *Acacia verek*. Because of its high molecular weight and highly branched structure, Maxigum is extremely effective in preventing the precipitation of color substances in wines ready for bottling. It also improves the organoleptic features of the wine by increasing structure and mouthfeel and reducing the astringency of tannins. The sulfur dioxide contained in this preparation ensures its microbiological stability, so it can be added following microfiltration.

Dosage: *0.3-1 ml/L (1.1-3.8L/1000gal)*

How To Use Enartis Gum Arabic

USES	CITROGUM®	MAXIGUM	AROMAGUM
WHITE AND ROSÉ WINES	●●●	●	●●●
FULL BODIED WHITE WINES	●	●●●	●●
YOUNG RED WINES	●●●	●●	●●●
FULL BODIED OR AGED RED WINES	●●	●●●	●
CHARMAT METHOD SPARKLING WINES	●●●	●	●●●
CLASSIC METHOD SPARKLING WINES	●●	●●●	●●

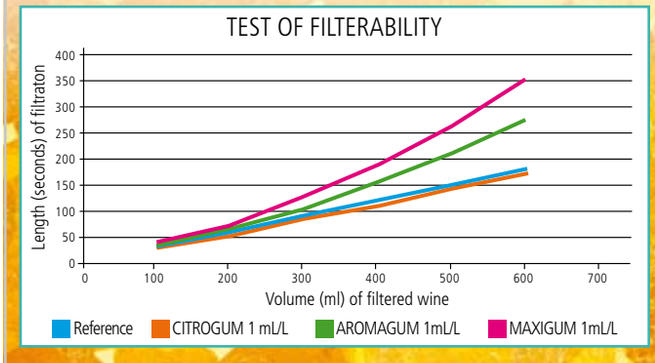
Gum Arabic is a versatile product which achieves very interesting winemaking results. However, given its characteristics, a few precautions must be taken in order to use it correctly.

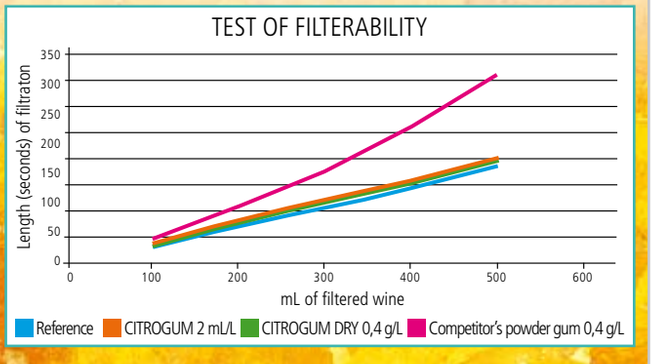
- It is always advisable to carry out laboratory tests with different addition rates in order to determine the ideal dose for each type of wine.
- If the wine is to be microfiltered, it is best to check its filterability index using membranes of the same porosity as the cartridges employed after adding the chosen dosage of gum.

Aromagum used at the recommended dosages [0.5-1 ml/L (1.9-3.8L/1000gal)], has a modest plugging effect upon filtration membranes and it can be added to wine before microfiltration. With higher dosages, it is recommended to add Aromagum through a dosing pump after final wine filtration. In all cases, it is advisable to check the filterability index of the wine.

Citrogum® has negligible blockage effects on microfiltration membranes, and therefore it is possible to add medium doses prior to final filtration. In all cases, it is advisable to check the filterability index of the wine and, if necessary, use a dosing pump downstream from the membrane filters. Dosages vary from 0.5-1 ml/L for wine stabilization. Higher doses can be used to modify the sensory characteristics of the wine. Citrogum® contains very little SO_2 therefore it leads to negligible increases in the overall sulfur dioxide content of the wine.

Maxigum should be added just before bottling. Since Maxigum is a Gum with a high molecular weight, the addition of high doses before final microfiltration may lead to partial membrane blockage. Therefore, it is best to add Maxigum through a dosing pump after final wine filtration. However, if medium to low doses are used, Maxigum may be added into the tank after checking the filterability index. The recommended dose for color pigment stabilization is 0.3-1 ml/L.





CELLOGUM P

PACKAGES 1 kg • 25 kg

Carboxy methylcellulose in granulated form. Cellogum P prevents the precipitation of potassium bitartrate crystals. It can be used to replace or to reduce the cold stabilization treatment in white, red, rosé and sparkling wines.

Dosage: *5-10 g/100L (0.4-0.8 lb/1000gal)*

CELLOGUM L

PACKAGES 25 kg • 200 kg (on demand) • 1000 kg

Carboxy methylcellulose in water solution. Cellogum L prevents the precipitation of potassium bitartrate crystals. It can be used to replace or to reduce the cold stabilization treatment.

Dosage: *100-200 mL/100L (3.8-3.5 L/1000gal)*

AMT PLUS QUALITY

PACKAGES 1 kg • 25 kg

Pure metatartaric acid produced by Enartis from food grade tartaric acid. When added to wine, AMT Plus Quality prevents the growth of potassium bitartrate and calcium tartrate crystals, making the wine stable against tartrate precipitation. Its high esterification rate (from 38 to 41) allows a long last protecting effect.

This means that cold stabilization processes can be reduced when refrigeration capacity is not available or not cost effective.

Dosage: *10 g/100L (0.8 lb/1000gal) (EU legal limit)*

CITROSOL rH

PACKAGES 0.25 Kg • 1 kg

It's a blend based on potassium metabisulfite, citric acid and ascorbic acid for chemical and physical stabilization of wine. Citrosol rH is particularly effective in preventing wine spoilage due to contact with air (color browning, appearance of oxidative flavors, haze and precipitation caused by iron-based complex). These properties allow Citrosol rH to preserve the color, brilliance and bouquet of the finished wine, even after long storage.

Dosage: *10-40 g/100L (0.8-3.3 lb/1000gal)*

SORBOSOL K

PACKAGES 1 kg

Sorbosol K is a blend of potassium sorbate, potassium metabisulfite and L-ascorbic acid. It's a chemical and microbial stabilizer that can be really useful to better protect bulk wines, wines ready for bottling and when existing winemaking technologies are unable to guarantee an adequate microbiological stability.

Dosage: *20-40 g/100L (1.7-3.3 lb/1000gal)*

know more ...About Gum Arabic

EFFECTS OF GUM ARABIC ON WINE AROMA

INTRODUCTION

Gum Arabic has been used in winemaking for quite some time. Its enological interest is due to its ability to prevent turbidity and precipitate formation caused by metallic casse and unstable color colloids.
In spite of its wide and, in some cases, nearly methodical use, its effects are not totally understood. Only recently, in fact, has it been shown that some gums are effective in improving tartrate stability.
More recent studies, drawn from the understandings and experiences of the food industry, indicate that the gum interacts with wine compounds in a manner consistent with its hydrocolloid nature, with interesting results relating to the organoleptic properties of the wine.
In the food industry hydrocolloids, such as Gum Arabic, are used because of their texturizing, film-forming and emulsifying abilities. Such effects are related to their molecular structure, hydrophilic carbohydrates and hydrophobic protein groups in such a manner as to produce polar, non-polar or Van der Wals bonds.
As a consequence of its hydrophilic and hydrophobic nature, Gum Arabic can react with wine components by the following two mechanisms:

- Formation of "chemical bonds" with various organic molecules of various degrees of polarity (primarily aromas and organic acids)
- Influence the rate of "mass transfer" of organic compounds. In particular, Gum Arabic slows the transfer of aroma compounds from liquid to vapor, allowing for a slower release of aroma compounds from the wine and preserving wine aromatics.

These two phenomena work together and in an unpredictable manner because they may cause a "positive", "negative" or "null" sensory response depending on factors tied to the composition of the wine and the physio-chemical characteristics of the Gum Arabic used.
In order to objectively verify the effects of Gum Arabic on the sensory properties of wine, an experiment was conducted in which the effects of two different Gum Arabic preparations were evaluated with non-conventional analytical criteria.

MATERIALS

A common quality red wine and two liquid preparations of Gum Arabic supplied by Enartis were used. The two gums were produced by different production techniques and were differentiated by the degree of hydrolysis:
Preparation A - highly hydrolyzed gum
Preparation B - slightly hydrolyzed gum
The research was conducted by the Department of Plant Production - Agronomy Faculty, of the University of Milan under the scientific guidance of Professors Ferdinando Tateo and Monica Bonomi.

METHODS

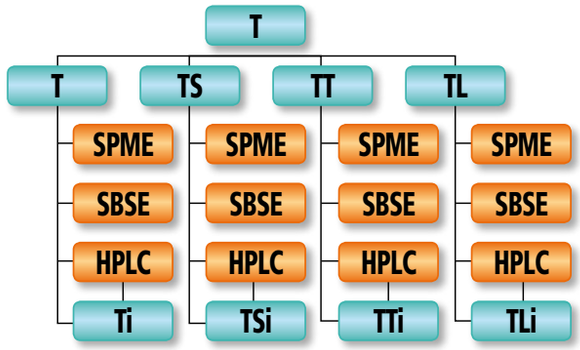
The wine was divided into three portions:

- Control
- Wine to which a liquid preparation of Gum Arabic A was added
- Wine to which a liquid preparation of Gum Arabic B was added.

A portion of each wine was subjected to the following treatments:
Sonication (S): Exposed to ultrasound at room temperature for 2 hours. This treatment simulates natural wine ageing of one year, under not particularly drastic conditions.
Thermal Stress (T): Thermal stress consists of two cycles, each lasting 12 hours. Each 12 hour cycle consists of alternating between 40°C for 2 hours and 4 °C for two hours. Between successive cycles, the wines were held at room temperature for 2 hours. Thermal stress simulates the state of wine after ageing for one year under non ideal transportation and storage conditions.
Light Stress (L): The wines were put into green glass bottles and were exposed to natural light for 50 days. This treatment simulates storage for 2 months under non ideal lighting conditions.
The wines samples, treated as described, were analyzed by the following methods:
SBSE Analysis (Stir Bar Sorptive Extraction): this extractive technique determines not only the most volatile aromatic substances, but also a series of low vapor pressure molecules that normally are not present in the head space. Results of this analysis can be correlated with the olfactory and retro olfactory aromas of wine.
SPME Analysis (Solid Phase Micro Extraction): this solid phase extraction technique determines the most volatile aromatic substances in the head space. The results obtained from this technique correlate with olfactory characteristics of the wine.
HPLC Analyses: for the determination of anthocyanins and anthocyanidins.
Figure 1 schematically represents the treatment protocol and the analytical results for the control wine with no gum addition. The same protocol was used for wine treated with Gum A and Gum B.

RESULTS AND DISCUSSION

FIGURE 1 - EXPERIMENTAL PROTOCOL FOR WINE WHICH DID OR DID NOT RECEIVE GUM ADDITION: TREATMENT ALIQUOTS AND ANALYSES



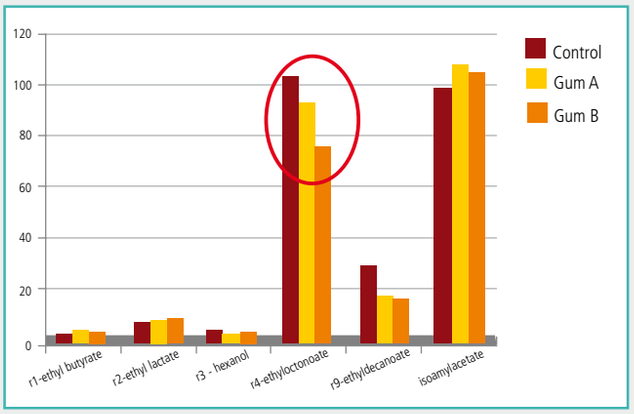
T – Control wine not subjected to stress. TS – Sonicated wine. TT – wine subjected to thermal stress. TL – wine subjected to light stress. Ti, TSi, TTi, TLi – wine subjected to acid hydrolysis for the determination of anthocyanidins by HPLC

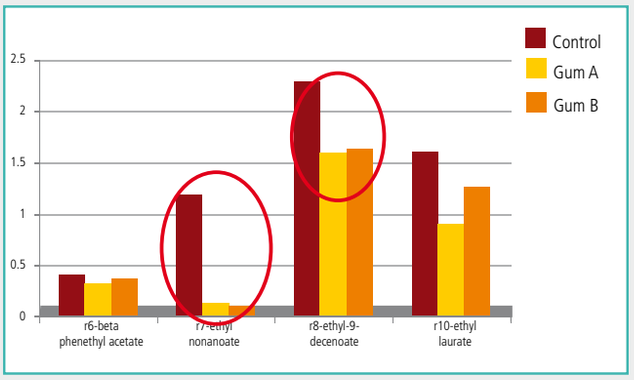
Table 1 shows the aromatic sensations and olfactory thresholds of the volatile compounds used as indicators of the effect of the gums.
For a more immediate comprehension of the results, SBSE and SPME results are expressed as relationships between the volatile compounds that are considered most significant to show the effects of the gums, and for their impact on the sensory nature of the wine.
In particular, the SBSE values, r1, r2, etc. represent relationships between values for isoamyl acetate, isoamyl alcohol, ethyl decanoate, diethyl succinate, phenethyl alcohol and the reference compound ethyl octanoate. Similarly, SPME values r1, r2, etc. represent relationships between the values of ethyl butyrate, ethyl lactate, ethanol, ethyl octanoate, isoamyl hexanoate, beta phenethyl alcohol, ethyl nonanoate, ethyl 9-decenoate, ethyl decanoate, ethyl laurate (ethyl dodecanoate) and the value of the reference compound, isoamyl acetate. The SBSE and SPME results are complimentary because SBSE represents "indices" of "global" sensory properties made up of semi-volatile compounds contained in the liquid phase which, presumably, contribute to the retro olfactory aroma. SPME, instead, furnishes information regarding headspace compounds which are related to olfactory perception.
The results show the differences in the effects produced by the two types of Gum Arabic A and B.

VOLATILE COMPOUND	SENSORY CHARACTERISTICS	OLFACTORY THRESHOLD (µg/L)
Phenethyl alcohol	honey, spice, rose, lilac	700
Isoamyl alcohol	pungent, balsamic, alcohol, bitter	300
Beta-phenethyl acetate	rose, honey, tobacco	250
Diethyl succinate	fruity	100
Hexanol	resin, flower, green	2500
Ethyl butyrate	apple, fruity, strawberry, sweet	1
Ethyl decanoate	grape	200
Ethyl lactate	fruity	1400
Ethyl laurate (dodecanoate)	leaf	20
Ethyl nonanoate	fatty-oily, fruity, nut-like	850
Ethyl-9-octanoate	fruity, wine	2
Ethyl-9-decenoate	sweaty, cheese	20
Isoamyl acetate	banana, sweet	2
Isoamyl hexanoate	fruity	120

TABLE 1 - SENSORY CHARACTERISTICS AND OLFACTORY THRESHOLDS OF VOLATILE COMPOUNDS THOUGHT TO BE AFFECTED BY GUM ARABIC.

FIGURE 2 - SPME ANALYSES OF HEADSPACE VOLATILE AROMAS FROM WINES TREATED WITH GUM ARABIC. Both gums tested reduced the heavy vinous character from ethyl octanoate, rancidity from ethyl nonanoate and vegetal from ethyl-9-decenoate, while lightly increasing the sweet-banana sensation contributed by isoamylacetate.
O Statistically significant difference.

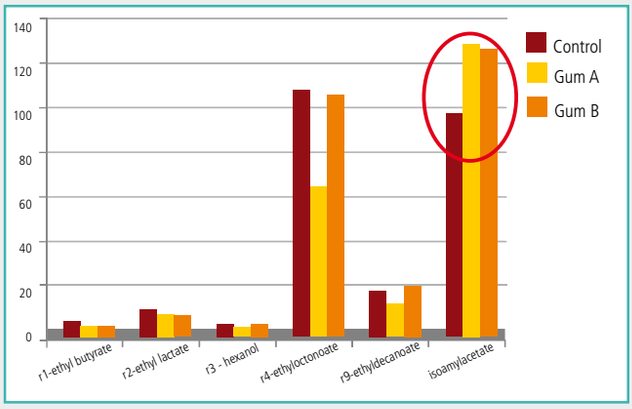


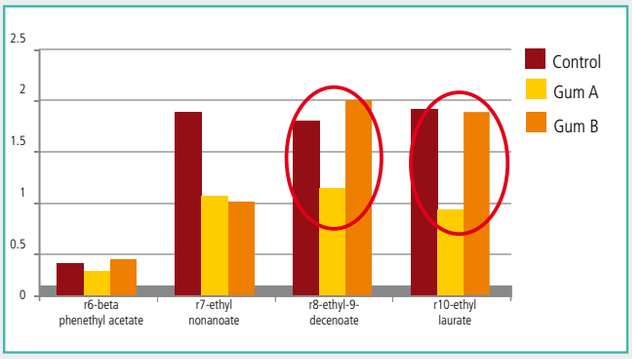


The effect of the simple addition of gums A and B is mainly seen in the level of the more volatile aromas (SPME analyses). The results shown in **Figure 2** show that treated wines have an attenuation of heavy wine characters as a consequence of a decrease in ethyl octanoate/isoamylacetate ratio. This last compound, which is responsible for a pleasant sensation of sweet bananas, is increased in wines treated with gum, but in an insignificant manner. In the same wines, a significant decrease of the volatility of ethyl nonanoate and ethyl-9-decenoate which are associated, respectively, with rancid and sweaty odors is seen. SBSE results do not show a significant gum effect on the retro olfactory qualities of the wine.

A diverse reactivity between the gums was seen when the wine was sonicated to simulate ageing. **Figure 3** shows headspace data indicating that Gum A reduces vinous (ethyl octanoate), sweat (ethyl-9-decenoate) and vegetal (ethyl laurate) characters while increasing banana sensations (isoamyl acetate).

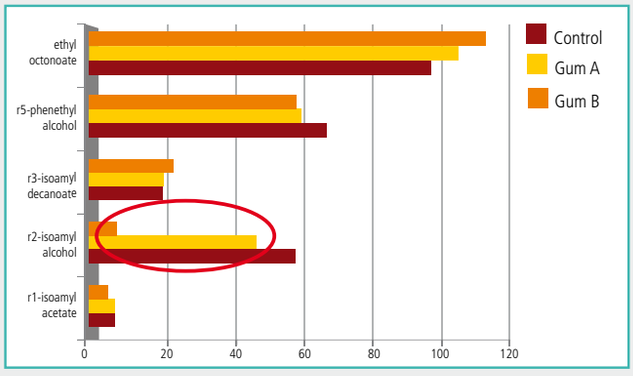
FIGURE 3 - SPME ANALYSIS OF HEADSPACE VOLATILE AROMAS OF WINES SUBJECTED TO ACCELERATED AGING BY SONICATION.
Gum A lessens heavy vinous character (ethyl octanoate), sweat (ethyl-9-decenoate) and vegetal (ethyl laurate) characters while increasing the sweet-banana sensation (isoamylacetate).
O Statistically significant difference.





For aromas partially contained in liquid **(Figure 4)** Gum B significantly reduces pungent characters which are related to isoamyl alcohol.

FIGURE 4 - SBSE ANALYSIS OF SEMI-VOLATILE AROMAS FROM WINES SUBJECTED TO ACCELERATED AGING BY SONICATION. Gum B lessens the pungent character which is associated with isoamyl alcohol.
O Statistically significant difference.



As a consequence of thermal stress **(Figure 5)** the differences between gums A and B are seen particularly in the indices r4 (honey aroma) and r5 (vinous characters) as determined by SBSE. Both of the gums reduce the unpleasant aromas of ethyl octanoate, ethyl-9-decenoate and ethyl laurate in the headspace, while increasing isoamylacetate. The analytical differences between the two gums are more marked in the case of light stress **(Tables 2 and 3).** The more positive results can be attributed to product B as a consequence of the reduction of pungent, bitter tones contributed by isoamyl alcohol, even if the heavy vinous character is increased. HPLC polyphenolic data shows no differences between gums A and B (data not published).

FIGURE 5 - SBSE ANALYSES OF SEMI-VOLATILE AROMAS PRESENT IN WINES SUBJECTED TO THERMAL STRESS. Gum B lessens pungent character (isoamyl alcohol) and heavy vinous character (ethyl octanoate).
O Statistically significant difference.

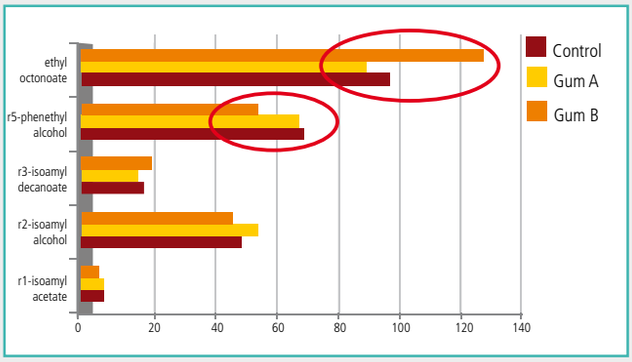


TABLE 2 - SBSE ANALYSIS OF SEMI-VOLATILE AROMAS IN WINE AFTER LIGHT STRESS. Gum B gives an organoleptically better result by significantly reducing the pungent character (isoamyl alcohol) and augmenting honey and character (phenethyl alcohol).
*Statistically significant difference.

		TL	AL	BL
r1	Isoamyl acetate	3.45	4.64	2.10
r2*	Isoamyl alcohol	24.72	38.69	3.22
r3	Ethyl decanoate	24.18	1.18	25.10
r4	Diethyl succinate	35.48	2.91	44.41
r5*	Phenethyl alcohol	61.85	78.12	82.75
	Ethyl octanoate	100.00	83.13	76.32

TABLE 3 - SPME ANALYSIS OF HEADSPACE VOLATILE AROMAS OF WINE SUBJECTED TO LIGHT STRESS.
*Statistically significant difference.

		TL	AL	BL
r1	Ethyl butyrate	4.96	7.09	6.74
r2	Ethyl lactate	11.34	10.93	11.22
r3	Hexanol	5.20	4.78	10.40
r4*	Ethyl octanoate	90.67	99.41	205.92
r5	Isoamyl hexanoate	0.20	0.29	0.55
r6	Beta phenethyl acetate	0.29	0.29	0.97
r7	Ethyl nonanoate	0.42	0.09	0.37
r8*	Ethyl-9-decenoate	1.44	1.63	5.92
r9*	Ethyl decanoate	14.48	17.81	44.69
r10*	Ethyl laurate	1.07	0.85	3.84
	Isoamyl acetate	100.00	85.45	95.48

CONCLUSIONS

Gum Arabic is a complex mixture of polysaccharides and glycoproteins. The presence of hydrophilic carbohydrates and of hydrophobic protein groups in its molecular structure allows for the formation of polar, non polar and Van der Waals bonds.
The purpose of this work was to verify that, at doses normally used in winemaking, Gum Arabic is able to form chemical bonds with aromatic components present in wine, consequently modifying the speed of transfer of the affected components. That would obviously have a positive, negative or null impact on the olfactory and retro olfactory perception of wine depending on how the gum diminished the consumers' positive or negative aroma perceptions. In order to objectively determine the effect of Gum Arabic, non conventional analytical criteria were utilized which were based on the measurement of volatile aromas and semi-volatile components of wine extracted using modern techniques. This is a good approximation of sensory perceptions.
The results so obtained show that the addition of gum alters the volatility of aromatic components of wine as a function of the physio-chemical characteristics of the gum that was used. Different gums yield different results. Gums with the capacity to reduce the volatility of molecules responsible for negative sensory qualities can change the aromatic quality of wine by attenuating defects and increasing positive characteristics.
This action is stable over the time, as verified in the wines treated with accelerated ageing.
The gums can exert a "protective" function in cases where the wine has been under stress conditions, such as storage under non optimal temperature conditions.
In conclusion, as shown in previous work concerning the stabilizing effect of gum on tartrate precipitation, this work also shows that enological Gum Arabic preparations are not all alike. Gums characterized by a varying amount of hydrolysis or obtained by different production processes have different effects. It is thus possible to determine the best gum for the intended application.

know more ...About Tartrate Stability

TARTRATE STABILITY: POSITIVE EFFECTS OF GUM ARABIC ADDITION

Authors: Dr. Marzio Mannino
Dr. Gianni Triulzi - Research and Development Enartis

SUMMARY

Gum Arabic has always been considered a winemaking material that has marginal effects on tartrate stability. The objective of this study was to demonstrate that, when used correctly, Gum Arabic produced from *Acacia Seyal* results in the typical effects associated with Gum Arabic use, as well as positive impacts on tartrate stability. These impacts have the potential to save time and money.

INTRODUCTION

In recent years, wineries have paid more and more attention to costs - not only the costs of raw materials, but the cost associated with winemaking processes, as well. The costs of processes such as tartrate stabilizing, filtration and racking are not always correctly quantified. Technical solutions that reduce operating costs, or speed up winemaking processes, can maintain high product quality standards and are of interest to all winemakers. Stabilizing wine against tartrate deposition incurs the highest cost of all wine stabilization processes for several reasons.

Refrigeration costs, the storage period required, restrictions on the use of tanks and all the other steps needed to ensure that stable wines are produced must be considered.

In this article, we have not covered basic information on this topic already well known by the wine industry, such as the chemical analysis of wine for tartrate stability, the description of the characteristics of Gum Arabic and the usual effects of Gum Arabic on wine.

THE USE OF GUM ARABIC AS A TARTRATE STABILIZING AGENT

Typically, Gum Arabic is considered to be a good stabilizing agent for color, protecting against precipitation of colloids and preventing oxidative modifications, but with very marginal effect on tartrate stabilization. We analyzed the stabilizing effects of different Gum Arabic preparations derived from a range of botanical origins and prepared using different production techniques. To evaluate the stabilizing capability of different gums, we carried out two different types of tests:

- Laboratory tests on raw materials and commercial products
- Cellar tests with commercial products to verify the effect of use under real conditions and to verify the influence that cellar techniques have on the stabilizing activity of the gums.

LABORATORY TESTS

Materials and methods

Six different commercial Gum Arabic preparations were analyzed: three derived from *Acacia Verek* and three from *Acacia Seyal*. Analysis was also carried out on the untreated raw material from which one of the Seyal gums is prepared. To evaluate the extent of the tartrate stabilizing activity of the gums, testing was carried out in two wines:

1) wine with a light tartaric instability (sample TQ);

2) same wine to which of 78 g/100L of monobasic potassium phosphate and 50 g/100L of tartaric acid had been added, creating a highly unstable wine (sample KHT).

Increasing doses of different gums were added to these wines. The gum solutions contained between 22 and 25% dissolved solids.

Seyal: doses of 30, 50 and 100 mL/hL were added;

Verek: doses of 50, 100 and 200 mL/hL were added.

Reliable instruments that give a rapid response were used to evaluate tartrate stability by measuring the difference between the conductivity of the wine, and the conductivity of the same wine after addition of a large quantity of potassium bitartrate crystals followed by mixing at 0°C. A wine is considered stable by this method if the conductivity decrease is less than 50 µS. In the cellar, wine is considered stable if the conductivity decrease is less than 25-30 µS. The limits of acceptability of the results obtained by this method vary according to the instrument that is used and the type of wine that is tested. The values indicated in other studies were taken into account and the following parameters were used wines showing a conductivity drop less than 50 µS are stable, and wines showing a conductivity drop less than 30 µS wine are extremely stable.

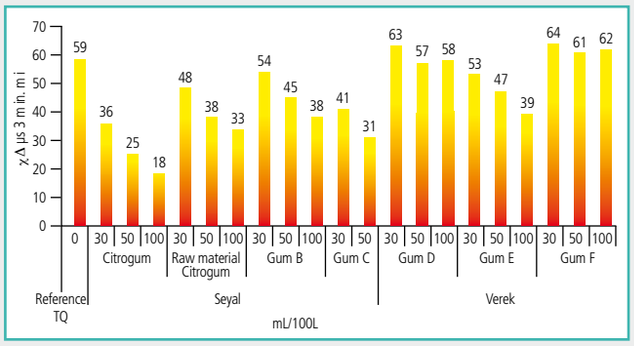
RESULTS AND DISCUSSION

The following Table shows analytical data obtained using the stability test that has been described. In this case, we used a Tartar Check unit produced by the Ing. C. Bullio company. The values obtained demonstrate the range of impact that different gums have on tartrate stability.

TABLE 1

Gum Arabic Source	Gum Arabic Type	Dose (mL/hL)	Wine Type: TQ xΔ µs 3 min.	TQ Result	KHT xΔ µs 3 min.	KHT Result
		0	59	UNSTABLE	159	UNSTABLE
		30	36	STABLE	85	UNSTABLE
	CITROGUM®	50	25	STABLE	68	UNSTABLE
		100	18	STABLE	36	STABLE
		30	48	STABLE	115	UNSTABLE
	RAW MATERIAL CITROGUM®	50	38	STABLE	103	UNSTABLE
		100	33	STABLE	87	UNSTABLE
SEYAL		30	54	UNSTABLE	122	UNSTABLE
	GUM B	50	45	UNSTABLE	126	UNSTABLE
		100	38	STABLE	110	UNSTABLE
		30	41	UNSTABLE	111	UNSTABLE
	GUM C	50	31	STABLE	102	UNSTABLE
		30	63	UNSTABLE	124	UNSTABLE
	GUM D	50	57	UNSTABLE	139	UNSTABLE
		100	58	UNSTABLE	130	UNSTABLE
		30	53	UNSTABLE	129	UNSTABLE
VEREK	GUM E	50	47	UNSTABLE	107	UNSTABLE
		100	39	UNSTABLE	94	UNSTABLE
		30	64	UNSTABLE	144	UNSTABLE
	GUM F	50	61	UNSTABLE	157	UNSTABLE
		100	62	UNSTABLE	135	UNSTABLE

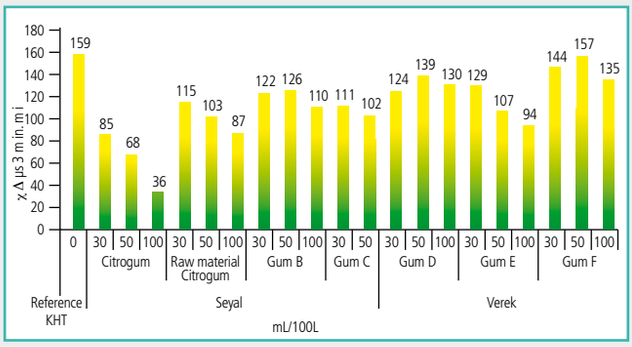
In Graph 1, the action of the different gums in the wine with a slight instability (TQ) is shown. The graph shows that Citrogum® and its raw material have high stabilizing power. Citrogum® has higher stabilizing power than the other Seyal gums. On the other hand, the Verek gums did not confer tartrate stability, even at high doses. Gum E is the only Verek gum that shows some impact on tartrate stability. However, stability is not achieved, even at a dosage of 200 mL/hL. The results show that when slight tartrate instability is present, the addition of increasing doses of Gum Arabic derived from *Acacia Seyal* can make the wine stable.



GRAPH 1 - ADDITION OF INCREASING DOSAGE TO THE WINE

In the wine that was made unstable by the addition of potassium and tartaric acid, the impact of the gums is changed. Under these conditions, it is possible to demonstrate the products that have higher stabilizing capability (Graph 2).

In this case, Citrogum® is again the only gum that has a marked stabilizing effect. As in the previous test, the raw material for Citrogum® does not have the same efficacy as the final product. The other Seyal gums show similar behavior to that in the previous test, but do not have a marked protective effect. The Verek gums also show similar behaviour. Again, Gum E reduces the level of instability better than the other Verek gums that were tested.



GRAPH 2 - ADDITION OF INCREASING DOSAGE TO THE WINE WITH KH_2PO_4 + TARTARIC ACID

Other tests confirmed these results. Another wine that was unstable (Figure 1) has a µs 3 min. of 84 µS. The addition of 50 and 100 mL/100L of Citrogum® gave a reduction in the conductivity to 39 and 30 µS respectively (Figure 2-3), confirming that addition of this gum provides considerable protection against tartrate instability.

FIGURE 1

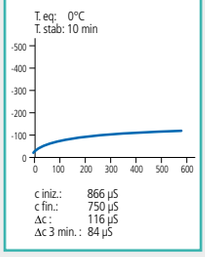


FIGURE 2

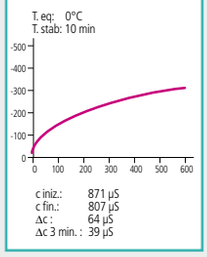
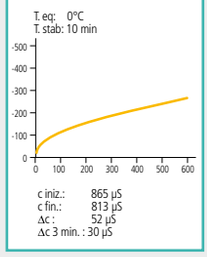


FIGURE 3



The differences between the action of Citrogum® and its raw materials indicate that the industrial process of purification and hydrolysis of the gum is essential to gain full expression of its natural stabilizing capability, derived from its botanical origin. Analyses made to compare the effects of Citrogum® 48 hours and up to one month after addition indicate that tartrate stability improves with time. This means that Citrogum® makes the wine more stable as contact time increases. The process of testing for tartrate stability that was used appears to have little margin of uncertainty. The results show that a laboratory test can be used to determine the dosage that is required to achieve stability, without having to take into account factors such as the degree of wine instability, varietal, the alcohol content and pH. In addition, this test allows the addition of only sufficient Gum Arabic to reach the level of stability requested, or to reduce refrigeration time, if minimal chilling time is required.

CELLAR TESTS

In the cellar tests, the effect that microfiltration (or filtration) has on the reduction of Gum Arabic concentration in wines was studied more closely.
Cellar tests were made by adding Citrogum® to wine and then verifying the level of tartrate stability in the wine by laboratory testing.

MATERIALS AND METHODS

Tests in different cellars were made to compare the stabilizing power of Citrogum® with those of other commercially available gums.

The trial protocol is shown below (Diag. 1):

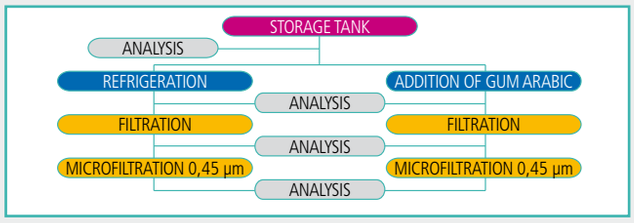


DIAGRAM 1

In other tests, the process was modified according to the requirements of the cellar (Diags. 2 and 3):

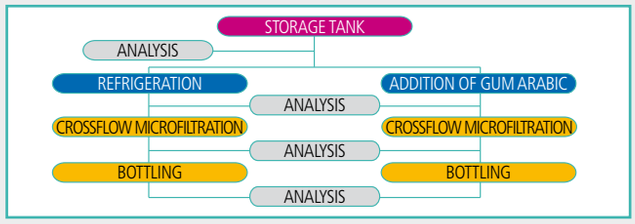


DIAGRAM 2

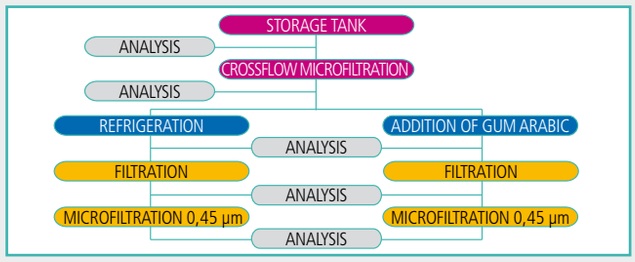


DIAGRAM 3

RESULTS AND DISCUSSIONS

Table 2 shows the results from analysis of samples taken at different stages as shown in Diag.1. It should be noted that the wine to which 100 mL/hL of Citrogum® was added is tartrate stable.

Its stability is similar to that of the products produced by cold stabilization. There was no difference in V max and filterability index, indicating that this gum has no blocking effects on the filters that were used, even the 0.45 µm membrane filters used before bottling.

CABERNET SAUVIGNON	Not refrigerated	Refrigerated (static)	Refrigerated after 3 µm filtration	not refrigerated before 3 µm filtration, addition of 100 mL/hL CITROGUM	not refrigerated after 3 µm filtration, addition of 100 mL/hL CITROGUM	Not refrigerated after 3µm filtration, addition of 100 mL/hL CITROGUM + 10 g/hL metatartaric acid
Alcohol	13.5	13.5	13.5	13.5	13.5	13.5
Total acid	5	5	5	5	5	5
pH	3.5	3.5	3.5	3.5	3.5	3.5
µs initial	1720	1540	1663	1740	1743	1749
µs final	1630	1497	1630	1713	1713	1739
χΔ µs	90	43	33	27	30	10
χΔ µs 3 min.	75	37	28	22	22	2
Filtration index	3.6	4.1	4.1	3.1	3.1	3.3
V max	4200	3552	3552	4330	4339	4998
Tartrate stability 24 hours after beginning of stabilization						
µs initial	1730	1592		1700	1700	1755
µs final	1643	1560		1683	1683	1743
χΔ µs	87	32		17	17	12
χΔ µs 3 min.	88	25		15	16	4

TABLE 2

PINOT GRIGIO	Crossflow filtration, no refrigeration (control)	Crossflow filtration, refrigeration in a continuous process	Crossflow filtration, refrigeration, after 3 µm filtration	Crossflow filtration, refrigeration, after 3 µm filtration addition of 180 mL/hL CITROGUM +10g/hL metatartaric acid	Crossflow filtration, refrigeration, after 3 µm filtration addition of 100 mL/hL CITROGUM + 10g/hL metatartaric acid, after 0.45 µm microfiltration	Crossflow filtration, non refrigerated, after 3 µm filtration	Crossflow filtration, non refrigerated, before 3 µm filtration addition of 180 mL/hL CITROGUM	Crossflow filtration, non refrigerated, after 3 µm filtration addition of 180 mL/hL CITROGUM	Crossflow filtration, non refrigerated, after 3 µm filtration addiction of 180 mL/hL CITROGUM after 0,45 ym microfiltration
OD 420 (1 cm)	0.088	0.088	0.088	0.074	0.074	0.083	0.08	0.08	0.074
Alcohol	12.19	12.19	12.19	12.19	12.19	12.19	12.19	12.19	12.19
Total acid	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23	5.23
pH	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42
Volatile acidity	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
µs initial	1705	1640	1640	1669	1669	1713	1749	1749	1749
µs final	1613	1598	1598	1654	1654	1624	1719	1719	1719
χΔ µs	92	42	42	15	15	89	28	30	30
χΔ µs 3 min.	88	37	37	9	9	80	20	20	20
Filtration index	3.4	4.1	4.1	3.1	3.1	3.3	3.1	3.1	2.1
V max	4188	3552	3552	5148	5148	4339	5148	5148	6680
Tartrate stability one month after treatment									
χΔ µs	105	48	42	16	15	90	38	38	24
χΔ µs 3 min.	95	37	37	9	9	88	20	20	16

TABLE 3 SHOWS THE RESULTS OBTAINED DURING PROCESS N° 3

In this case, the use of Citrogum® stabilizes the wine to the same extent as the cold treatment. A check one month after the addition of Citrogum® confirmed the results shown here. The process of microfiltration does not affect the stabilizing action of the product. These results show that the gum is not retained by the filter. The filterability tests indicate that some of the wines to which Citrogum® had been added had a better filtration index and an improved V max.

Other tests verified that, after one year, wine treated with Citrogum® maintains its tartrate stability. The same reduction of conductivity was found as that obtained soon after addition. When the same tests are carried out on a wine to which Gum B has been added (Table 4), it can be seen that the product does not have the same stabilizing efficacy in the wine and has a negative influence on filterability.

PINOT GRIGIO	Crossflow filtration, no refrigeration (control)	Crossflow filtration, refrigeration in a continuous process	Crossflow filtration, refrigeration, after 3 µm filtration	Crossflow filtration, refrigeration, after 3 µm filtration addition of 180 mL/hL Gum B + 10 g/hL metatartaric acid	Crossflow filtration, non refrigerated, after 3 µm filtration	Crossflow filtration, non refrigerated, before 3 µm filtration addition of 180 mL/hL Gum B	Crossflow filtration, non refrigerated, after 3 µm filtration addiction of 180 mL/hL Gum B
OD 420 (1 cm)	0.088	0.088	0.088	0.074	0.083	0.08	0.08
Alcohol	12.19	12.19	12.19	12.19	12.19	12.19	12.19
Total acid	5.23	5.23	5.23	5.23	5.23	5.23	5.23
pH	3.42	3.42	3.42	3.42	3.42	3.42	3.42
Volatile acidity	0.23	0.23	0.23	0.23	0.23	0.23	0.23
µs initial	1705	1640	1640	1713	1625	1758	1758
µs final	1613	1598	1598	1640	1590	1700	1692
χΔ µs	92	42	42	35	89	58	66
χΔ µs 3 min.	88	37	37	25	80	55	57
Filtration index	3.4	4.1	4.1	3.6	3.3	3.5	3.5
V max	4188	3552	3552	4560	4339	4525	4480
Tartrate stability one month after treatment							
χΔ µs	105	48	42	42	90	51	51
χΔ µs 3 min.	95	37	37	38	88	48	48

TABLE 4

COSTS OF ACHIEVING TARTRATE STABILITY

Tartrate stabilizing incurs a cost that varies according to the technique used. On average, costs range from € 1.3 (USD 1.55) /hL to € 2.13 (USD 2.55) /hL. The use of Citrogum® at a rate of 100 150 mL/hL reduces the stabilizing costs to € 0.70 (USD 0.84) - € 1.80 (USD 2.15) /hL. The use of Citrogum® also shortens the time required to prepare wine for bottling.

CONCLUSIONS AND ACKNOWLEDGEMENTS

The tests carried out confirm that the botanical origin of Gum Arabic is fundamental for its effectiveness in tartrate stability in wine. Only gum obtained from *Acacia Seyal* has this property, while gum produced by *Acacia Verek* does not make a practical contribution to making wines stable. The effectiveness of Gum Arabic produced from *Acacia Seyal* varies according to the processes and treatments to which it is subjected.

The raw materials for Citrogum® go through purification and hydrolysis processes, after which its effectiveness in preventing tartrate instability is enhanced. This makes it different from other gums on the market. The use of Citrogum® can result in savings in cost and time. These are both very important factors in gaining a competitive advantage in today s wine industry. By using correct doses of Citrogum®, the time required to stabilize highly unstable wines by chilling can be reduced. When working with products with medium instability, cold stabilization can be replaced by the addition of Gum Arabic.

We kindly thank the following people for their cooperation: Mr. Luigi Cigaia and Mrs. Silvana Rebecca from Enopiave, Mrs. Sabino Russo from Cantina Castellani and Mr. Pucci Riccardo from C.S. Vinci.

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Oak Chips

Incanto

An Original and Quality Proposal

INCANTO IS THE NEW RANGE OF ENARTIS CHIPS WHICH ARE CHARACTERIZED BY THEIR ORIGINALITY AND QUALITY

Why Originality

- Enartis - Esseco Group is partner in production.
- Toasting of the wood is done in a plant which uses hot air convection.
- The toasting technique is done at a relatively low, and progressively increased, temperature which preserves the maximum natural content of polysaccharides and tannins present in the wood.

Why Quality

- The wood used for the production of INCANTO is subject to the same criteria used for barrel production, and it is aged for at least 18 months
- The use of hot air assures a homogenous toasting, consistent depth of toasting and no risk of burning.
- Perfect control of the raw materials and the toasting process guarantees maximum consistency of quality as well as reproducibility of results.

A Versatile Range

The versatility of INCANTO, which is capable of responding to every winery need, is the result of the combination of two types of wood - French and American oak - coupled with three levels of toasting.

INCANTO NATURAL

PROFILE: non-toasted French wood, which is matured for at least 18 months. This allows for the degradation of the more aggressive and disagreeable tasting polyphenolic substances, while preserving the noble tannins and the polysaccharide fraction.

AROMATIC CHARACTERISTICS: it enhances fruity and clean notes without modifying the aromatic profile of wine.

TASTE CHARACTERISTICS: increase of structure and mouthfeel.

Dosage: *1-2 g/L (8.3-17 lb/1000gal) or 1-2 kg/ton (2.2-4.4 lb/ton) in fermentation*

INCANTO AMERICAN MT

PROFILE: medium toasted American oak.

AROMATIC CHARACTERISTICS: rapid and evident enrichment of sweet vanilla notes, as well as coconut, coffee and toast.

TASTE CHARACTERISTICS: rapid augmentation of mouthfeel and volume, while bringing in a very small amount of tannin.

Dosage: *1-4 g/L (8.3-33 lb/1000gal) in white wine production*
2-6 g/L (17-50 lb/1000gal)
or 2-6 kg/ton (4.4-13.2 lb/ton) in red wine production

INCANTO FRENCH MT

PROFILE: medium toasted French oak.

AROMATIC CHARACTERISTICS: it enriches the vanilla and caramel notes of wine, accompanied with light sensations of spice and toast.

TASTE CHARACTERISTICS: increase of volume, mouthfeel and a light sensation of sweetness.

Dosage: *1-4 g/L (8.3-33 lb/1000gal) in white wine production*
2-6 g/L (17-50 lb/1000gal) or 2-6 kg/ton (4.4-13.2 lb/ton) in red wine production

INCANTO FRENCH MT+

PROFILE: French oak with a toasted level slightly higher than medium.

AROMATIC CHARACTERISTICS: confers elegant notes of toast, chocolate, coffee and spice on the wine.

TASTE CHARACTERISTICS: it mainly strengthens the volume and mouthfeel.

Dosage: *1-4 g/L (8.3-33 lb/1000gal) in white wine production*
2-6 g/L (17-50 lb/1000gal)
or 2-6 kg/ton (4.4-13.2 lb/ton) in red wine production

Application

INCANTO chips can be used as a single product by or in combination with themselves.
The combined use of different types of oak and toast levels allows the natural attainment of greater organoleptic and olfactory complexity, thus allowing for better personalization of the results.
The following table is a guide to determine which chips to use as a function of the type of wine to be produced.

Advantages

By using INCANTO, the following can be accomplished:

- Reduce time and cost of maturation
- Produce wines of diverse organoleptic profiles depending on the type of chips used
- Produce wines in line with the demands of the market.

Packages

INCANTO chips are packed in 10 kg (22 lb) bag containing 2 food grade polyethylene bags of 5 kg (11 lb) each which are suitable for direct introduction into the wine.

	NATURAL	FRENCH MT	FRENCH MT+	AMERICAN MT
FRESH AND FRUITY WHITE WINES				
WHITE WINES WITH AN INTERNATIONAL TASTE				
ULTRA PREMIUM WHITE WINES				
ROSÉ WINES				
LIGHT, FRESH AND FRUITY RED WINES				
RED WINES WITH AN INTERNATIONAL TASTE				
ULTRA PREMIUM RED WINES				

Oxygen Management

The possibility to precisely dose oxygen during the whole winemaking process, starting from the alcoholic fermentation up to the wine bottling, can help prevent fermentation anomalies that are difficult and expensive to fix, prevent and cure off odors that are linked to sulfur compound synthesis, stabilize color, reduce herbaceous notes and define the aromatic and taste profile of the future wine.

ENARTIS MICROOX new

Oxygen dispenser that can be used to micro/macro oxygenate while measuring the actual oxygen supply in terms of weight. Enartis MicroOx guarantees a more linear and constant oxygen supply; in fact, **it does not use a supply chamber but rather sensors that measure the real time gas supply.** A microprocessor and an advanced software complete the calculations necessary in order for the system to maintain the oxygen supply at the desired rate and automatically adapt the oxygen supply in accordance with every variation in exit pressure. The oxygen is provided at the minimum pressure needed so as to minimize oxygen bubble size and to increase its solubility. This is fundamental for use during fermentations since yeast can only use dissolved oxygen. Enartis MicrOx is available in formats of 1, 5 and 10 units and can be used with all types of nozzles.

ENARTIS TAN MICROFRUIT new

PACKAGES 1 kg

This blend of condensed tannins is to be used in micro-oxygenation and every time the wine comes in contact with oxygen (rack-off, filtration, refrigeration etc.). In fact, its components are very reactive with oxygen and effective in promoting color stability, enhancing fruitiness and reducing astringency.

Dosage: *5-20 g/100L (0.4-1.7 lb/1000gal)*

USING OXYGEN DURING ALCOHOLIC AND MALOLACTIC FERMENTATIONS		
AIM	**WHAT TO DO**	**WHY**
Preventing sluggish and stuck fermentations	**1.** At 1/3 of the alcoholic fermentation add 20 g/hL of Nutriferm Advance. **2.** Together with the nutrient, add 3 mg/L of O_2 in 3 hours.	Alcohol produced during fermentation solubilizes fatty acids and sterols found in the yeast cell membrane. This causes yeast to lose their sugar consumption ability. Using a complex nutrient which supplies fatty acids and sterols, allows the membrane to remain functional and prevent stuck fermentations.
Curing reduction that occurs in the second half of white grape fermentation	**1.** Add 3-5 g/hL of Tanenol Max Nature. **2.** Add 1-2 mg/L of O_2 in 30 minutes.	There are two mechanisms that eliminate sulfur compounds responsible for reduced odors: **1.** direct condensation reactions between tannins and sulfur compounds; **2.** tannin oxidation along with the formation of hydroperoxides and free radicals that can destroy sulfur compounds. The reduction of sulfur substances through tannin reactions is enhanced by the presence of oxygen.
Curing reduction that appears in the second half of red fermentation	**1.** Add 3-5 g/hL of Enartis Tan Fruitan. **2.** Add 2-3 mg/L of O_2 in an hour.	
Production of smooth and fruity red wines	**1.** Add 20-40 g/ton of grapes of Enartis Zym Couleur to shorten maceration time. **2.** Add 100-400 g/ton of grapes of Enartis Tan Rouge or 50-100 g/ton of grapes of Enartis Tan Red Fruit to stabilize color and give fruitiness. **3.** Start the alcoholic fermentation by inoculating 20 g/hL of Enartis Ferm Red Fruit. **4.** Add 30 g/hL of Nutriferm Arom to stimulate the synthesis of fermentation aromas. **5.** At 1/3 of the alcoholic fermentation add 20 g/hL of Nutriferm Advance and add 3 mg/L of O_2 in 3 hours to prevent stuck fermentations. **6.** At the end of the fermentation rack twice in 48 hours. **7.** Add 20 g/hL of Enartis Zym Lyso to inhibit the MLF. **8.** Add 5 g/hL of Enartis Tan Fruitan and add 0.5-1 mg/L/day of O_2 for 5-7 days to stabilize the color before the MLF. **9.** Start the MLF by inoculating Enartis ML One. **10.** During the MLF prevent reduction appearance by adding 0.5 mg/L O_2 in 30 minutes.	Proper fermentation, maceration and oxygen management allow for rapid production of red wines with stable fruity aromas and good smoothness.
Production of structured red wines with well balanced tannins	**1.** Add 20-40 g/ton of grapes of Enartis Zym Balance to the grapes to increase the polyphenol content of the wine. **2.** Add 100-200 g/ton of grapes of Enartis Tan Fruitan to the grapes to stabilize the color and to increase fruity notes. **3.** Start the fermentation by inoculating 20 g/hL of Enartis Ferm ES 488. **4.** Add 20 g/hL of Nutriferm Special to ensure a good fermentation onset. **5.** At 1/3 of the alcoholic fermentation add 20 g/hL of Nutriferm Advance and add 3 mg/L of O_2 in 3 hours to prevent stuck fermentations. **6.** At the end of the fermentation rack twice in 48 hours. **7.** Add 20 g/hL of Enartis Zym Lyso to inhibit the MLF. **8.** Add 10 g/hL of Enartis Tan Fruitan or 5 g/hL of Enartis Tan Uva and add 1-2 mg/L/day of O_2 for 5-7 days to stabilize the color and increase wine structure. **9.** Start the MLF by inoculating Enartis ML Silver. **10.** During the MLF prevent reduction appearance by adding 0.5 mg/L O_2 in 30 minutes.	Producing a premium red wine begins in the vineyard. However maceration, alcoholic fermentation and malolactic fermentation remain strategic phases in which all the quality produced in the vineyard can be transmitted to the wine. Maceration enzymes, tannins, oxygen and yeast are all tools that define the tannin structure and the aromatic profile of the future wine.

USING OXYGEN AFTER THE MALOLACTIC FERMENTATION		
AIM	**WHAT TO DO**	**WHY**
Enhance fresh fruit aromas and smoothness (Merlot, Syrah, Pinotage)	**1.** At then end of the malolactic fermentation wait 2-3 weeks for the wine to clarify, then rack and/or centrifuge. **2.** Add 5-10 g/hL of Enartis Tan Microfruit and 20-40 g/hL of Surlì Natural or One. **3.** Microoxigenate for one month at 1-2 mg/L/month.	The combined use of specially selected tannins, yeast polysaccharides and oxygen allows for the stabilization of fruity aromas and for the smoothing out of natural wine astringency.
Enhance aromatic complexity and structure (Merlot, Cabernet, Malbec)	**1.** At the end of the malolactic fermentation wait 2-3 weeks for the wine to clarify, then rack and/or centrifuge. **2.** Add 5-10 g/hL of Enartis Tan Fruitan and 20-40 g/hL of Surlì One. **3.** Microoxygenate for two months at 2-4 mg/L/month. **4.** In the last 3 weeks of microoxygenation add 3-5 g/hL of Enartis Tan Cœur de Chên (for complexity and elegance) or 3-5 g/hL of Enartis Tan Extra (for vanilla and sweetness).	A controlled supply of oxygen in combination with oak tannins and polysaccharides allows for wine structure enhancement without increasing astringency and also highlights complex woody notes.

Sulfiting Agents

Sulfiting for Cask and Barrel

EFFERBARRIQUE / EFFERGRAN DOSE 5

PACKAGES Boxes of 40 packets Efferbarrique • Boxes of 25 packets Effergran Dose 5

THE PRACTICAL GRANULAR PRODUCT FOR GREAT WINES
Drawing on its experience in the enological field, Enartis has developed two new products: Efferbarrique and Effergran Dose 5. These effervescent granular metabisulfite products have been created for use during the maturation of wine in barrels.

Dosage: *each package of Efferbarrique liberates 2 grams of SO_2 and each package of Effergran Dose 5 liberates 5 grams of SO_2*

Advantages of Use

The use of ***Efferbarrique*** and ***Effergran Dose 5*** in small oak storage allows easy maintenance of an ideal concentration of SO_2. A target SO_2 level can be maintained consistently over time.

The use of ***Efferbarrique*** and ***Effergran Dose 5*** assures the addition of the correct dose of SO_2, with uniform mixing in all containers, reducing the risk of incorrect additions and poor distribution of SO_2 in the wine.

The formulation of ***Efferbarrique*** and ***Effergran Dose 5*** contains 25% of potassium bicarbonate. This material causes effervescence when ***Efferbarrique*** and ***Effergran Dose 5*** are added to wine, assuring complete dissolution and uniform distribution without requiring any bâtonnage.

Efferbarrique and ***Effergran Dose 5*** reduce the time needed when SO_2 additions need to be made to many small containers. The packages are easy to open and the products can be added directly to the wine to be treated without further preparation.

Efferbarrique and ***Effergran Dose 5*** reduce the risk for the cellar workers health.

The SO_2 liberated by ***Efferbarrique*** and ***Effergran Dose 5*** rapidly dissolves on the surface of the liquid, assuring that its antioxidant effect is maintained where it is needed. Over time it tends to be distributed automatically in the wine, spreading to all parts of the container. Studies carried out by Enartis show that 5 days after addition of the granular metabisulfite, the concentration of SO_2 is the same in wine in the upper and lower part of the container, demonstrating that it is uniformly distributed.

Therefore, ***Efferbarrique*** and ***Effergran Dose 5*** allow the precise and uniform addition of small amounts of SO_2 to wine in barrels, making these products a valuable tool during the production of all barrel stored wines.

Sulfiting for Grape Bins and Tanks

EFFERGRAN

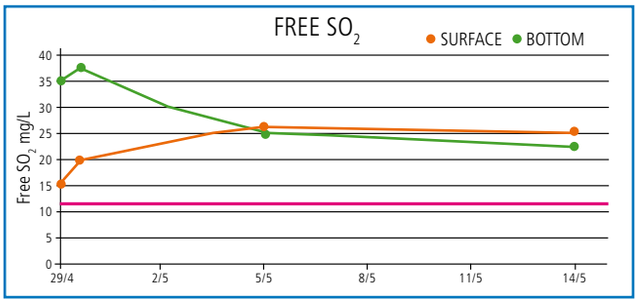
PACKAGES 0.125 Kg • 0.25 Kg

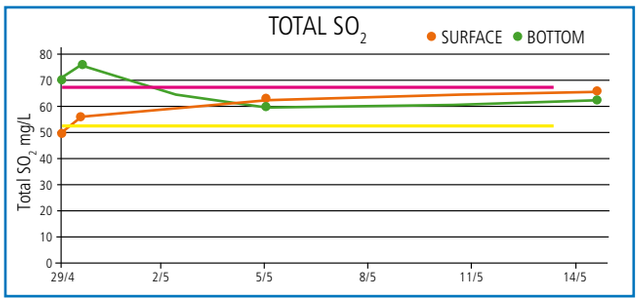
Effervescent granulated potassium metabisulfite designed to be added directly to wines and grapes. When added to wine, it rapidly dissolves on the surface of the liquid, assuring that its antioxidant effect is maintained where it is needed. Subsequently, it assures homogenous and rapid distribution of the released SO_2 without requiring pum-overs in tank volumes up to 50000 liters (13200 gal).

When added to the bottom of picking bins, it assures a rapid release of SO_2 into the atmosphere occupied by the grapes, minimizing oxidation during transport from the vineyard to the winery.

Dosage: *125 g (53.5 g SO_2) packet for gondolas of 4-5 tons or 2500L (660gal) of wine*
250 g (107 g SO_2) packet for gondolas of 8-10 tons or 5000L (1320gal) of wine

30000L (7926 gal) tank added with 15 ppm of SO_2 (SO_2 content before 11/49 mg/L; after: 23/62 mg/L); the homogeneous distribution of the SO_2 is reached 5 days after the addition of Effergran





WINY

PACKAGES 0.25 kg • 1 kg • 25 kg

Pure and high quality potassium metabisulfite. Winy is an additive with multiple functions which is indispensable in winemaking. It is capable of oxygen scavenging, reducing oxidation, kills unwanted microflora, renders polyphenols more soluble and it acts as antioxidasic agent against oxidases (laccase and tyrosinase).

Dosage: *1 g of Winy develops approx. 0.56 g of SO_2*

AST

PACKAGES 1 kg

Contains potassium metabisulfite, ascorbic acid and hydrolysable tannin in carefully balanced amounts to maximize antioxidant and antimicrobial action. When used on grapes, AST provides the antibacterial and antioxidizing protection provided by sulfur dioxide, while limiting macerating action. It is suitable for the treatment of grapes intended for sparkling wine base, white grapes rich in phenolic substances and for grapes that have been machine harvested.

When used in the treatment of must derived from grapes rich in aromatic precursors, it assists in the production of wines with intense varietal aroma. AST is very effective in preventing the untypical ageing off flavor.

Dosage: *150-200 g/ton of grapes*
15-20 g/100L (1.2-1.7 lb/1000gal) in juice
10 g/100L (0.8 lb/1000gal) of AST provide approx 28 ppm of SO_2 and 30 ppm of ascorbic acid

AST: All-Round Protection Before Fermentation

Good wine comes from good grapes. This is why it is important to protect the products of the vine after picking. Maceration of the grapes during transport from the vineyard to the winery must be limited. Phenolic and aromatic components must be protected from oxidation and the development of indigenous microbial flora must be prevented.

AST ASSURES:

Correct fermentation: the antiseptic action of sulfur dioxide is enhanced by the bacteriostatic effect of hydrolysable tannin, slowing down the development of lactic acid bacteria and helping to prevent bacterial spoilage under high pH conditions.

Production of aromatic wines, with a good structure: AST carries out a fast de-oxygenating action, helping to prevent the oxidation of the natural aromatic and phenolic components of grapes. When employed in the treatment of must derived from grapes rich in aromatic precursors (Sauvignon Blanc, Muscat, Gewürztraminer, Muller Thurgau), AST assists in the production of wines with intense varietal aroma.

In addition, the hydrolysable tannin ensures a long-lasting fresh aroma and helps to achieve structure and balanced flavor.

Protection from the action of fungal oxidases: when used in musts obtained from grapes affected by *Botrytis cinerea*, AST limits the oxidizing action of laccase.

Reduced need for stabilization and clarification treatments: when used on grapes, AST provides the antibacterial and antioxidant protection provided by sulfur dioxide, while limiting its macerating action. It is suitable for the treatment of grapes intended for sparkling wine bases, white grapes rich in phenolic substances and for grapes which have been machine harvested.

Fresh and clean aroma: AST reduces the amount of sulfur dioxide required at the pre-fermentation stage. This can reduce the amount of acetaldehyde and hydrogen sulfide produced during alcoholic fermentation, which contributes to a significant improvement in the organoleptic quality of the wine.

SOLFOSOL A

PACKAGES 25 kg

Aqueous solution of ammonium bisulfite. It enables both sulfur dioxide and ammonia nitrogen to be easily and safely added to must. SO_2 concentration: 150 g/L (15% w/v). NH_4 concentration of 40 g/L (4% w/v).

Dosage: *10 mL/100L (378 mL/1000gal) of Solfosol A add 15 ppm of SO_2*

NEOSOLFOSOL C

PACKAGES 25 kg • 1300 kg

Aqueous solution of ammonium bisulfite. It enables both sulfur dioxide and ammonia nitrogen to be easily and safely added to must. SO_2 concentration: 630 g/L (63% w/v). NH_4 concentration of 177 g/L (17,7% w/v).

Dosage: *6-20 mL/100L (227-757 mL/1000gal) of juice or 60-200 mL/ton of grapes (10 ml/100L of Neosolfosol provide 63 ppm of SO_2 and approx. 18 ppm of YAN)*

SUPERSOLFOSOL

PACKAGES 25 kg • 250 kg • 1000 kg

Aqueous solution of ammonium bisulfite. It enables both sulfur dioxide and ammonia nitrogen to be easily and safely added to must. SO_2 concentration: 400 g/L (40% w/v). NH_4 concentration of 113 g/L (11% w/v).

Dosage:
10-30 mL/100L (0.38-1.1 L/1000gal) of juice or 100-300 mL/ton of grapes (10 ml/100L of Supersolfosol provide 40 ppm of SO_2 and approx. 11 ppm of YAN)

TABLES FOR CALCULATING THE DOSAGE OF SULFITING AGENT TO BE USED IN RELATION TO THE DESIRED ADDITION OF SULFUR DIOXIDE ARE AVAILABLE ON THE WEBSITE **WWW.ENARTIS.COM,** LIBRARY SECTION, TECHNICAL SHEET PAGE.

SOLFOSOL M

PACKAGES 25 kg • 250 kg •1000 kg

Aqueous solution of potassium bisulfite. Sulfiting agent that enables sulfur dioxide to be easily and safely added during all winemaking processes, from harvest to bottling. SO_2 concentration: 150 g/L (15% w/v).

Dosage: *10 mL/100L (378 mL/1000gal) of Solfosol M provide 15 ppm of SO_2*

know more ...About Winy

THE CELLAR'S CHOICE FOR METABISULFITE

Potassium metabisulfite is a widely used winemaking additive and for this reason it is often thought to be unimportant. In reality, considering the dosages used, the client should be given the assurance of acquiring and using a well characterized product.

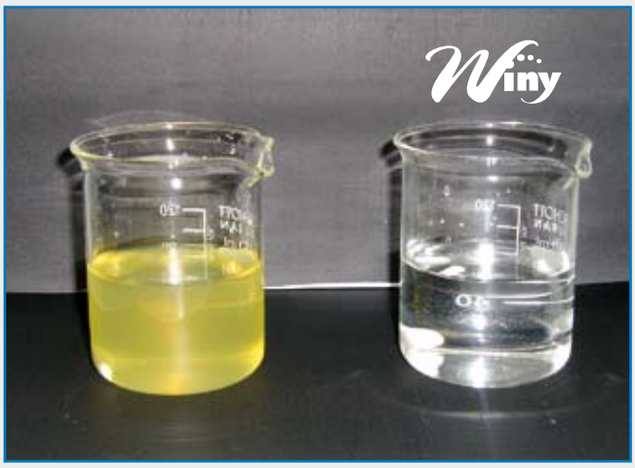
WHY IS WINY THE BEST CHOICE?

1 Winy possesses an elevated purity

Winy is produced with a high quality raw material, i.e. without metals that could favor the oxidation of potassium metabisulfite. Moreover, sulfur dioxide undergoes a purification process that eliminates oxygen and sulfites that could create sulfates. As a result, the specifications of Winy are often better than those specified by law and the average values are often higher. Enartis controls and guarantees the technical specifications of its products even those which may not be specifically required by law.

CHEMICAL CHARACTERISTICS OF WINY

	FOOD CHEMICAL CODEX	SPECIFICATIONS OF WINY	AVERAGE VALUES OF WINY
APPEARANCE	CRYSTALLINE POWDER	CRYSTALLINE POWDER	CRYSTALLINE POWDER
COLOR	WHITE	WHITE	WHITE
ODOR	OF SO_2	OF SO_2	OF SO_2
APPEARANCE OF 20% SOLUTION	CLEAR	CLEAR	CLEAR
CONTENT IN $K_2S_2O_5$	> 90%	> 97.2%	**98.5%**
IRON	< 10 mg/kg	< 5 mg/kg	**0.2 -1 mg/kg**
SELENIUM	< 5 mg/kg	< 5 mg/kg	< 5 mg/kg
LEAD	< 2 mg/kg	< 2 mg/kg	< 2 mg/kg
COPPER	NOT REQUIRED	< 10 mg/kg	**6 mg/kg**
CHLORIDES	NOT REQUIRED	< 0.1%	
SULFATE	NOT REQUIRED	< 2.8%	**1.4%**
THIOSULFATE (S_2O_3)	< 0.1%	< 0.04%	**< 0.04%**



COMPETITOR'S PMS - 20% W/V SOLUTION
WINY - 20% W/V SOLUTION

2 Winy does not smell bad or irritate the olfactory membrane.

Potassium metabisulfite ($K_2S_2O_5$) is odorless. The odor perceived while using it is the smell of Sulfur Dioxide (SO_2) set free after the degradation of metabisulfite. How does metabisulfite degrade? In water we have the following reaction:

$K_2S_2O_5$ (potassium metabisulfite) $+ H_2O$ (water) $\longrightarrow 2KHSO_3$ (potassium bisulfite)

Potassium bisulfite, with oxygen, starts the following reaction:

$KHSO_3$ (potassium bisulfite) $+ \frac{1}{2} O_2$ (oxygen) $\longrightarrow KHSO_4$ (potassium bisulfate)

Potassium bisulfate is a strong acidifying agent that reacts with potassium bisulfite, freeing sulfur dioxide and potassium sulfate:

$KHSO_4$ (potassium bisulfate) $+ KHSO_3$ (potassium bisulfite) $\longrightarrow SO_2$ (sulfur dioxide) $+K_2SO_4$ (potassium sulfate) $+H_2O$ (water)

Sulfur dioxide formation means lack of concentration and presence of the fastidious odor, while the formation of potassium sulfate causes hardening of the product. This reaction depends on the quantity of water and oxygen absorbed by potassium metabisulfite.

During the production process, Enartis adopts a series of measures to minimize the absorption of water and oxygen.
As a result, the series of degradation actions outlined above is very limited. Therefore, we obtain a metabisulfite - WINY - that:

- **is almost odorless**
- **has a high concentration of metabisulfite (systematically superior than 99%)**
- **does not form rocks.**

3 Winy is packaged to guarantee a long shelf life

Winy is packaged in a controlled atmosfere with a multi-layer film to grant the maximum integrity of the product during storage. A different type of packaging and/or improper packaging conditions may allow for a 2-3% loss of titer during storage.

MULTI-LAYER POLYLAMINATE MEANS TOTAL GUARANTEE

- The **75 µm** internal neutral **polyethylene liner** is 100% food safe
- The **9 µm aluminium** liner in the middle guarantees zero permeability to gas and assures great mechanical resistance.
- The **12 µm** outer **polyester liner** guarantees a long lasting, readable label and greater mechanical resistance.
- A big and wide seal guarantees a perfectly tight pack.

Cleaning Materials

Alkaline Detergents for Tanks & Equipment

SECODET LIQUIDO

PACKAGES 28 kg • 1200 kg

Liquid alkaline detergent for cleaning and removing tartrate from tanks - stainless steel, coated, cement and fiberglass.

SECODET POLVERE

PACKAGES 25 kg

Powder alkaline detergent for cleaning and removing tartrate from tanks - stainless steel, coated, cement and fiberglass.

Chlorinated Detergents

SECOCLOR EXTRA

PACKAGES 10 kg • 28 kg • 1000 kg

Chlorinated detergent in liquid solution for cleaning and sanitation of tanks and pipes.

Chlorine Free Detergents

SECOSAN ECO

PACKAGES 28 kg

Powder detergent composed of alkali, dispersers, descalers, polishers and sources of active oxygen. It has strong discoloration and oxidation actions and provides additional disinfecting properties. Suitable for cleaning and sanitation of tanks, pipes, filling machines, barrels, etc.

Detergents for Bottle Washers

SECOCLEAN SPECIAL

PACKAGES 25 kg

Alkaline detergent for hot washing and hot deep cleaning of bottles.

SECOCLEAN SUPER

PACKAGES 25 kg

Alkaline detergent for cold washing of bottles.

Lubricants For Conveyor Belts

SECOLUBE NF

PACKAGES 25 kg

Lubricating detergent for conveyor belts. Liquid.

SECOLUBE SPECIAL

PACKAGES 25 kg

Water soluble lubricant for conveyor belts. Liquid.

Sanitizers

SECODES AKTIV

PACKAGES 10 kg • 25 kg

Liquid sanitizer based on peracetic acid and hydrogen peroxide. Effective towards gram-positive and gram-negative bacteria, yeasts and moulds. It carries out a completely safe sanitation in tanks, tubes, pumps, filling machines, filter sheets, micro-filtration cartridges and ultra-filtration membranes.

SECO BRETT

PACKAGES 10 kg

Detergent sanitizer in powder form specific for *Brettanomyces* control in the cellar. Seco Brett is a valuable option to reduce the population of *Brettanomyces/Dekkera* cells in the cellar to a level under the safe contamination threshold. A report of a study carried out by Enartis in this area can be found in the "Library" section of the Enartis Web site.

Great Little Helps

ANTICASSE FN

PACKAGES 1 kg

Blend of potassium bicarbonate, potassium metabisulfite, casein and ascorbic acid. Anticasse FN is particularly suited for treating oxidized wines and for efficiently preventing oxidation.

Dosage: *20-60 g/100L (1.7-5 lb/1000gal)*

ANTIFLOR

Product containing allyl iso-thiocyanate (mustard essence), supported by paraffin for the food industry. Available in three sizes: Antiflor Damigiane suitable for containers from 20 to 200 liters (5-50 gal); Antiflor Fusti suitable for containers from 200 to 5000 liters (50-1300 gal); Antiflor Vasche for large tanks.

TREFOSOLFINA

PACKAGES 0.2 kg • 1 kg

Stabilizing and regulating agent for fermentation based on potassium metabisulfite, bentonite and ammonium salts.

Dosage: *10-30 g/100L (0.8-2.5 lb/1000 gal)*

TANNISOL

PACKAGES tube with 10 tablets

Potassium metabisulfite and tannin tablets for microbial stabilization of wines and musts.

Dosage: *1-2 tablets in 100L (26gal)*
Each tablet provides approx. 5.2 g of SO_2
(1 tablet in 100L or 26gal of wine provides 52 ppm of SO_2)

ENOPLASTICO SPECIAL

PACKAGES 0.5 kg

Enoplastico Special (bung-putty) is a stiff paste, odorless and impermeable, containing ultra pure oily substances and adhesive powders. The product's pasty texture makes it particularly suited to sealing vat doors, ensuring a perfect seal.

DETERSOL

PACKAGES 1 kg

Acid detergent ideal for ensuring general cellar hygiene and for cleaning and washing concrete tanks, vats, casks, wine vessels and winemaking equipment.

DISACIDIFICANTE BIANCONEVE

PACKAGES 1 kg

Blend of potassium bicarbonate and neutral potassium tartrate designed to reduce the acidity of over acid wines, making them smoother and more pleasant to the taste.

Dosage: *5-135 g/100L (0.4-11.2 lb/1000gal)*
135 g/100L (11.2 lb/1000gal) reduce wine total acidity by approx. 1 g/L as tartaric acid

ZOLFO DISCHI

PACKAGES 1 kg

Sulfur disks for cask and barrel disinfection.

Dosage: *each disc provides approx 12 g of SO_2*

NEODETERSOL BOTTI

PACKAGES 1 kg

Alkaline detergent for washing barrels, vats and tanks.

BYOSAL

It consists of two separate sealed sachets containing dried selected yeast and a specific nutrient. Individual doses for 100 liters (26 gal) of juice.

SANATON LIQUIDO

PACKAGES 1 kg

Liquid alkaline detergent for removing tartrate and sanitizing barrels and tanks.

SANATON

PACKAGES 1 kg

Alkaline detergent for removing tartrate and sanitizing barrels and tanks.

NEODETERSOL VETRO

PACKAGES 1 kg

Alkaline detergent for washing bottles.

TREFOSOLFITO

PACKAGES 1 kg

Fermentation nutrient and sulfiting agent in liquid solution based on sulfur dioxide and ammonium salts.

Dosage: *25-35 g/100L (2.1-2.9 lb/1000gal)*

Analytical Kit

ProtoCheck

QUICK METHOD FOR THE VALUATION OF POTENTIAL PROTEIN INSTABILITY IN WINES AND BEVERAGES WITH ACIDIC pH

Analytic valuation of protein instability in wines has been performed, up to now, through different methods that are not giving univocal results, even on the same wine, resulting in uncertainty over the treatment to be applied.
For such reasons, it has been decided to proceed in studying a new method that could be absolutely standardizable, reliable, of easy and quick use, useful for wines, musts, juices and other beverages with acidic pH. ***ProtoCheck***, patented by prof. Celotti of University of Udine, is based on the reaction of potentially unstable proteins present in the wine with a blend of stabilized anionic reagents. With respect to other tests, the "specific" reaction that will take place does not interact with other substances and, in seconds, causes a turbidity perfectly measurable with a tubidimeter.

ADVANTAGES OF PROTOCHECK ARE

- Rapidity and specificity of the reaction with potentially unstable proteins.
- No significant interferences.
- The method is standardizable, which makes possible having comparable results between different laboratories.
- Simplicity of analysis.
- Precise determination of the dosage necessary for the bentonite treatment.

INSTRUCTIONS FOR USE

1. Filter the sample with a 0,65µm - or narrower - membrane
2. Measure turbidity T1 on the filtered sample by meaning of a turbidimeter that can measure also value of 0.1 NTU. Be sure that the value (NTU) remains stable, not changed by the presence of air or gas bubbles. If necessary, strip gas away by meaning of ultrasound.
3. Fill the test tube with the sample up to the mark shown by the arrow. Open the tube just immediately before its use.
4. Close the test tube, delicately turn it upside down avoiding formation of bubbles of air. Pour the liquid into the cuvette of the turbidimeter.
5. One minute after mixing the sample with the reagent, measure the turbidity T2 and verify, with a second reading, the stability of this value. If T2 increases, make further readings during the following 3-4 minutes until reaching a stable reading. If the value decreases, use the highest value measured.
6. Calculate the ***ProtoCheck*** value, according the following formula T2 - (T1/1.5*) where *1.5 is the dilution factor.

The beverage is considered stable when the ***ProtoCheck*** value is = 0 (no more protein residue)

EXAMPLE 1: STABLE
Turbidity of sample as such **(T1)** = 3.3 NTU
Turbidity of sample + **ProtoCheck (T2)** =2.2 NTU
ProtoCheck = 2.2 - (3.3/1.5) ➡ 0

EXAMPLE 2: UNSTABLE
Turbidity of sample as such **(T1)** = 1.5 NTU
Turbidity of sample + **ProtoCheck (T2)** = 4 NTU
ProtoCheck = 4 - (1.5/1.5) ➡ 3

Protocheck value can not be lower than 0. In the case value results negative, repeat analysis.
When making fining trials, wait till the fining agents completely precipitate or separate solids from clear liquid by filtration before using the **ProtoCheck** test. Fining and stabilising agents can interfere with **ProtoCheck**.

PACKING: Box of n. 50 ProtoCheck determinations

Keep **ProtoCheck** at room temperature and protected from light; open the test tube immediately before use.

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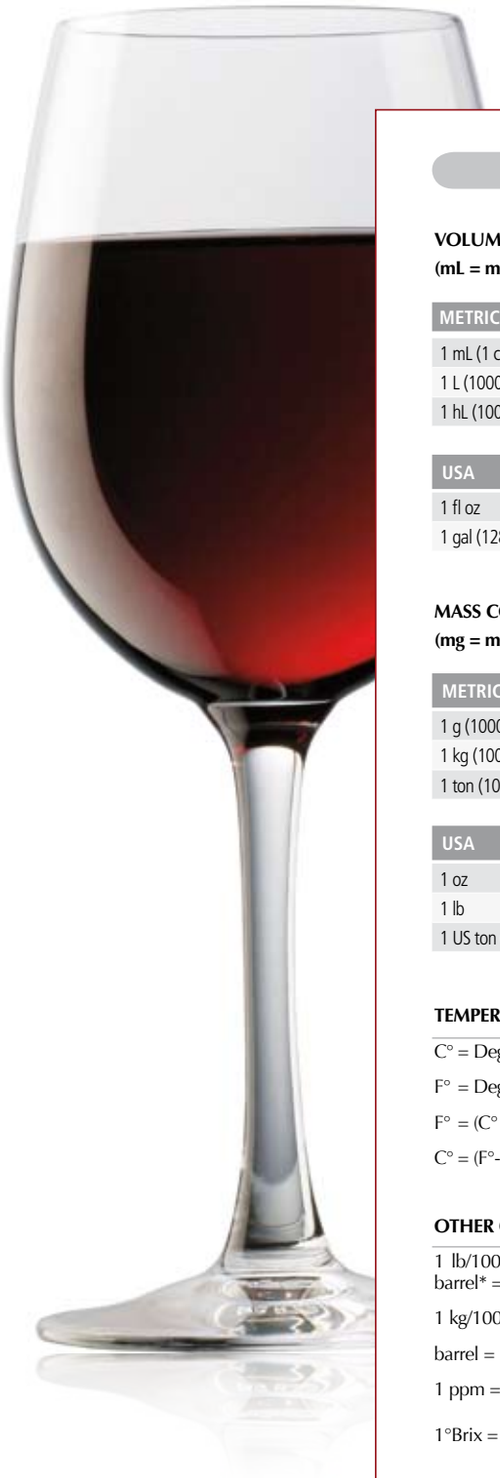

CONVERSIONS

VOLUME CONVERSIONS

(mL = milliliter, L = liter, hL = hectoliter, fl oz = fluid ounce, gal = gallon)

METRIC	USA
1 mL (1 cc)	0.035 fl oz
1 L (1000 mL)	0.2642 gal
1 hL (100 L)	26.4 gal

USA	METRIC
1 fl oz	30 mL (29.6 mL)
1 gal (128 fl oz)	3785 mL (3.785 L)

MASS CONVERSIONS

(mg = milligram, g = gram, kg = kilogram, oz= ounce, lb = pound)

METRIC	USA
1 g (1000 mg)	0.035 oz
1 kg (1000 g)	2.205 lb
1 ton (1000 kg)	2205 lb

USA	METRIC
1 oz	28.35 g
1 lb	453.6 g (0.4536 kg)
1 US ton (2000 lb)	907 kg

TEMPERATURE CONVERSIONS

C° = Degree Celsius

F° = Degree Fahrenheit

F° = (C° x 9/5) + 32

C° = (F°-32) x (5/9)

OTHER CONVERSIONS

1 lb/1000 gal = 454 g/1000 gal = 0.454 kg/1000 gal = 120 mg/L = 27.2 g/barrel* = 0.120 g/L

1 kg/100L (1 hL) = 1000 g/100L = 10 g/L = 10,000 mg/L = 2.271 kg/barrel

barrel = 60 gal = 227.1 L

1 ppm = 1 mg/L

1°Brix = 1% sugar (w/v)

INTERNET CONVERSION PROGRAMS

www.convertworld.com/en
or tip GOOGLE "convert *x* into *y*"