ENARTIS NEWS

WANT TO PRODUCE A WINE WITH LOW OR ZERO SO_2 ADDITION?

SO_2 is one of the most controversial additives currently used in the wine industry. Numerous attempts have been made to find alternatives as effective and healthy for human consumption. With the recent approval of products such as chitosan and PVI/PVP, it is now easier to replace sulphur dioxide. SO_2 performs antioxidant, antioxidasic and antimicrobial activities but Enartis can give you a series of product alternatives to give the same benefits whilst producing low or SO_2 free wines.

ANTIOXIDANT AND ANTIOXIDASIC ACTIVITY

Mechanisms of oxidation in juice:

- Mainly mediated by oxidases (tyrosinase and laccase)
- Very fast reaction: SO_2 is not sufficiently rapid in scavenging oxygen. It can only inactivate the enzyme when adding at least 50 ppm
- Phenolic (hydroxycinnamic acids and low molecular weight catechins) and aromatic compounds are the main substrates of oxidation
- Copper seems to have an activating effect on oxidases

Mechanisms of oxidation in wine:

- Mainly chemical
- Phenolic compounds (catechins) and ethanol are the main substrates of oxidation
- Iron and copper catalyse oxidation by turning oxygen into free radicals

How to prevent oxidation minimizing the use of SO_2:

- Prevent dissolution of oxygen by using a fast oxygen scavenger like ascorbic acid, glutathione and tannins
- Remove iron and copper with co-polymers of vinylimidazole and vinylpyrrolidone (PVI/PVP), activated chitosan or pea protein (*figure 1*)
- Remove catechins and hydroxycinnamic acids with plant proteins, PVPP and activated chitosan (*figure 2*)
- Maintain low wine redox potential with tannin and glutathione

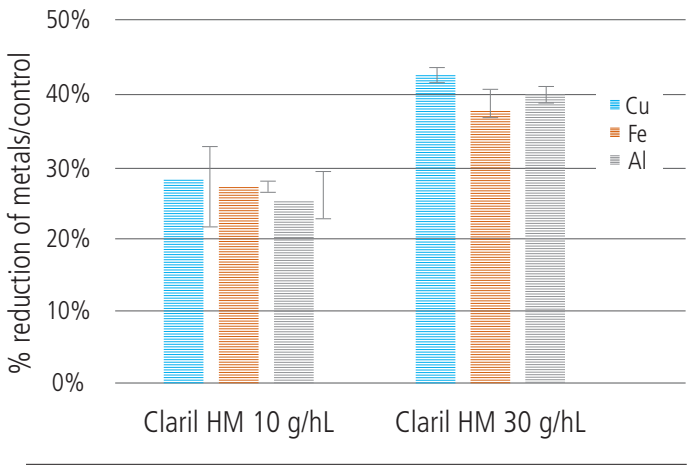

Figure 1: Claril HM removes iron and copper, the real catalyst of wine oxidation

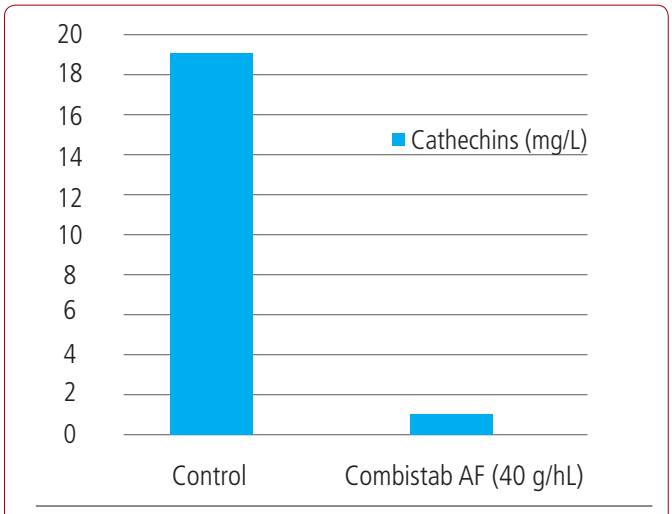

Figure 2: Combistab AF reduces wine sensitiveness to oxidation by removing catechins

ANTIMICROBIAL ACTIVITY

- Only the so-called molecular form of SO_2 has an antimicrobial effect
- Molecular SO_2 content is free SO_2 and is pH related: it is about 10% of free SO_2 content at pH 2.8, and only 1% of free SO_2 content at pH 3.8
- Different microbes are sensitive to different levels of molecular SO_2

Microorganism	mg/L of molecular SO_2
Brettanomyces	0.6-0.8
Non-Saccharomyces yeast of the juice	0.4-0.5
Bacteria	0.5-1

How to prevent wine microbial spoilage by minimizing the use of SO_2?

Use a wide spectrum antimicrobial like activated chitosan (*figure 3*)

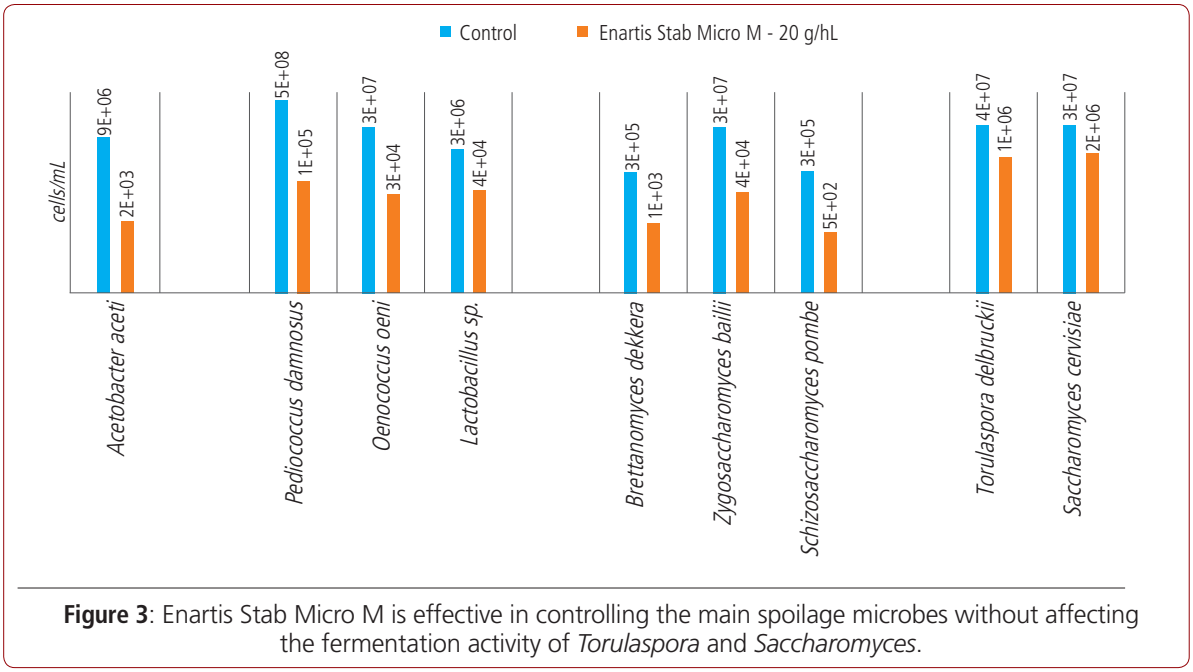

Figure 3: Enartis Stab Micro M is effective in controlling the main spoilage microbes without affecting the fermentation activity of *Torulaspora* and *Saccharomyces*.

WHITE AND ROSÉ VINIFICATION				
Vinification phase	**Product**	**Composition**	**Dosage**	**Effects**
Reception of grapes	AST	PMS, Ascorbic acid, Gallic tannin	100-150 g/ton	• Reduction of dissolved oxygen • Antimicrobial activity
Juice settling / flotation	Tan Antibotrytis or Tan Arom	Tan Antibotrytis: Mixture or gallic, digallic and elagic tannin Tan Arom: Gallic/ digallic tannin + yeast derivative with GSH	10 g/hL under the press	• Reduction of dissolved oxygen • Blocks the radicals
	Protomix AF	Bentonite, PVPP, pea protein, cellulose	30-50 g/hL during settling or flotation	• Removal of catechins • Removal of iron
	Stab Micro M	Activated chitosan	5-10 g/hL during settling or after flotation	• Removal of spoilage microbes • Removal of catechins • Removal of iron and copper • Clarification

WHITE AND ROSÉ VINIFICATION				
Vinification phase	**Product**	**Composition**	**Dosage**	**Effects**
Fermentation	Pro FT or Pro XP	Pro FT: sulphur amino acids + free mannoproteins + PVI/PVP Pro XP: free mannoproteins + PVI/PVP	30-50 g/hL	• Removal of copper and iron • Removal of catechins • Increase of wine resistance to oxidation
	Top Essence or ES 181	Selected dry yeast	20-40 g/hL	• Low SO_2 producing yeast strains
Wine maturation	Surlì Natural or Stab SLI	Surlì Natural: inactivated yeast Stab SLI: Inactivated yeast + PVPP + oak tannin	20-30 g/hL	• Reduction of dissolved oxygen • Removal of catechins • Reduction of wine redox potential
	Claril HM	PVI/PVP, activated chitosan	30-50 g/hL	• Removal of iron and copper • Removal of catechins
	Combistab AF	PVPP, pea protein, silica	20-40 g/hL	• Removal of catechins • Removal of iron
	Tan SLI	Ellagic tannin from untoasted American Oak	0.5-1 g/hL (racking, filtration, clarification, etc.)	• Reduction of dissolved oxygen • Reduction of wine redox potential
	Stab Micro	Activated chitosan	5 g/hL	• Removal of spoilage microbes • Removal of catechins • Removal of iron and copper
Bottling	Tan SLI	Ellagic tannin from untoasted American oak	0.5-2 g/hL	• Removal of dissolved oxygen
	Citrostab rH	PMS, ascorbic acid, citric acid, gallic tannin	10-50 g/hL	• Reduction of dissolved oxygen • Prevention of pinking

RED VINIFICATION				
Vinification phase	**Product**	**Composition**	**Dosage**	**Effects**
On the grapes or after crushing	AST	PMS, ascorbic acid, gallic tannin	100-150 g/ton	• Reduction of dissolved oxygen • Antimicrobial activity
	Tan Antibotrytis or Tan Rouge	Tan Antibotrytis: Mixture of gallic, digallic and ellagic tannins Tan Rouge: Condensed tannin extracted from exotic wood species, chestnut tannin and Tara tannin	100 g/ton	• Reduction of dissolved oxygen • Blocks the radicals
	Stab Micro M	Activated chitosan	50-100 g/ton	• Removal of spoilage microbes • Removal of catechins • Removal of iron and copper
Fermentation	ES 488 or WS	Selected dry yeast	20-40 g/hL	• Low SO_2 producing yeast strains
Wine maturation	Surlì Natural or Stab SLI	Surlì Natural: Inactivated dry yeast Stab SLI: Inactivated yeast + PVPP + oak tannin	20-30 g/hL	• Removal of dissolved oxygen • Removal of catechins • Reduction of wine redox potential
	Claril HM	PVI/PVPP, activated chitosan	30-50 g/hL	• Removal of iron and copper • Removal of catechins
	Tan SLI	Ellagic tannin from untoasted American oak	1-2 g/hL (racking, filtration, clarification, etc.)	• Reduction of dissolved oxygen • Reduction of wine redox potential
	Stab Micro	Activated chitosan	5 g/hL	• Removal of spoilage microbes • Removal of catechins • Removal of iron and copper
Bottling	Tan SLI	Ellagin tannin from untoasted American Oak	1-2 g/hL	• Removal of dissolved oxygen
	Citrostab rH	PMS, ascorbic acid, citric acid, gallic tannin	10-50 g/hL	• Removal of dissolved oxygen