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ENARTIS NEWS

MICROBIAL AND ANTIOXIDANT PROTECTION TECHNIQUES FOR INCREASING WINE QUALITY

Microbial control is one of the most critical factors in producing quality wines. With potential labor shortages, quality control measures such as sorting fruit and utilizing bio-protective strategies will be less feasible considering the time and financial limitations the wine industry is facing. Therefore, microbial control techniques will play a central role in protecting and maintaining wine quality.

SULFUR DIOXIDE AND ASCORBIC ACID

Sulfur dioxide has long been the antimicrobial and antioxidant of choice for winemakers and is one of the most important preservatives in winemaking. Potassium metabisulfite (KMBS) is the most widely used form of SO₂, but it should be noted that not all formulations of KMBS are equal, especially when considering the ease of application. Some forms of KMBS can easily clump, making measuring and handling difficult in the cellar. It is important to consider these factors to increase the ease of application of various enological additives while considering staff safety. Ascorbic acid is another antioxidant used in conjunction with SO₂. These two antioxidants complement each other in that SO₂ has a stable semi-continuous effect in the presence of oxygen, while ascorbic acid's antioxidant activity is instant, protecting wine from detrimental, abrupt aeration. Blends of ascorbic acid, KMBS and tannin are especially useful to protect grapes during transport and in remediating compromised fruit infected with *Botrytis cinerea*.

Enartis KMBS Based Products for Harvest

Product	Composition	Characteristic	Application
WINY	High-purity potassium metabisulfite	Low odor, easy to dissolve, low clumping	Grape transport Juice Wine
EFFERGRAN, EFFERGRAN DOSE 5, EFFERBARRIQUE	Effervescent high-quality potassium metabisulfite	Low odor, allows for the rapid dispersion and homogenization of SO ₂ without mixing	Grape transport Wine
AST	Potassium metabisulfite, ascorbic acid and hydrolysable tannin	Strong antioxidant and antimicrobial activity	Grape transport Juice Wine

ACTIVATED CHITOSAN

Chitosan is an allergen-free, plant-based natural polysaccharide produced from *Aspergillus niger* with various bioactive and antimicrobial activities depending on its production process.

For harvest, Enartis offers EnartisStab Micro M, an allergen-free, vegan friendly bioregulator containing activated chitosan and yeast hulls rich in chitin-glucan. EnartisStab Micro M was specifically developed for the treatment of turbid must and wine; therefore, it is especially recommended for the early stages of wine production, from harvest to the end of MLF. Its powerful antimicrobial activity depends on the pre-activation process employed by Enartis during production. In fact, chitosan's antimicrobial activity is attributed to its positively-charged surface that interferes with negatively-charged residues on the microorganism's cell membrane surface and thereby alters their membrane permeability resulting in cell death. This modification step increases the reactivity and polymer surface area allowing for lower dosages and superior antimicrobial activity. That is why EnartisStab Micro M can control the development of numerous contaminants during different stages of vinification.

REASONS FOR USING ENARTISSTAB MICRO M DURING HARVEST

CONTROL JUICE CONTAMINANTS

EnartisStab Micro M reduces wild yeasts (*Brettanomyces*, *Schizosaccharomyces*) and bacteria (*Acetobacter*, *Oenococcus*, *Pediococcus*, *Lactobacillus*) populations on grapes, in the juice pan, in must and during cold soak, thus limiting volatile acidity and other off-flavor production. EnartisStab Micro M is able to assure adequate antimicrobial protection even in high pH juice where SO₂ has a very little antimicrobial activity.

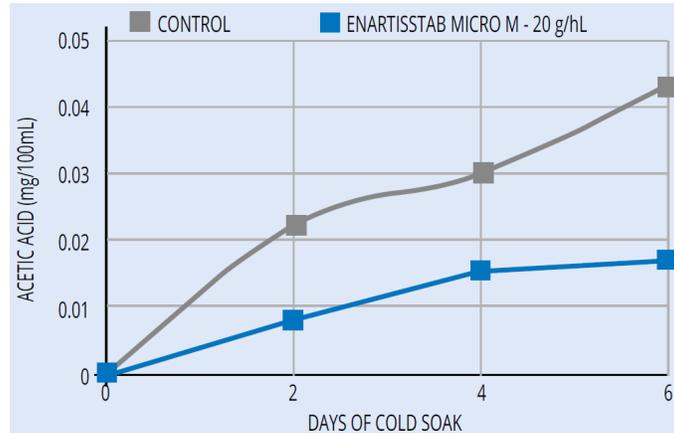


Figure 1: The addition of EnartisStab Micro M on grapes controls VA production during cold soak.

HELP THE DOMINANCE OF THE SELECTED YEAST

EnartisStab Micro M reduces wild microorganisms competition and promotes the dominance of the inoculated yeast, thus improving fermentation kinetic and cleanliness.

LIMIT LACCASE ACTIVITY

In the case of *Botrytis* infected grapes, EnartisStab Micro M limits laccase activity. The exact mechanism is unknown but there are various hypotheses: removal/inactivation of laccase (negatively charged) by direct interaction with chitosan (positively charged); removal of copper (pro-oxidant and pro-oxidase metal); removal of oxidation substrate (catechins). Whatever the mechanism, the fact remains that the use of EnartisStab Micro M reduces browning and preserves aromatics and color intensity.

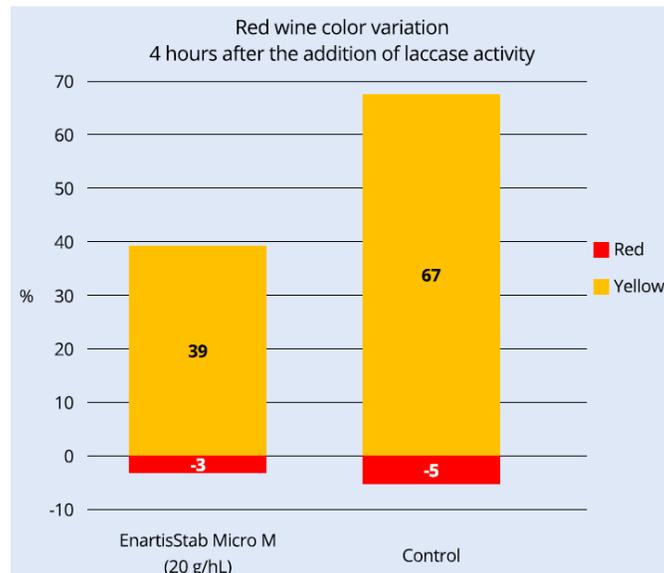


Figure 2: EnartisStab Micro M effectively reduces laccase activity.

CONTROL CONAMINANTS DURING STUCK OR SLUGGISH FERMENTATIONS

EnartisStab Micro M is used to stop the growth of acetic and malolactic bacteria which otherwise can metabolize residual sugars, increase acetic acid content and inhibit fermentation.

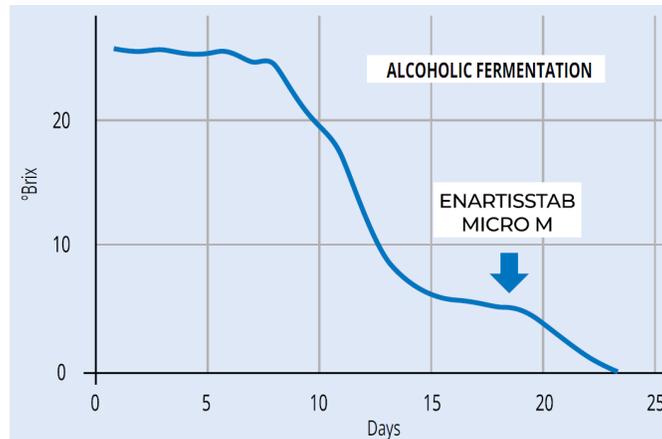


Figure 3: The addition of EnartisStab Micro M to a sluggish fermentation helps achieve complete sugar depletion.

DELAY OR PREVENT MALOLACTIC FERMENTATION

At the end of alcoholic fermentation EnartisStab Micro M can be used as an alternative to lysozyme to delay or avoid MLF. Additional advantages include being allergen-free and vegan friendly, having no impact on protein stability and no significant impact on color.

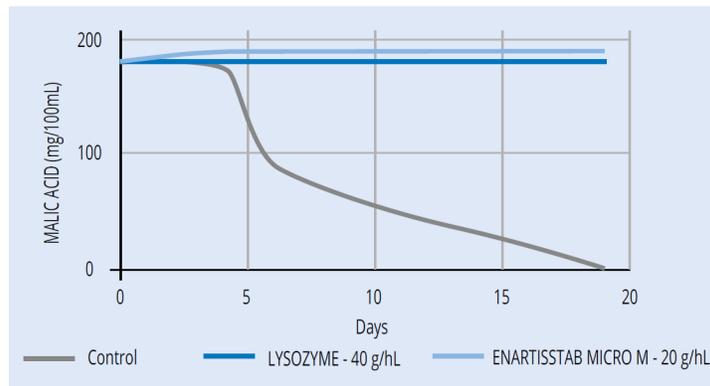


Figure 4: EnartisStab Micro M can be used to delay or avoid malolactic fermentation.

PREVENT THE FORMATION OF H₂S

EnartisStab Micro M can be used to prevent the formation of H₂S and preserve a larger quantity of free SO₂. Fermentation yeast remain alive for at least 10-15 days after the completion of alcoholic fermentation. An addition of SO₂ during this time period will activate yeast enzymatic pathways that lead to the formation of H₂S and SO₂ binders, mainly acetaldehyde. These two mechanisms help yeast turn SO₂ into less harmful compounds but create two enological problems: appearance of reduction and increase in bound SO₂. The use of EnartisStab Micro M allows for postponing sulfur additions by at least two weeks while ensuring wine is protected from spoilage microorganisms.

PRESERVE A LARGER QUANTITY OF SO₂

EnartisStab Micro M can be used to preserve a bigger quantity of free SO₂. It is known that lactic acid bacteria have the ability to degrade acetaldehyde produced by fermenting yeast. Degradation mainly takes place 2-3 weeks after malic acid depletion. This means that an early addition of SO₂ after malic acid depletion can turn into the bound form by up to 80%. To fully take advantage of malolactic fermentation's contribution of decreasing the total SO₂ level, delaying SO₂ addition by 7-10 days after malolactic fermentation completion is advised. EnartisStab Micro M allows for postponing sulfur additions by at least 2 weeks while controlling the growth of spoilage microorganisms, mainly *Brettanomyces*.

PROMOTE QUALITY DURING NATIVE FERMENTATIONS

Native fermentations can be used to produce unique wines due to the contribution of wild yeast strains naturally present on the grapes or in the cellar; nevertheless, this practice is not without risk. The dominance of yeast with poor enological attributes can lead to stuck fermentations or production of wine with faults. Taking advantage of *Saccharomyces cerevisiae* and *Torulaspota's* low sensitivity to chitosan, EnartisStab Micro M can be added to must to help the dominance of the best fermenting yeast over non-*Saccharomyces* yeast and bacteria, increasing the chances of a clean, regular and complete fermentation.

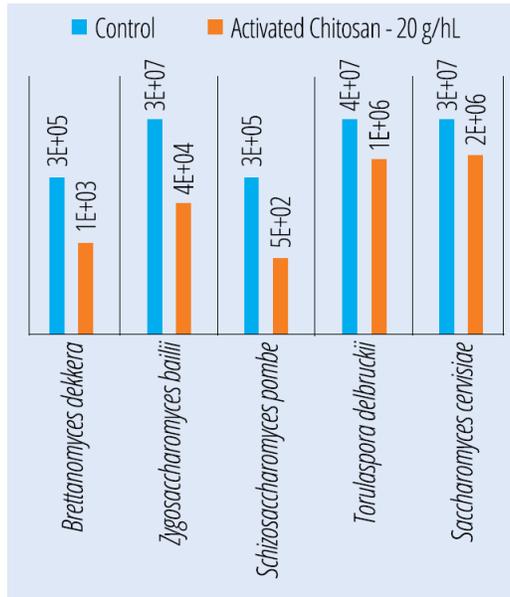


Figure 5: EnartisStab Micro M has a minimal impact on fermenting yeast such as *Torulaspota delbruckii* and *Saccharomyces cerevisiae* while it is very effective in reducing the population of spoilage yeast and bacteria.

REDUCE OR ELIMINATE THE USE OF SO₂

EnartisStab Micro M can partially or completely replace sulfur dioxide additions. In fact, in addition to its antimicrobial activity, chitosan performs antioxidant action. It has the capability of reducing browning, pinking, loss of aromatics and preventing the increase of acetaldehyde due to its capability of chelating copper and iron that activate the oxidative process.

For more information, please call us at (707) 836-2451 or contact your technical sales representative.

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