
THERMO-VINIFICATION

Thermovinification treatment temperatures range from 104-158°F (40-70°C) with duration of heat application spanning from 15 minutes to more than one hour (Morata et al, 2019). The musts exposure to heat denatures detrimental oxidative enzymes, and destroys microorganisms, making this treatment ideal for compromised fruit infected with *Botrytis cinerea* (Wang et al., 2016)

The major problems faced in fermenting red wines after thermo-vinification

- Difficulties to settle due to the inactivation of natural enzymes during the treatment.
- Appearance of reductive characters and off-flavors due to high solids content during fermentation.
- Loss of color during fermentation, due to a lack of extracted tannins, needed for condensation and co-pigmentation of the anthocyanins.
- Lack of structure, volume and balance.

// ENOLOGICAL TOOLS FOR THERMOVINIFICATION

- Sacrificial Tannins Prior to Thermal Treatment

Sacrificial tannins are important for protecting color and aromatic compounds prior to thermovinification treatments. Their additions will promote the precipitation of grape proteins allowing for the preserved grape tannins to react with anthocyanins, stabilizing color, instead of precipitating with proteins. **Pro Tanin R** – Pro-anthocyanidin tannin has been developed for application on red grapes, to scavenge oxygen radicals, inhibit oxidative enzymes such as laccase and PPO and eliminates reactive proteins, thus protecting grape polyphenols. Pro tannin R is instantaneously soluble, simply sprinkle it on the top of the grapes at picking and after treatment in the 'slurry'.

- Clarification Enzymes

It is important to apply pectolytic enzymes to aid in clarification and filtration. The liquid phase should be below 400 NTU prior to fermentation to reduce the formation of volatile sulfur compounds associated with high solids.

Oenzym Clar is a strong pectolytic enzymatic preparation developed for use at low and high temperatures. The pectolytic and hemicellulosic activities promote a rapid breakdown of grape cell walls, thus reducing juice viscosity and improving wine filterability. The balanced ratio between pectin-esterase and polygalacturonase helps optimize and improve the filterability of pressed juice or wine, in conjunction with press yield increase. Add when must is below 140°F (60°C).

- Tannins and Polysaccharides for Color Stabilization

Post thermal treatment and clarification, it is vital to ensure the ratio of anthocyanins and tannins are in balance to support the highest preservation of color matter. The addition of enological tannins will participate in co-pigmentation reactions, color protection and preservation. Yeast polysaccharides aid in preserving the colloidal matrix of wine, stabilizing anthocyanin-tannin condensation and resulting color. Using protective polysaccharides, like yeast mannoproteins, helps contribute to the protection and longevity of co-pigmented color. Blends of yeast polysaccharides and tannins can be especially useful for leveraging stable, long lasting wine color

Softan Vinification – catechins tannins bounded to plant polysaccharides. Added during fermentation, Softan Vinification has a strong ability to stabilize color and protect it from loss during fermentation. It is a gentle tannin that contributes to mouthfeel and build up mid-palate.

Natur'Soft - preparation of specific yeasts hulls, selected for their high content of polysaccharides. It is strongly effective in color stabilization, especially for high tannins content wines. Natur'Soft® increases wine complexity, reduces tannins perception, stabilize color and enhances fruity characters.

// WINEMAKING GUIDELINES

HARVEST	Pro Tanin R, 80 g/ton , at picking or during fruit processing to protect from oxidation and inhibit oxidative enzymes.
AFTER TREATMENT	Right after thermo treatment, add Pro Tanin R, 100 g/ton , to bind with proteins and prevent loss of color. Promote an effective clarification to clean juice and prepare it to ferment, add Oenozym Clar at 4 mL/hL
ALCOHOLIC FERMENTATION	Fermentation temperature: 75-85°F Excellence DS₂ at 20 g/hL to produce fresh, and elegant aromatic profile with smooth structure. Rehydrate yeast with OenoStim at 30 g/hL to reinforce yeast activity, increase aromatic production and optimize grape expression. At inoculation, add OptiEsters at 20 g/hL to promote the production of ethylesters and enhance fresh, fruity and floral characters.
	1 DAY AFTER INOCULATION Ensure good yeast nutrition and limit off-flavors production with Optiflore O[®] at 40 g/hL (complete organic nutrient based on inactivated yeast).
	Add 200 g/ton of Softan Vinification to encourage the stabilization of anthocyanins via co-pigmentation and condensation, protect anthocyanins add fill mid palate.
	AT 18 BRIX Add 20-30 g/hL of OptiFerm (ammonium salts and vitamin B1) at 1/3 of fermentation. 180 g/ton Natur'Soft to stabilize color, fill mid palate, balance acidity and increase wine volume.
MLF	You can choose to do co-inoculation or sequential inoculation. <ul style="list-style-type: none"> - Co-inoculation, add Oeno1 at 1 g/hL, 1 day after AF starts to keep fresh, fruity profile. - Sequential inoculation: add Oeno1 at 1g/hL after AF is completed.
AGEING	Once AF and MLF completed: rack off gross lees after fermentation. Use inert gas during transfer. 10 g/hL of Vinitan Advance to reinforce wine structure, build up mid palate, compensate for low grapes tannins content and improve color stabilization. KillBrett at 4 g/hL to prevent any microbial development and protect wine from spoilage. Aroma Protect at 15 g/hL to reduce redox potential and increase natural wine resistance to oxidation.