

## ENARTIS NEWS

### HOW TO IMPROVE COLOR STABILITY AND INCREASE RED WINE QUALITY

Colour is part of red wine quality. It is not only a visual sensation, it also largely contributes to wine taste. It does not matter if with poor or excellent grapes, in both cases extracting, protecting and stabilising colour improves wine overall quality.

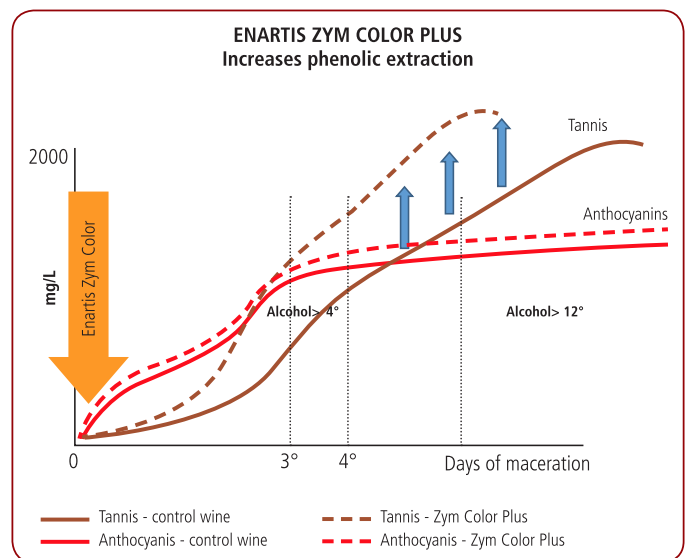
#### STEP 1: MAXIMISING EXTRACTION OF COLOUR AND PHENOLIC COMPOUNDS

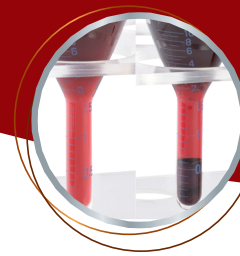
Phenolic compounds, anthocyanins and tannins are important for the organoleptic properties of wine, colour stability and ageing potential.

Anthocyanins, the phenolic compounds responsible for colour, are located in the berry skin cells. They are water-soluble small molecules thus extracted early in the process.

Tannins are located both in the berry skin cells and in the seeds. Tannins can have very different structures and dimensions. The smallest tannins are water-soluble and can be extracted quite easily. The extraction of the biggest ones requires that the berry skin cells be degraded to allow diffusion into the must.

One of the ways to maximise phenolic extraction is with the use of maceration enzymes such as **Enartis Zym Color** and **Enartis Zym Color Plus**. Their pectolytic, cellulase and hemicellulase activities ensure the degradation of berry cell walls, increasing permeability, which facilitates the diffusion of anthocyanins and, more importantly, accelerates the extraction of tannins into the must. More tannins in solution in the very first stages of fermentation, when conditions are favourable to the formation of anthocyanin/tannin complex, improve long-term colour stability. In this regard, the application of **Enartis Zym Color Plus** can make a significant difference when compared to the classic maceration enzymes. **Enartis Zym Color Plus** contains a secondary protease activity whose role is to degrade grape proteins and to reduce their reactivity with grape tannins. Once more, the result is to maintain in solution a bigger quantity of tannins thus favouring the formation of stable pigments.





## STEP 2: USE OF EXOGENOUS TANNINS TO PROTECT AND STABILISE PIGMENTS

Anthocyanins are sensitive to oxidation when found in free form; they must be combined with tannins or other co-factors in order to form more stable pigments. Anthocyanins and tannins are extracted at different stages during the fermentation process. Anthocyanins are water-soluble thus extracted earlier in the process which makes them more susceptible to oxidation if not stabilised rapidly.

A prompt antioxidant protection as soon as there is formation of juice prevents loss of colour.

During the transport or at the grape reception, **AST** (ascorbic acid, potassium metabisulphite and gallic tannin) guarantees a prompt and complete antioxidant and antimicrobial action.

At crushing, while filling the maceration tank, during cold soak, **Enartis Tan FP** or **Enartis Tan Rouge** are mixtures of hydrolysable and condensed tannins designed to be added

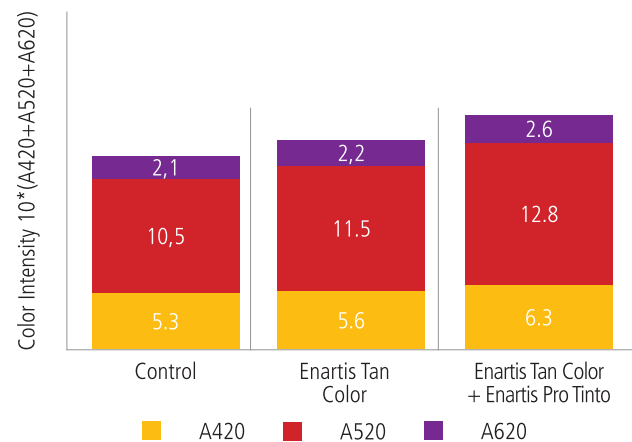
during the early stages of maceration. The hydrolysable (ellagic and gallic) tannins react with oxygen and prevent the oxidation of anthocyanins, while condensed tannins have two roles:

- 1) precipitate grape proteins thus preserving grape tannins (the most effective for colour stability) from precipitate
- 2) participate in stabilisation reactions to form more stable colour pigments

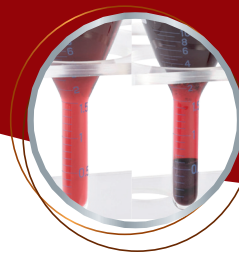
## STEP 3: TURNING ANTHOCYANINS INTO MEDIUM- TO LONG-TERM STABLE PIGMENTS

The initial colour of red wine is mainly due to anthocyanins, extracted from grapes during the winemaking process. Because of their sensitivity to oxidation, they do not adequately ensure a nice, fresh colour over time - they must be combined with tannins or other co-factors in order to form more stable pigments via co-pigmentation or condensation reaction.

**Co-pigmentation** is the enhancement of colour due to formation of complexes between anthocyanins and cofactors such as flavonols, hydroxycinnamates and/or colloids via a weak electrostatic bond. Co-pigmentation leads to higher intensity and darker coloured wines initially. These molecules are important to protect anthocyanins from oxidation during the first stages of fermentation. A big portion of the colour in young red wines originates from these "semi-stable" pigments.



**Figure 2:** Impact of Enartis Tan Color and Enartis Pro Tinto on color intensity

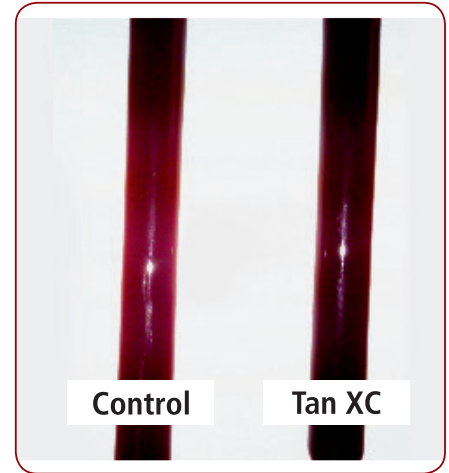


**Condensation** leads to more stable pigments. They can be formed via direct bonds between anthocyanins and tannins or in oxidative environment via acetaldehyde bridges. For these interactions to occur there needs to be a presence of condensed tannins.

For young red wines and rosés, the use of **Enartis Tan XC** during the alcoholic fermentation, promotes the formation of semi-stable pigments via co-pigmentation. **Enartis Tan XC** is a blend containing condensed tannins with a molecular structure very similar to that of grape tannins and selected for their ability in combining anthocyanins. The hydrolysable tannin fraction protects the condensed tannins and makes it possible to use **Enartis Tan XC** like a sacrificial tannin, if easier, during the filling of the fermentation tank.

For wines intended for longer ageing, where the objective is to create a very stable colour, **Enartis Tan V** or **Enartis Tan Color** bring grape tannins that can combine anthocyanins in condensed forms. Best results are obtained when these tannins are added at the beginning of the fermentation, when alcohol is below 4%. **Enartis Tan V** is a pure grape seed tannin, rich in low molecular weight catechins, very reactive with anthocyanins. **Enartis Tan Color**, besides the grape tannin, contains a yeast derivative rich in sulphur amino acids that can be used either to stimulate the production of thiols by the yeast or to protect the grape seed fraction in case **Enartis Tan Color** is added before the alcoholic fermentation onset.

Also, additives containing readily available mannoproteins can be very beneficial to protect colour and improve its stability. The mannoproteins immediately released by the **Enartis Pro products** are capable of interacting with anthocyanins and forming complexes that are less sensitive to oxidation. Furthermore, the interaction between yeast polysaccharides and tannins can significantly affect the perception of tannin astringency creating a fuller structure and better integration on the palate.





## MACRO-OXYGENATION: THE LAST OPPORTUNITY TO STABILISE COLOUR

Oxygen added in the period between alcoholic and malolactic fermentation, induces the production of acetaldehyde, a product of ethanol oxidation. This compound acts as a bridge in polymerisation reactions involving tannins and anthocyanins, creating stable colour compounds that contribute a nice mauve colour and a soft tannicity.

The addition of tannins specifically designed for this application like **Enartis Tan E** (grape seed extract rich in monocatechins) or **Enartis Tan Microfruit** (blend of oak tannin and condensed tannins extracted from grape seed and wood of red fruit trees) amplifies the effect of the macro-oxygenation increasing the fraction of anthocyanins converted to more stable forms.

