TARTARIC STABILISATION OF RED WINES
Study on the development of innovative solutions

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There is still a major question when it comes to tartaric stabilisation: what can be done to stabilise red wines? Most of the existing methods provide solutions that are more or less restrictive for users and for the environment. Metatartaric acid (MTA) is effective but it is highly unstable; hence short stabilisation, especially if storage temperatures are poorly controlled. Carboxymethylcellulose (CMC) causes significant colour loss in red wines. Mannoproteins (MP) do not work on very unstable wines, and require a wine eligibility method for the treatment to work with no variations in turbidity or colour. Regarding physical methods, cold treatment negatively impacts aromas and colour, and requires time and a significant expense in frigories. Electrodialysis requires heavy investment, especially for smaller structures, as water and energy consumption are not neutral.

This summary (6) aims to describe the technical assessment of a new protective colloid authorised by the European Union at the end of 2017 – potassium polyaspartate (KPA). Between 2012 and 2015, the European STABIWINE programme (FP7-SME No. 314903) enabled the study of different potentially interesting polymers for the stabilisation of potassium bitartrate salts. This programme made it possible to screen certain polyaminoacids, as they had properties close to metatartaric acid. A potassium polyaspartate molecule named A5D-KSD was chosen at its most effective molecular weight (4) with regard to tartaric precipitation, as well as for its high solubility and filterability. It was tested in several countries, including France, by IFV and Inter Rhône, in small volumes. At the same time, testing was carried out on the toxicology of the product and made it possible to submit a dossier to the EFSA, which evaluated it favourably (5). In addition, a study on the environmental impact of the different tartaric stabilisation methods was carried out by FIRAB (Fondazione Italiana per la Ricerca in Agricoltura Biologica e Biodinamica) (**figure 1).** The results show that potassium polyaspartate is the product with the least impact regarding all the criteria that were studied (energy, water, waste, price, etc.).

	Cold	Resin	ED	MTA	CMC	MP	GA	KPA
Efficacy in tartrate **stabilization**								
Duration of the effect								
Effect on **red color**								
Effect on **wine flavor**								
Filterability after treatment								
Sustainability of the practice								
Investment requirements								
Personnel expertise needs								
Cost of treatment								

High criticality Moderate criticality Absence of critical issues

Figure 1: Comparison table of practices for tartaric stabilisation – from deliverable D 4.1 (FIRAB) of the STABIWINE programme, submitted to the Wine Technology Commission at the OIV in March 2016.

Once the product's modalities of use were defined, high-volume trials confirmed the value of the treatment compared to competing practices (**Figure 2**). The results of the minicontacts that were carried out show ever smaller drops in conductivity for potassium polyaspartate compared with the other practices tested.

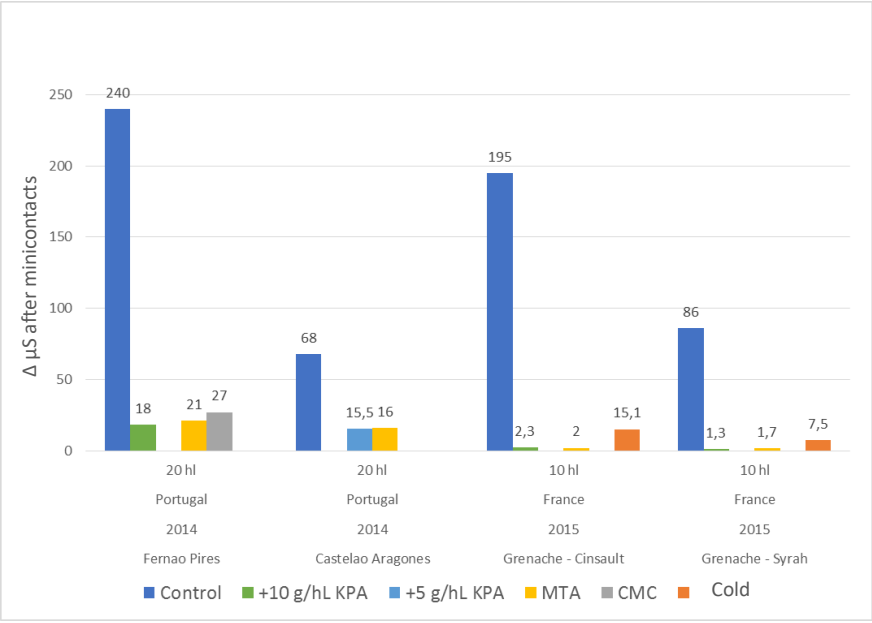

Figure 2: Comparison of potassium polyaspartate (PKA) treatment with treatments using metatartaric acid (MTA), cellulose gum (CMC), and cold treatment – Large-volume trials – Portugal and France – STABIWINE 2015.

All these technical, toxicological and environmental elements will allow potassium polyaspartate to be included in the list of authorised food additives (E456). It will be authorised by the European Union at the end of 2017 for the production of still and sparkling wines of all colours.

Although potassium polyaspartate's effectiveness vis-a-vis potassium tartaric precipitation in wines has been clearly established by the European STABIWINE project, it is still an important factor in the stabilisation of red wines, namely the instability of the colouring matter in young red wines. In order to overcome this, it seemed necessary to the Martin Vialatte® Development & Application team to find synergistic formulation solutions in an attempt to provide a sustainable and effective solution for the stabilisation of red wines.

This development of innovative solutions involves searching for the right combination of products to overcome the need to stabilise colouring matter, regardless of the time elapsed since the end of fermentation; then, assessing the solutions from an organoleptic viewpoint while taking no risks regarding the tartaric stability of the wines.

A series of tests were carried out on different matrices of red wines from the 2016 vintage that had not been subjected to any cold treatment and underwent rough filtration.
At the first stage, a comparison was conducted between:

- Untreated witness (T),
- Treatment with 10g/hL metatartaric acid (MTA),
- Treatment with 10g/hL of CMC (CMC),
- Treatment with 10g/hL of polyaspartate K (PAK),
- And 4 modalities – F10, F20, F30, F40 – corresponding to various potassium polyaspartate-based formulas, in order to define the product that enables tartaric stabilisation of the treated wine with no colour precipitation, shown in **figures 3 and 4.**

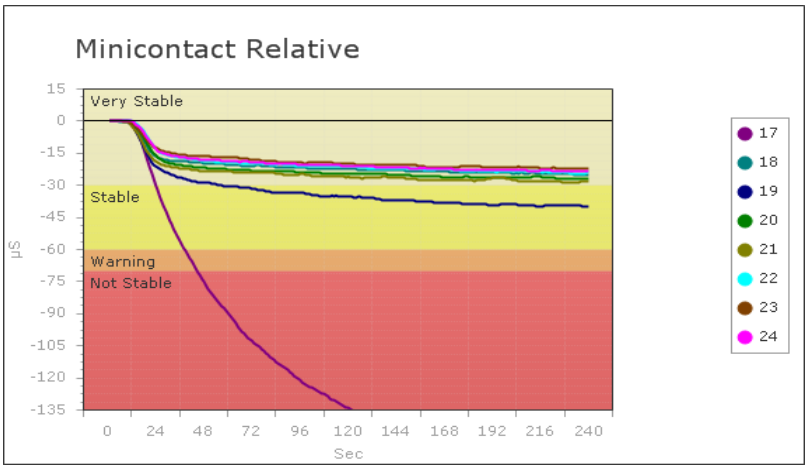

Figure 3: Minicontact test / check stab - Merlot 2016.
Codification: T:17, MTA:18, CMC:19, PAK:20, 10F:21, 20F:22, 30F:23, 40F:24.

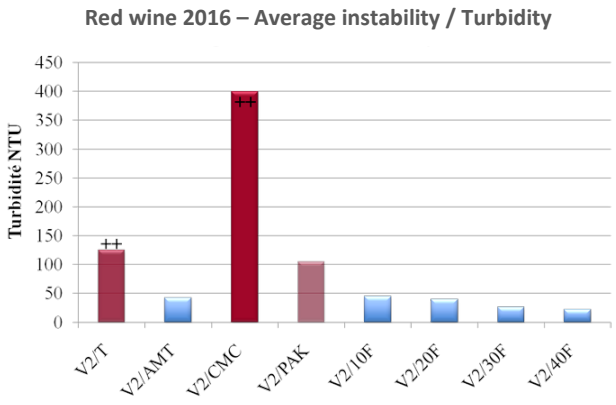

Figure 4: Turbidity assessment after 6 days at -4°C on Grenache 2016.
+++: Presence of tartaric instability and estimate of its intensity
The intensity of the red colour of the histogram's bars reflects the intensity of colour instability.

This series of tests illustrates the work of the Martin Vialatte® team on the formulation and synergy of raw materials in order to define the formulation of ANTARTIKA® VR, an additive for tartaric stabilisation and colour preservation.

Following the formulation of ANTARTIKA® VR, the need arose to validate another formulation by adding an organoleptic reflection to this approach. The series that followed aimed to find synergies between products in order to improve roundness in the mouth while maintaining good tartaric stability and avoiding colour disturbances. After checking the analytical parameters regarding the tartaric and colour stability of the wines, the samples were submitted for tasting by an internal panel of professionals. The results of these sensory analyses are shown in **figure 5**.

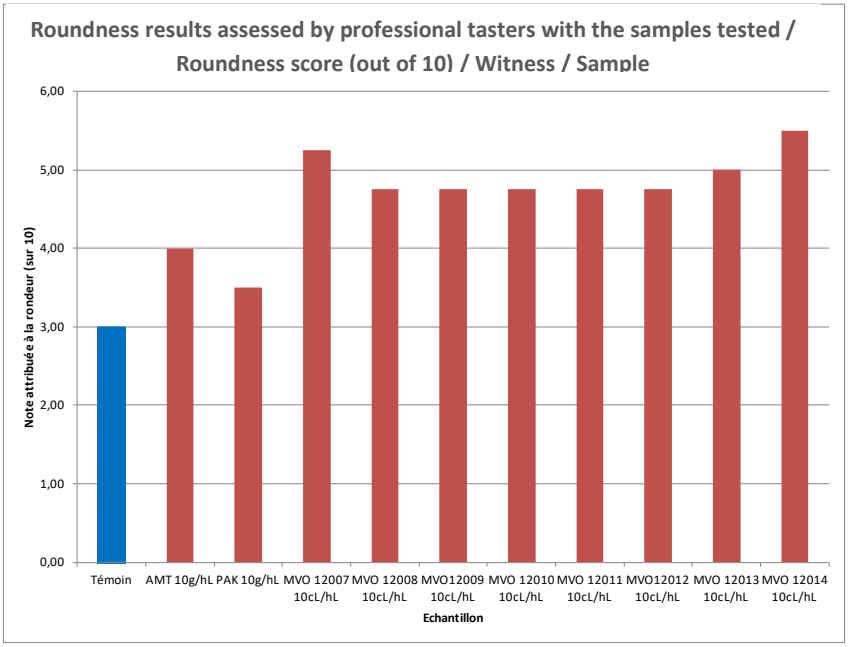

Figure 5: Tasting Product Roundness – Pinot Noir 2016.
MVO 12007 to MVO 12014 modalities at 10cL/hL, formulations aimed at the tartaric stabilisation of treated red wine with no colour loss while improving the organoleptic profile of the wine, particularly roundness after treatment.

The Martin Vialatte® Development & Application department therefore validated another product at the end of these series: ANTARTIKA® DUO, a solution for tartaric stabilisation, colour preservation and enhancement of roundness in the mouth.

In conclusion, potassium polyaspartate is an excellent stabilizer of potassium bitartrate precipitation, and has enabled Martin Vialatte® to develop products in the ANTARTIKA ® range in answer to the question of many winemakers: "How can I stabilize my red wines at the tartaric level without risking colloidal disturbances or organoleptic degradation?"

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