New tools for potassium bitartrate precipitation inhibition: an evaluation of cellulose gum and yeast mannoproteins

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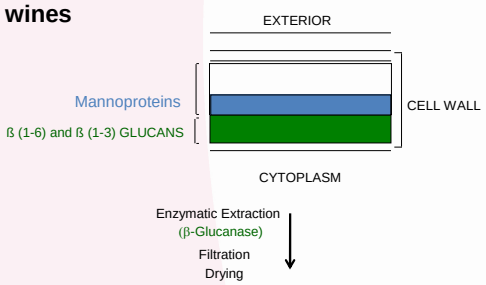
Introduction

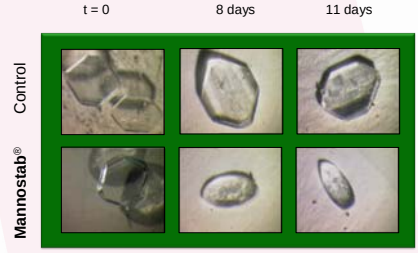
The OIV has recently authorized two new inhibition techniques for potassium bitartrate stabilization, allowing the replacement of subtractive methods such as electrodialysis and cold stabilization: yeast mannoproteins in 2006 and cellulose gum in 2008 (with an authorization in the EU in August 09). Yeast mannoproteins can be used in Australian wines, and there is currently an application before FSANZ to include cellulose gums in the Wine Production Standard. These methods allow potassium bitartrate stabilization with reduced organoleptic impact on wine and minimal energy expenditure, with concurrent quality and environmental benefits. However, these new products correspond to very different approaches for the wine industry in terms of production ethos.

Potassium bitartrate stabilization with mannoproteins from yeast cell wall: *natural* origin and *natural* stabilization for super premium wines



SPECIFIC MANNOPROTEINS FOR POTASSIUM BITARTRATE STABILIZATION

The mannoprotein commercial preparation called **Mannostab®** is obtained through yeast cell wall enzymatic digestion. Its addition before bottling prevents from **potassium bitartrate crystallisation** in *all wine types*.



Starting with a KHT crystal, the figure (left) shows arrested crystal development as a result of Mannostab inhibition

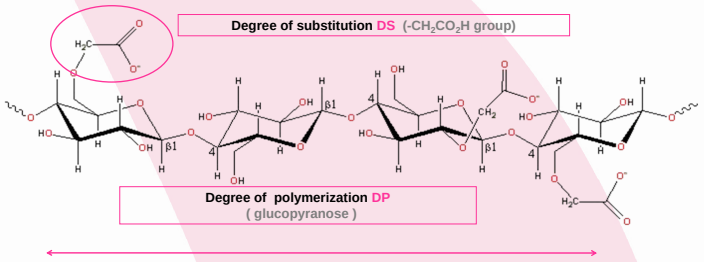
WINE	Degree of Tartaric Instability (DIT) CONTROL WINE	Mannostab® Dosage (ppm)	Critical Tartaric Stability Index (ISTC) After Mannostab add.	Crystallization test 6 days -4°C After Mannostab add.
2010 Sem/Sauv. bl. Margaret River	15.8	200	Stable	Stable
2010 Sem/Sauv. bl. Margaret River	15.8	300	Stable	Stable
2009 Shiraz Margaret River	6.8	200	Stable	Stable
2009 Chardonnay S.E. Australia	19	200	Stable	Stable

2009 Chardonnay South eastern Australia	Control Wine	Cold Stabilization	Mannostab®
Alcohol 20°C %.Vol.	12.7	12.9	12.7
Reducing sugars g/L	3.6	3.6	3.6
TA g/L	**6.6**	**6.3**	**6.7**
pH	**3.22**	**3.17**	**3.22**
VA g/L	0.32	0.32	0.32

Comparative trials Mannostab treatment vs cold stabilization treatment.

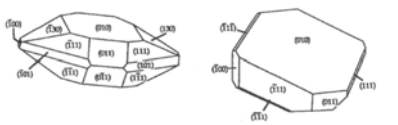
Mannostab® retains the **wine's natural balance**, leading to an unchanged, more naturally-balanced wine. Cold stabilisation causes colour loss in reds and rosés. Both cold stabilisation and electrodialysis change the acid structure of the wine, which affects the wine's balance. The simple addition of Mannostab causes no colour loss and does not affect acid balance. Other chemical characteristics of the wine are unaltered.

Tartaric stabilization with cellulose gum: efficient additive for young and very unstable white wines.



Cellulose gums are efficient additives (E466) derived via an industrial process and are common in the global food industry. A **high degree of Substitution (DS)** governs efficiency regarding potassium bitartrate precipitation while a low **Degree of Polymerization (DP)** reduces viscosity once dissolved, which increases ease of use.

Potassium bitartrate crystal in the absence of CMC



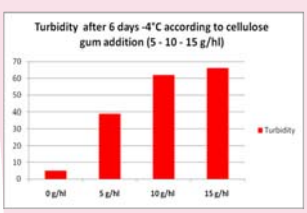
Potassium bitartrate crystal in the presence of CMC

WINE	Degree of Tartaric Instability (DIT) CONTROL WINE (%)	Maximum Legal dosage (ppm)	Critical Tartaric Stability Index (ISTC) After Celstab add.	Cristallization test 6 days -4°C After Celstab add.
2010 Margaret River Chardonnay	12.6	100	Stable	Stable
2010 Margaret River Sauvignon blanc/Semillon	10.8	100	Stable	Stable

Results of tartaric stabilization using Celstab® Conductivity test by Stabilab (Eurodia/Inra patent)

The addition of a cellulose gum commercial preparation (CELSTAB®) at bottling at maximum legal dosage (10 g/hl) prevents potassium bitartrate crystallisation.

6 days @ -4 °C 6 days at 25 °C



Results of crystallization test after addition of cellulose gum on red wine – Turbidity measurement

The addition of cellulose gum to red and rosé wines can lead to precipitations of **colouring matter**, especially at lower temperatures. Cellulose gum is thus inherently complimentary to use in white wines and low colour rosés. It is not recommended for red wines.

Summary

TECHNIQUES	Treatment cost
Cold stabilization	1.5 to 3.5 €/hL/ Service: 4 to 6 €/hL
Electrodialysis	1.2 to 2 €/hL/ Service : 7 €/hL
MANNOSTAB®	15 g/hL (reds) : 3.5 €/hL 25 g/hL (white) : 6 €/hL
CELSTAB® 10 g/hL	< 0.8 €/hL