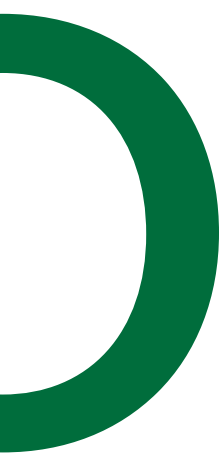




MANNOSTAB<sup>®</sup>

PATENT N° 2726284



OSTAB<sup>®</sup>

NATURAL STABILITY OF WINES

# Ten

*years of research and development by LAFFORT has led to a revolutionary new product, Mannostab. Our scientists have been able to isolate, identify and extract from yeast a specific a macromolecule capable of tartrate stabilization for white, rose and red wines. This exciting new tool allows winemakers the option of replacing the process of cold stabilization.*



This work was recognized by winning the Gold Innovation Trophy at Vinitech 2006 in Bordeaux, France. This is the first time the Gold Trophy has been awarded to a manufacturer of œnological products for its contribution to research.

**Mannostab® : the first natural treatment for the potassium bitartrate stability of potassium salts in wines.**

Mannostab® is the only mannoprotein naturally present in wines with a potassium bitartrate stabilization property. This specific mannoprotein, called MP40™, is enzymatically extracted from yeast cell walls by a patented process (patent n°2726284), which guarantees and preserves the stabilizing capacity of MP40™ regarding potassium bitartrate precipitations.

## Why is Mannostab® innovative?

Mannostab® is a targeted œnological treatment, based on the inhibition of potassium bitartrate crystallization. It provides a natural, simple solution to the stability requirements of filtered or non-filtered wines.

- A natural constituent already present in wines, Mannostab® perfectly conserves the quality of the wine.
- Involving no waste materials, no energy or water consumption, Mannostab® is an ecological treatment which complies with new environmental constraints.

The production process of Mannostab® is covered by a French patent, N°94-13261, published in the "Bulletin Officiel de la Propriété Industrielle" under the n°2726284.

# OSTAB®

NATURAL STABILITY OF WINES

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## Research

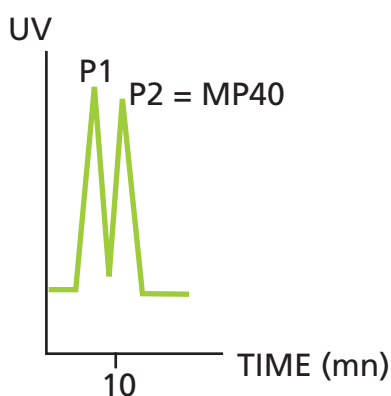
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### Initial observation

Barrel lees ageing of white wines for several months is accompanied by improved potassium bitartrate stability.

### The discovery of MP40®

A 40 kDa glycosyl-phosphatidyl-inositol anchored mannoprotein (*P2 peak in Figure 1*) causes the inhibition activity of potassium bitartrate salt crystallization (Moine-Ledoux and Dubourdieu, 2002). MP40™ is the only fraction amongst the many manno proteins extractable from yeast that totally inhibits crystallization of these salts.



*figure 1* : Fractions of manno proteins enzymatically extracted from yeast cell walls by TSKG2000 size exclusion chromatography.

### Inhibition of crystallization

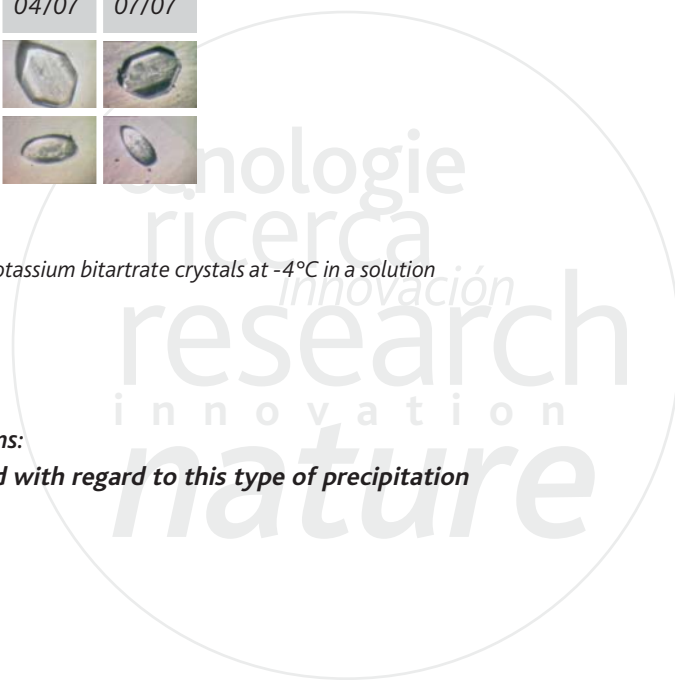
The microscopic observation of the potassium bitartrate crystal development in the presence or absence of Mannostab® shows that Mannostab® prevents the preferential growth of certain crystal faces, flattening the shape of the crystals. The crystal only grows in a certain orientation (*figure 2*), thus preventing it from precipitating.

Sampling date	27/06	30/06	02/07	04/07	07/07
Control					
Mannostab®					

*figure 2* : Microscopic observation of the development of potassium bitartrate crystals at -4°C in a solution with or without Mannostab®.

**Specific case of neutral calcium tartrate precipitations:**

**Mannostab® does not allow wines to be stabilized with regard to this type of precipitation**



## The results

Treating wines with Mannostab® leads to potassium bitartrate stability levels which are comparable to traditional treatments, such as cold stabilization, and presents a lasting action over time, contrary to metatartaric acid.

Wine types	Storage at -4°C				Alternating storage at 25°C and -4°C in 2 week intervals			
	Untreated	MANNOSTAB®	Cold	Metatartaric acid	Untreated	MANNOSTAB®	Cold	Metatartaric acid
late harvest, AOC, Jurançon	5 days	> 95 months	> 95 months	> 95 months	19 days	> 95 months	> 95 months	4 months
dry white wine, AOC, Bordeaux	3 days	> 91 months	> 91 months	> 91 months	17 days	> 91 months	> 91 months	3 months
Red wine, AOC, Irouléguay	5 days	> 89 months	> 89 months	> 89 months	17 days	> 89 months	> 89 months	3 months
Rosé	4 days	> 89 months	> 89 months		17 days	> 89 months	> 89 months	

### Specific case of red wines:

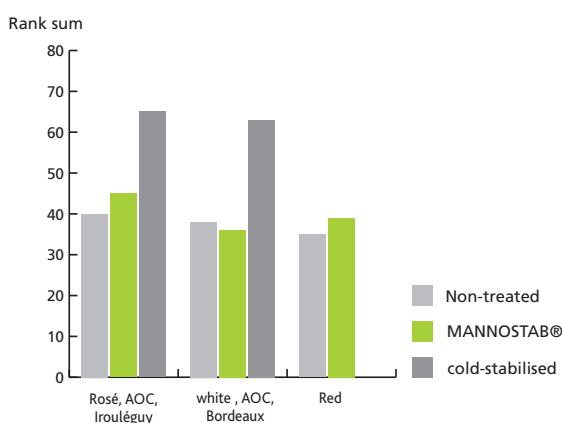
The instability of the colouring matter in red wines is a parameter which can compromise potassium bitartrate stability over time. Under these conditions, the efficiency of Mannostab® can be reduced.

## Wine quality

Wines treated with Mannostab® conserve their acid-base balance and their colour is not modified.

Rosé wine	Untreated	Cold-stabilised	Mannostab®
Alc. (% vol.) at 20°C	12,45	12,45	12,35
Reducing sugars g/l	3,0	3,1	3,1
TA g/L	5,0	4,85	5,0
pH	3,4	3,4	3,4
VA g/L	0,26	0,23	0,21
Modified colour Intensity	1,10	1,01	1,1
TPI	12,4	10,4	12,2

With Mannostab® the original organoleptic qualities are preserved.



No significant difference between the non-treated wines and those treated with Mannostab®, both of which are significantly preferred over the wines treated with cold stabilization.

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## treatment

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### For which types of wine?

- For red, white and rosé wines.
- For still and sparkling wines.
- For filtered and unfiltered wines.

### When?

*Mannostab® is the last treatment before bottling.*

*In the case of filtered wines, it should be added between the pre-filtration and the final filtration phases.*

*With unfiltered wines, the treatment should be performed on the day before bottling.*

### How?

***Mannostab® treatment must be supervised by an œnologist.***

Correct dosages for each wine (between 15 and 30 g/hL) are determined by preliminary stability tests in order to prevent the risk of overdosage.

*Two stability tests can be used:*

- *Cold stability testing is easily performed in the winery.*
- *The mini-contact test is performed in a laboratory.*

**LAFFORT** has developed a specific database which allows the correct Mannostab® dosage for each wine to be implemented with high precision, according to the results obtained by mini-contact tests. Once the dosage has been determined, it is essential to avoid any subsequent operations which affect the colloidal structure of the wine (blending, fining, pre-filtration, etc.) before Mannostab® is added. Equally, no treatment should be carried out after the addition of Mannostab®, excepting only SO<sub>2</sub>, Stabivin® (gum Arabic) and ascorbic acid.

**For wines which are filtered at bottling**, strict control of filtration conditions is necessary. Indeed, while Mannostab® does not increase the clogging index of well prepared wines (Index < 50), a tight filtration could, however, retain colloids and/or Mannostab® and render the treatment useless.

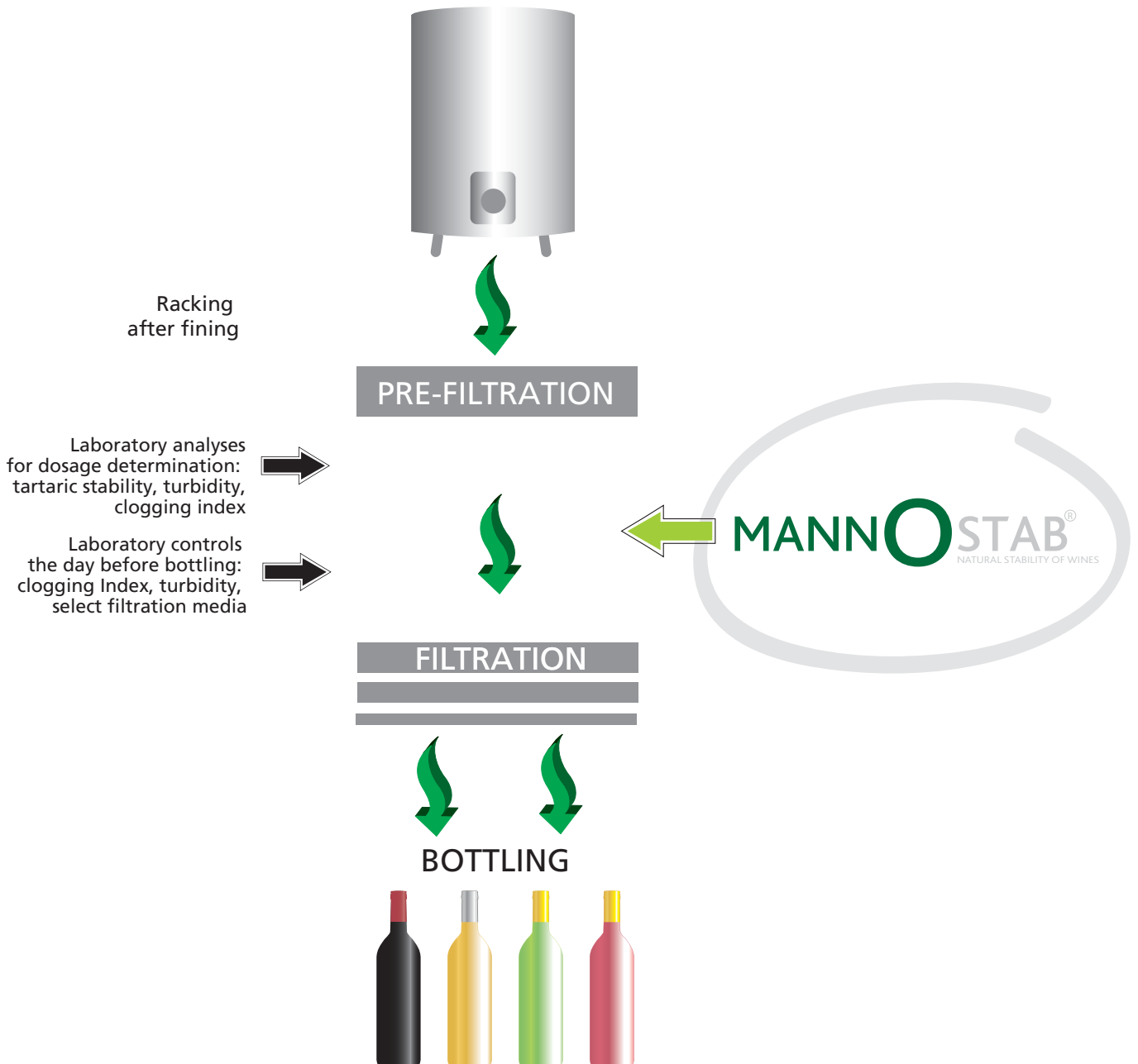
The practical application of the product is very simple: dilute in ten times its weight of water at 30°C; leave to stand for a few minutes, add to the wine and homogenise.

**The product is packaged in sealed 500 g sachets.**

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## Key treatment stages

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**OSTAB<sup>®</sup>**  
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**LAFFORT**

*l'œnologie par nature*

**MANNO**