



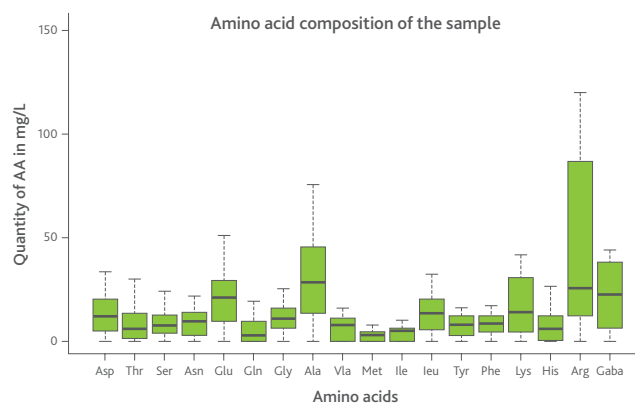
LACTIC ACID BACTERIA NUTRITION

Bacteria have specific nutritional needs that cannot be compared to those of *Saccharomyces cerevisiae* yeasts, which essentially require mineral and organic nitrogen in its free form.

NUTRITIONAL NEEDS OF *OENOCOCCUS OENI*

Unlike *Saccharomyces cerevisiae*, *Oenococcus oeni* is not able to use the nitrogen contained in the NH_4^+ ion (known as "mineral nitrogen"). They can however use other sources of nitrogen such as amino acids. The nature and number of these essential amino acids vary according to the strain, but there is agreement that some are indispensable to ensure growth of *Oenococcus oeni* (e.g. arginine, cysteine, glutamic acid, isoleucine, methionine, tryptophan...).

Research has also shown that only a minimal concentration of amino acids is required: as low as 2 mg/L (2 ppm) is sufficient for each amino acid under laboratory conditions. A review carried out on many wines prior to MLF enabled us to demonstrate that available concentrations of amino acids routinely are found at levels above 2 mg/L (2 ppm).



Amino acid content of wines at the end of alcoholic fermentation (data taken from the bibliography and assays on wines at the end of AF, 144 wines were examined in total - Maisonnave, personal communication).

AMINO ACIDS ARE NOT THE ONLY REQUIRED NUTRIENT...

Free amino acids are not the only source of nitrogen that *Oenococcus oeni* can use, and the species seems to favour more complex sources, which it can use thanks to proteolytic enzyme activities. Studies have highlighted the positive impact of the presence of small peptides (0.5 - 10 kDa) in the medium for the growth of *Oenococcus oeni*. These peptides are found in certain yeast derivatives which can then serve as a source of bacterial nutrition.

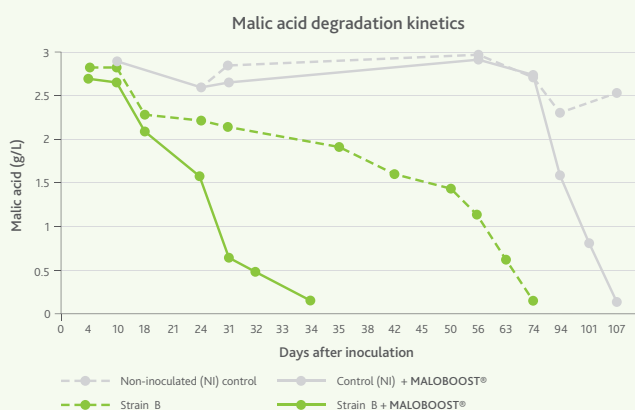
	GROWTH / MLF ACTIVITY	PERCENTAGE OF FREE AMINO ACIDS IN THE TOTAL ORGANIC NITROGEN
Derivative A	+	71%
Derivative B	++	65%

	PERCENTAGE OF PEPTIDES IN THE TOTAL ORGANIC NITROGEN		
	< 0.5 kDa	< 0.5 - 10 kDa	> 10 kDa
Derivative A	24%	< 10%	< 5%
Derivative B	< 5%	35%	< 5%

Link between the capacity for growth of a model *Oenococcus oeni* strain and the peptide content of the yeast derivative used in the culture medium (after Remize et al., 2005).

With a comparable free amino acid content, the growth of *Oenococcus oeni* is favoured in the medium enriched with yeast derivative B, containing the highest percentage of medium-sized peptides (between 0.5 and 10 kDa).

Work carried out by LAFFORT® and by teams of independent researchers enabled us to rely on robust data in order to select specific yeast derivatives for the formulation of MALOBOOST®.



Study of a Cabernet Sauvignon wine reluctant to go through MLF (ABV: 14.04%; pH: 3.62; L-malic acid: 3.34 g/L). Comparison of MLF carried out with and without inoculation with selected lactic acid bacteria at 1 g/hL (10 ppm).

Addition of MALOBOOST® (30 g/hL / 300 ppm) 24 hours before adding bacteria to the inoculated wine and at the same time for the non-inoculated wine. Temperature of the trial: 18°C.

MALOBOOST® significantly improves the MLF kinetics in wine inoculated with MLB, and allows the initiation and completion of MLF in wine uninoculated with MLB.

MALOBOOST®

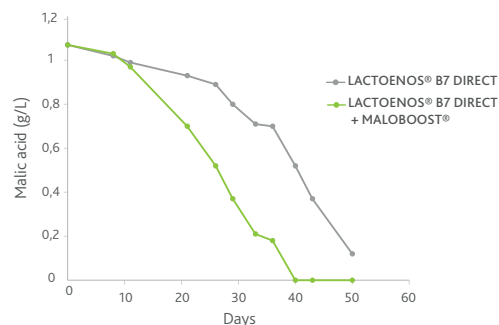
Nutrient adapted to the specific nutritional needs of lactic acid bacteria (*Oenococcus oeni*). Promotes a rapid start to the malolactic fermentation and optimal kinetics.

Facilitating all MLFs, MALOBOOST® is used to:

- Start and complete MLF more rapidly.
- Help to restart stuck or sluggish MLFs.
- Encourage MLF under difficult conditions (low temperature and pH, high alcohol).

Dosage: 20 - 40 g/hL (200 - 400 ppm).

MLF: utility of MALOBOOST® under difficult conditions



During inoculation with bacteria, the addition of a nutrient such as MALOBOOST® allows for full completion of the MLF in a shorter time

Chemical analysis of the wine at the end of AF

Merlot: ABV: 14.6%. | pH 3.43 | L-malic acid 1.07 g/L | MLF temperature: 20°C. Population of indigenous lactic acid bacteria detected by Epifluorescence: 10⁵ cell/mL.

MALOBOOST® dose: 30 g/hL

