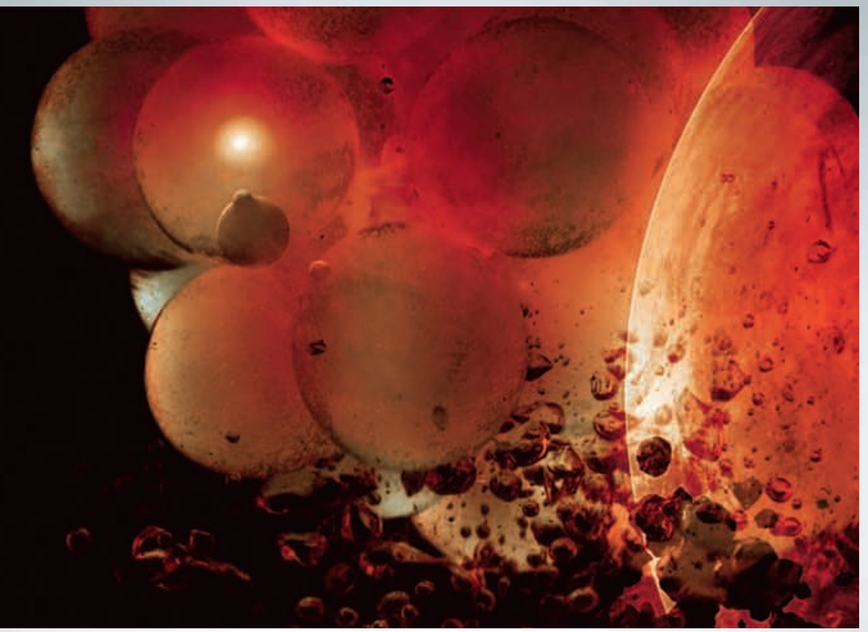

The issues of must conditions (generality)

To assure a complete and regular fermentation, it is necessary for the grape must to have a reasonable balance of nutritional, physical and chemical environment that will allow the yeast to multiply and thrive. It is essential to have an optimum development of healthy yeast cells in order to reduce the risk of sluggish and stuck fermentations.

The following factors are the most likely causes of stuck and sluggish fermentations:

- Nitrogen deficiency
- Lack of oxygen
- Lack of temperature management
- Improper yeast rehydration and handling
- Lack of growth factors such as vitamins and minerals
- Highly clarified musts
- Inhibitory metabolites produced by yeasts
- Excessive sulphur dioxide or agrochemical residues

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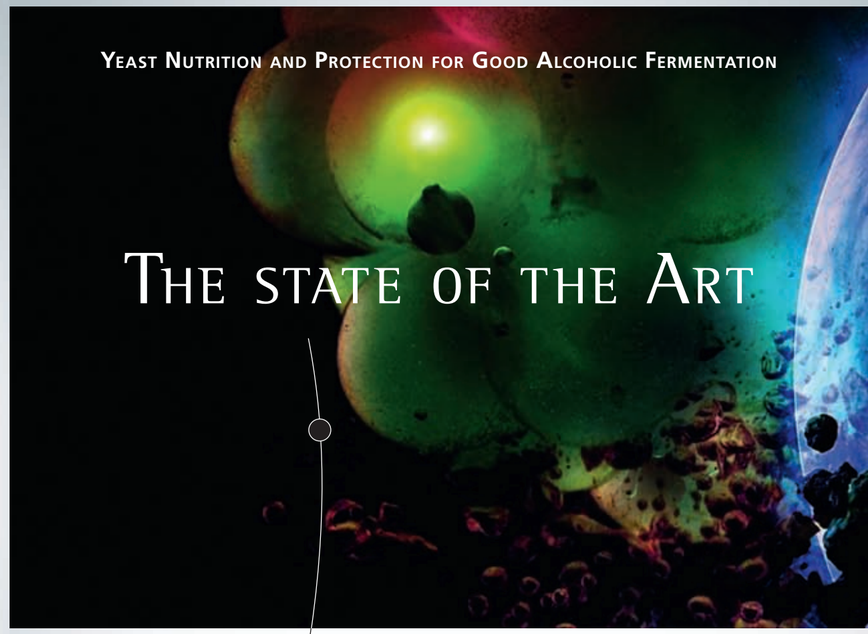


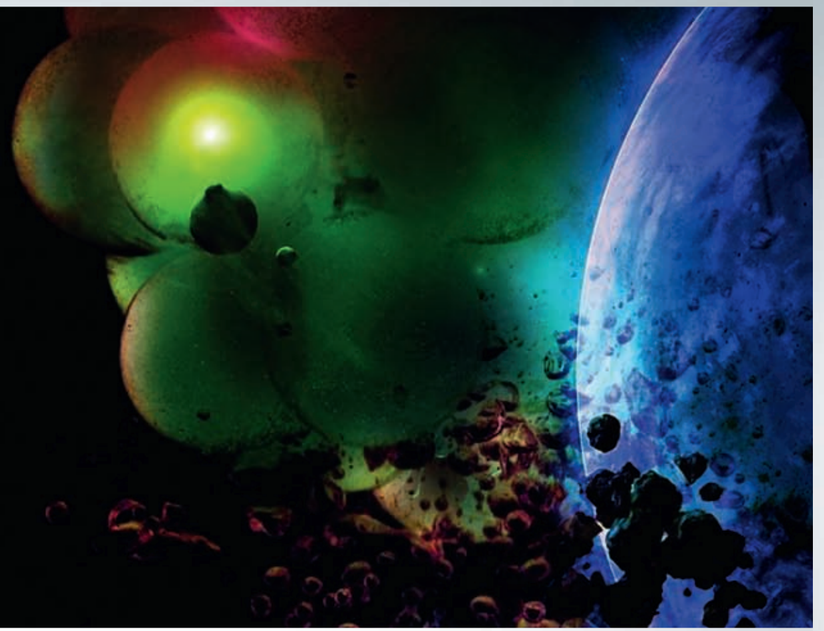
Yeast Nutrition and Protection for Good Alcoholic Fermentation

The state of the Art

Natural solutions that add value to the world of winemaking LALLEMAND

Yeast Nutrition and Protection for Good Alcoholic Fermentation

Lallemand, a leading producer of Œnological yeasts and bacteria and their fermentation nutrients (the Lallemand range of oenology products is most widely known under the LALVIN®, UVAFERM® and ENOFERM® brand names), is a privately owned Canadian corporation.
The Oenology Group, based in Toulouse (France), is focused on research and development, both in-house and in collaboration with renowned research institutes. The purpose of this document is to provide winemakers and oenologists with a description of the current scientific understanding on Yeast Nutrition and protection for good Alcoholic fermentation management.



Go-Ferm Protect®: source of micronutrients and survival factors (NATSTEP®).

Fermaid O™: source of free amino acids (organic nitrogen) and vitamins.

Fermaid K™: a blended complex yeast nutrient that supplies inorganic nitrogen (DAP), organic nitrogen (alpha amino nitrogen), key nutrients (magnesium sulfate, thiamine, folic acid, niacin, biotin and calcium pantothenate) and inactivated yeast.

Fermaid A™: enriched source of alpha amino nitrogen blended with inorganic nitrogen specifically developed for the Australian and New Zealand Wine Industries.

Nutrient Vit End™: specific inactivated yeast to detoxify fermenting musts or stuck or sluggish fermentations.

Yeast Nutrition and Protection Chart

Survival factors needs

Critical level of survival factors*

Low NTU
& Extreme temperature
& High potential alcohol

	[YAN] mg/L < 125	125 < < 200	> 200
1.	Goferm Protect Rehydration	Goferm Protect Rehydration	Goferm Protect Rehydration
2.	K/A start of AF	Fermaid O start of AF	Fermaid O start of AF
3.	K/A 1/3 of AF	K/A 1/3 of AF	Fermaid O 1/3 of AF
4.	Fermaid End 2/3 of AF*	Fermaid End 2/3 of AF*	Fermaid End 2/3 of AF*

Moderate or adequate level of survival factors**

Low NTU
& Extreme Temperature
or
Low NTU
& High Potential Alcohol
or
Extreme Temperature
& High Potential Alcohol

	[YAN] mg/L < 125	125 < < 200	> 200
1.	Goferm Protect Rehydration	Goferm Protect Rehydration	Goferm Protect Rehydration
2.	K/A start of AF	Fermaid O start of AF	Fermaid O start of AF
3.	K/A 1/3 of AF	K/A 1/3 of AF	Fermaid O 1/3 of AF

* When there is a slow down of less than 0,5 Beaume or °Brix/day except for slow fermenting yeasts or fermenting T°<12°
** When only one or two of these difficult must or fermentation conditions are met: <50 NTU, >14% potential alcohol or fermentation temperatures below 16°C or above 28°C

Low NTU: < 50
Extreme Temperature: <16°C and >28°C
High Potential Alcohol: >14%
YAN : Yeast Assimilable Nitrogen - NTU: Nephelometric Turbidity Unit

FAQ

Protection / Nutrition: what are the differences?
Protection and nutrition are two risk management concepts with synergistic effects on yeast health and vitality. Protection is a solution for supplying survival factors in case of deficiencies and Nutrition is the response to nitrogen and micronutrients depletion.

If I plan to ferment with an YSEO® yeast, should I also use Go-Ferm Protect® for yeast rehydration and Fermaid® during the alcoholic fermentation (AF)?
It depends on initial must YAN level, yeast nitrogen requirements and winemaking conditions such as potential alcohol, temperature, pH, good fermentation practices.

If I use Go-Ferm Protect® for rehydration and specific inactivated yeast such as Opti-Red® or Opti-White® during AF, should I also add Fermaid® during AF?
Yes, since the use of Go-Ferm Protect® and SIY do contribute a minor amount of YAN but do not replace the regular nutrition program integrating juice parameters and the nutritional needs of yeast.

How do I feed a spontaneous fermentation?
It is always very risky since you don't know exactly what you are feeding but at the first sign of fermentation onset and as long as there are no negative aromas or flavors, the addition of B vitamins, including thiamine, which are a component of Fermaid O™ (recommended dosage is 20g/hL) plus aeration (oxygen) to stimulate the yeast is recommended. Repeat this addition of Fermaid O™ at 1/3 sugar depletion with aeration.

Fermenting with an YSEO® yeast rehydrated in Go-Ferm Protect® and adding Fermaid® during the fermentation, do I need to be concerned that my fermentation will go too quickly and that I won't optimize colour extraction?
If all these products are used as we recommend to avoid the risk of stuck fermentations occurring in red wine fermentations at extreme high temperatures with out of balance nutrients and/or high potential alcohol, colour extraction will be optimized.

What quantity of yeast assimilable nitrogen (YAN) does complex nutrition supply versus ammonium salts such as DAP or DAS?
Although complex nutrition does not supply as much YAN as ammonium salts, what is important is not the quantity but the quality of YAN. Organic source of YAN nitrogen found as AA's in complex nutrients, is known to be much more efficient for the yeast than YAN from ammonium salts.

How do I decide which is the best complex nutrient for my alcoholic fermentations?
Based upon the must turbidity, YAN content and temperature management fermentation, Lallemand, as a wine yeast producer, evaluates different yeasts strains to bring the best appropriate organic nitrogen, and vitamin source through inactive yeast naturally enriched for the formulation of its nutrients.

Will I use more energy trying to cool down fermentations when I add Fermaid® compared to adding no nutrients?
No, usage of Fermaid® will help to have steady and complete fermentation while avoiding heat spikes.

How do I manage steady and complete fermentations under cold and low turbidity (NTU) when I ferment aromatic whites?
It is important to add survival factors, with Go-Ferm Protect® from the rehydration step and a complex nutrient rich in sterols to overcome these stressful fermentation conditions.

In musts with high alcohol potential, is yeast protection during rehydration or yeast nutrition during alcoholic fermentation more important in order to have steady and complete fermentations?
Because of high alcohol, both protection and nutrition are needed to have steady and complete fermentations.

What is the best time to add thiamine and complex nutrition during AF?
From the start of yeast growth and again at roughly 1/3 of the way through the AF, thiamine and complex nutrition plays an important role in yeast growth and their contribution to wine aroma production.

What do I do when I have a sluggish end of alcoholic fermentation?
The use of Nutrient Vit End™ is recommended in order to detoxify the wine of inhibitory compounds produced by the yeasts under these difficult conditions. Moving the yeasts back up into suspension as well as good temperature management should also be considered. If this strategy does not work then a stuck fermentation restart protocol should be considered.

Should I adapt my nutrition strategy based on the yeast strain I use?
Yes; the nutrition can be adapted based on the nitrogen requirements of the yeast used. It is important to know your yeast nitrogen requirement in order to adjust the necessary nutrition.

Why do some complex nutrients contain high levels of ammonium salts?
Ammonium salts are beneficial for the yeast when available in balance with organic nitrogen especially when used under nitrogen limiting conditions at about 1/3 of the way through AF. It depends on their timing of addition: ammonium salts alone at the beginning of AF is very risky.

When is yeast unable to use amino acids? When is yeast unable to use ammonium salts?
Yeast is able to assimilate both nitrogen sources up to ½ to ¾ of the way through the AF depending on the initial sugar level but the best moment to add these nitrogen supplements is roughly at 1/3 of the way through the AF in terms of the yeasts efficiency on the fermentative activity.

In a must containing a sufficient level of YAN, why is it still good to add Fermaid®?
Because Fermaid® and generally a complex nutrient contribute more than nitrogen: survival factors, vitamins and minerals…

Is it necessary to add oxygen at the same time as Fermaid®?
It is useful to add oxygen at the 1/3 of the way through the AF with Fermaid® especially in highly clarified juice which is usually deficient in survival factors.

Could Fermaid F™ and specific amino acids improve a wines aroma profile?
Yes: Some amino acids are precursors of specific esters. The balanced nutrition provided by Fermaid® helps to avoid the production of volatile acidity and sulfur like off-aromas which are compounds that mask positive sensory descriptors.

Are there any issues adding both Fermaid O™ and Go-Ferm Protect® together in the yeast rehydration water?
It is highly recommended to rehydrate the yeast only in presence of Go-Ferm Protect® and to add Fermaid O™ just after yeast inoculation.

Does the addition of complex nutrients also benefit potential spoilage organism growth?
As long as the yeast inoculation rate and yeast nutrition are well managed and adapted to the winemaking conditions, complex nutrients will be used efficiently by the selected yeast and will not benefit spoilage organism growth.