



## TIPS FOR OPTIMAL YEAST NUTRITION

A successful fermentation is defined by the complete consumption of sugars by the yeast with a minimum production of off-flavours and maximum expression of desired aromas and flavours. Yeast nutrition is an essential factor in managing the overall health and success of fermentations. **Without proper nutrition added at the right stage** of fermentation, yeast can become stressed, produce off-flavour and in some instances, cause stuck fermentations.

### WHICH NUTRIENTS DO YEAST NEED?

**Yeast Assimilable Nitrogen (YAN)** is composed of **ammonium ions** and **amino acids**. It is used by yeast for the synthesis of proteins, cell wall components and enzymes.

- **Ammonium ions** are **easily** and **quickly** assimilated by yeast; throughout fermentation ammonium is the primary form of nitrogen used by yeast.
- **Amino acids** are used as a 'high quality' source of nitrogen and are the aromatic precursors used to synthesise higher alcohols, esters and acetates. Their transport into yeast cells is inhibited by ethanol and/or ammonium.

**Vitamins** such as thiamine, biotin, pantothenic acid and nicotinamide are essential in many enzymatic reactions. Deficiencies may result in slow yeast growth and stuck fermentations.

**Minerals** (Mg, Zn) are used as cofactors in catalyzed enzymatic reactions. They facilitate the uptake of nitrogen and are used in the synthesis of protein and nucleic acids and contribute to the pool of aromas and flavours. These proteins are necessary for cell growth and will not be possible in the absence of Mg, as its key role is in ATP synthesis. It is also vital in preventing cell death when ethanol concentration increases and has been shown to improve the cell's ability to withstand stress conditions.



**Sterols** and **unsaturated fatty acids** are essential for maintaining cell membrane integrity and yeast capability to regulate exchanges with the external environment. Low levels of sterols and unsaturated fatty acids can stop yeast sugar consumption, cause stuck fermentations and increase off-flavour production.

**YEAST NUTRITIONAL REQUIREMENTS (Table 1)**

NUTRIENT	BIOCHEMICAL FUNCTION	TIMING OF ADDITION
<b>Thiamine</b>	Stimulates yeast growth Reduces production of SO <sub>2</sub> binding compounds	Lag phase
<b>Mg, Zn</b>	Act as cofactors for glycolytic enzymes Reduce yeast stress	Lag phase
<b>Amino Acids Ammonium</b>	Stimulate yeast multiplication Maintain active yeast metabolism Enhance aroma production	Lag phase End of exponential phase
<b>Sterols And Fatty Acids</b>	Increase membrane permeability and tolerance to alcohol	End of exponential phase
<b>Oxygen</b>	Increases production of lipids and sterols Stimulates yeast multiplication	End of exponential phase

## YEAST DO NOT NEED ALL NUTRIENTS AT THE SAME TIME

- **Growth phase:** yeast requires vitamins, minerals and nitrogen to build 'healthy' cells resistant to stress. Due to the inhibiting effect of alcohol and/or ammonium ions, **amino acids** should be added **at inoculation**.
- In case of severe nitrogen deficiencies, juice must to be corrected by an addition of ammonium ions **24-48 hours after inoculation**.
- **At 1/3 of fermentation**, yeast become stressed and their capacity to use nitrogen is reduced. To complete fermentation and increase their alcohol resistance, they need fast and easy-to-adsorb (ammonium ions) nutrients and survival factors (sterols and unsaturated fatty acids) with oxygen.



## ENARTIS NUTRIENTS

Enartis has a wide range of nutrients which provide solutions for various conditions and purposes.

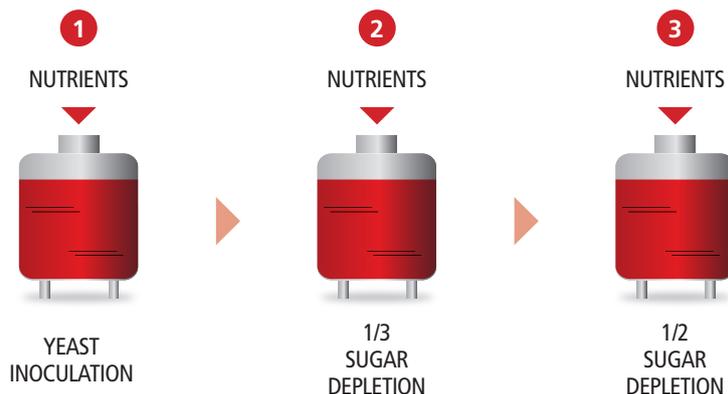
**Nutrifer Energy** provides *quickly-absorbed amino acids*, *vitamins* and *minerals* necessary for proper yeast development. It makes yeasts stronger and more resistant to difficult conditions, prevents off-flavours forming and stimulates the production of compounds such as glycerol and polysaccharides. ①

**Nutrifer Arom Plus** contains a high content of *moderately-absorbed amino acids*, selected for their aromatic precursors potential, *vitamins* and *minerals*. It stimulates yeast multiplication, enhances fermentation aroma production and increases aromatic intensity. ①

**Nutrifer Special** is a complex nutrient containing *yeast hulls*, *ammonium phosphates* and *thiamine*. It provides the necessary vitamins, ammonium, sterols and fatty acids creating for a healthy environment for the yeast population to grow, produce aromas and no off-flavours. ①

**Nutrifer Advance** is specifically designed for providing what yeast need at 1/3 sugar depletion: *easy-to-adsorb nitrogen* (DAP) for restoring transport proteins; *sterols* and *long-chain fatty acids* for improving alcohol tolerance; yeast hulls and cellulose for removing toxic compounds. ②

**Nutrifer No Stop** is a fermentation aid made of yeast hulls rich in *sterols* and *long-chain fatty acids*. It has a detoxifying action, helps maintain yeast membrane integrity and prevents and corrects fermentation irregularities. ③





## AND... AS REMINDER FOR HIGH SUGAR GRAPES

### **The higher the sugar to be fermented, the higher the YAN requirement.**

Grapes produced in hot and dry seasons are rich in sugar but poor in YAN. Attention must be given to correct yeast nutrition as it is not comparable to “normal” harvest conditions as these are in fact “exceptional” conditions.

### **Multiple nutrient additions are favoured over a single addition at inoculation**

Adding a large amount of nitrogen during inoculation stimulates rapid yeast growth and causes a significant rise in temperature. The addition of nitrogen in 2 or 3 parts is adequate to satisfy the yeast nutrient requirement and prevents temperature spikes.

### **Preferable to have a mixed nitrogen nutrient than to use only inorganic nitrogen.**

At inoculation use an organic nutrient rich in amino acids (Nutriferm Energy, Nutriferm Arom Plus) that not only stimulates yeast multiplication but also has a lowering effect on the fermentation temperature. These organic nutrients will help to boost your wines aromas. Adjustments to YAN content can be made with inorganic nitrogen (DAP) starting from 24 hours after inoculation.

### **The higher sugars, the greater the need for sterols and long chain fatty acids.**

Nutrients containing yeast derivatives (Nutriferm Energy, Nutriferm Arom Plus, Nutriferm Special, Nutriferm No Stop) enrich the must in sterols and long-chain fatty acids and increase the alcohol tolerance of fermenting yeast.

### **Detoxification of musts.**

In dry seasons, pesticides used in vineyards remain on the grape skins and accumulate in the musts, causing a potential difficulty to alcoholic and malolactic fermentations. The addition of yeast hulls (Nutriferm No Stop) helps detoxify the must and re-establish conditions for a regular and complete fermentation.