

BALANCED NUTRITION IN THE PRESENCE OF OXYGEN

Intelligent Fermentation Management

Alcoholic fermentation is a central phase of the winemaking process. The metabolic activity of yeast not only converts sugars into alcohol but also directly affects the wine's sensory profile and overall identity. The biological complexity of fermentation requires **continuous monitoring of operating conditions and nutrient availability**. Balanced yeast nutrition is critical to ensure reliable fermentation kinetics and to achieve the intended winemaking objectives.

Yeast require a complex array of nutrients (organic and inorganic nitrogen, vitamins, trace elements, lipids, and oxygen) whose role extends beyond the simple value of yeast assimilable nitrogen (YAN).

Yeast nutritional requirements vary throughout fermentation depending on the composition of must, fermentation kinetics, and the winemaking objective, highlighting the limitations of static and standardized nutritional approaches.



ENGINEERED
& INTEGRATED
WINEMAKING PROCESS

enartis

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PARSEC

Oxygen as a Nutrient

Although it is not used by yeast for respiration during alcoholic fermentation, **oxygen plays an essential role in yeast physiology**. It promotes the synthesis of sterols and phospholipids, improving the fluidity of the cell membrane.

Adequate oxygen availability enables yeast to:

- Better withstand ethanol stress
- Facilitate access to nutrients required for metabolic activity
- Rapidly expel harmful metabolites

For these reasons, oxygen supply during alcoholic fermentation should be considered an **essential nutrient for yeast metabolic activity**.

The recognition of oxygen as a nutritional driver has led to the development of the Yeast Nutritional Requirements (**YNR**) concept—a new reference model for managing yeast nutrition that integrates oxygen availability alongside traditional nutrient metrics.

What does YNR stand for?

YNR - Yeast Nutritional Requirements

The YNR index describes the actual nutritional requirements of yeast at a specific stage of fermentation.

It integrates:

Fixed factors

- Yeast type
- pH
- Winemaking objective

Variable factors

- Must density
- Temperature
- Nitrogen availability
- Turbidity
- Fermentation kinetics

This approach goes beyond traditional models based on standardized additions and allows **nutrition to be interpreted as a true process variable**, to be continuously monitored and adaptively managed throughout fermentation.

An Integrated
Nutrition
Management System



TARGETED
NUTRITION



CONTINUOUS
MONITORING



INTERPRETATION
AND ADAPTIVE
MANAGEMENT

Each phase generates new data and fuels a continuous cycle of optimized and precise process control.

How can fermentation be managed intelligently?

INTEGRATED TECHNOLOGICAL SOLUTIONS

CONTINUOUS AND REAL-TIME MONITORING

Objective monitoring of alcoholic fermentation



WINEPLUS

State-of-the-art precision sensors that monitor fermentation dynamics and key parameters, transmitting accurate, continuous data directly from the tank. WINEPLUS enables:

- Real-time measurement of density and temperature, providing a continuous and objective view of the evolution of the must and yeast activity.
- Interpretation of fermentation curves to predict key moments, detect deviations, and anticipate critical events.
- Identification of optimal nutrient addition timing, transforming continuous data into actionable insights.

With WINEPLUS, the alcoholic fermentation process becomes transparent, controlled, and precise.

INTERPRETATION AND ADAPTIVE CONTROL

Translating data into measured interventions



EVO2FERM

A stand-alone system that requires no permanent installation or modifications to equipment or tanks.

EVO2FERM allows winemakers to:

- Dynamically manage yeast nutrition through predictive and adaptive dosing strategies.
- Interpret real-time fermentation data to intervene effectively in must nutrition, adjusting and correcting deviations in fermentation kinetics.
- Regulate the supply of organic nutrients (No), inorganic nutrients (Ni), and oxygen (O₂) during the various stages of alcoholic fermentation.

Dosing is performed automatically to align with key fermentation stages and the yeast's varying nutritional needs, preventing overdosing and supplying nutrients only when there is a genuine metabolic need.

NUTRIFERM

A balanced blend of nutrients that provides yeast with what they need to support fermentation in a smooth and controlled manner.

NUTRIFERM ULTRA L

A liquid organic nutrient, composed of 100% yeast autolysate, derived from a yeast strain selected and developed in collaboration with CERM.

With a high bioavailability of vitamins, it is also rich in essential amino acids, survival factors (sterols and unsaturated fatty acids), and mineral salts.

NUTRIFERM VIT L

A liquid inorganic nutrient based on diammonium phosphate (DAP).

BALANCED NUTRITION AS A CONTROLLED PROCESS VARIABLE

The gradual, step-by-step addition of these nutrients—enabled by automatic dosing—eliminates the need for standardized manual additions. This approach improves fermentation efficiency and enhances the wine's overall sensory quality. **Yeast nutrition management thus becomes a controlled and proactive process variable**, allowing winemakers to:

- Improve fermentation consistency
- Reduce the risk of slowdowns, stuck fermentations, or deviations
- Optimize energy use and labor efficiency

Automated nutrition management is a technology that enhances sustainability across the production process.

BALANCED NUTRITION

Physiological yeast requirements throughout fermentation

