Beverage Treatment Products

SIHA®
yeast nutrient navigator

EATON
Powering Business Worldwide

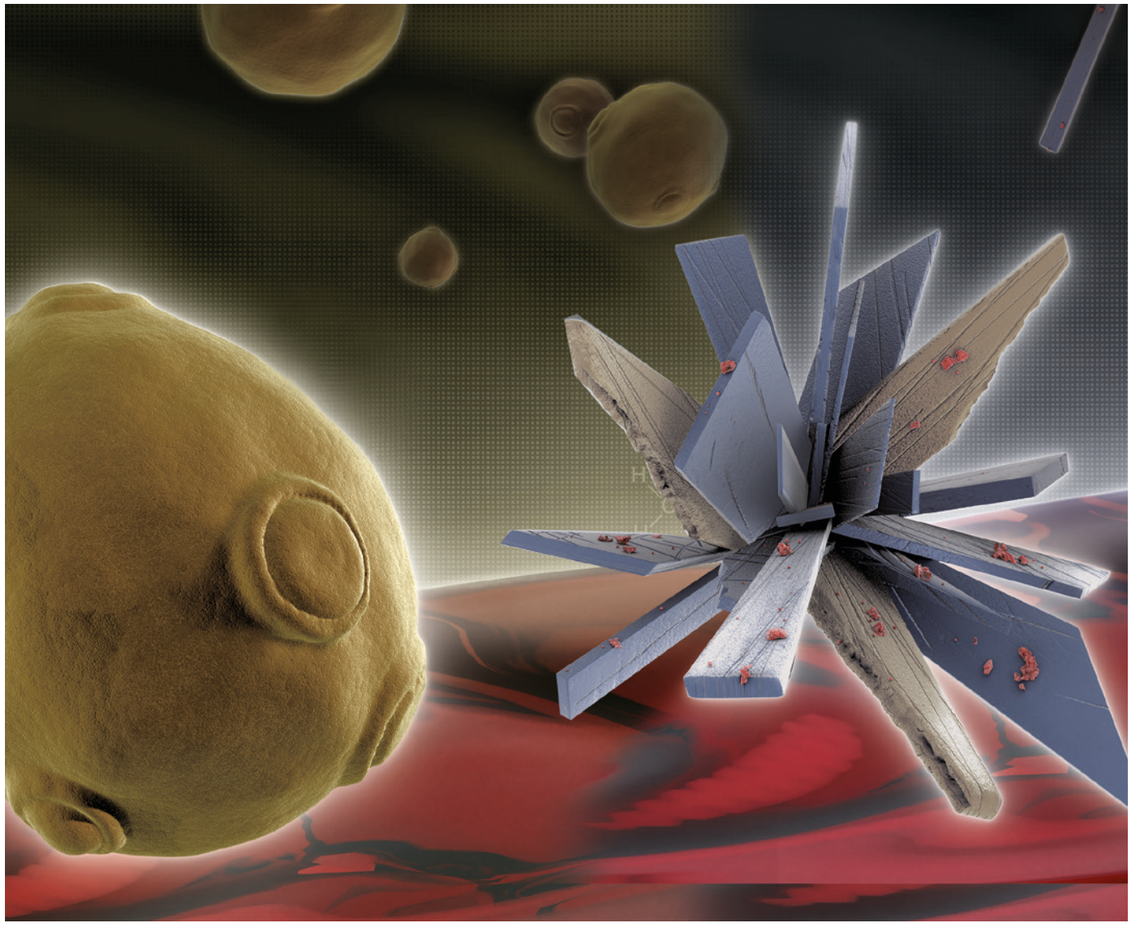
Function

Microbiological processes, like alcoholic fermentation, are dynamic because they are adapted to the laws of nature and change according to environmental factors. The situation is further complicated by the fact that microorganisms have very complicated metabolisms. This combination forces the wine and sparkling wine industry to face new challenges again and again.

A successful and complete alcoholic fermentation requires that the wine yeasts are still alive at the end of the fermentation process because they are the essential interface between grape must and wine. Nutrients available in adequate and sufficient form ensure their survival. Table 1 shows the main nutrients and their effect on wine yeasts.

Yeast cell requirements	Yeast function
Vitamins	Increases growth rate
Minerals	Provides enzyme co-factors
Nitrogenous compounds	"Multiplication motor" and increases amino acid metabolism
Lipids/sterols	Stabilizes cell membrane transport and increases cell growth

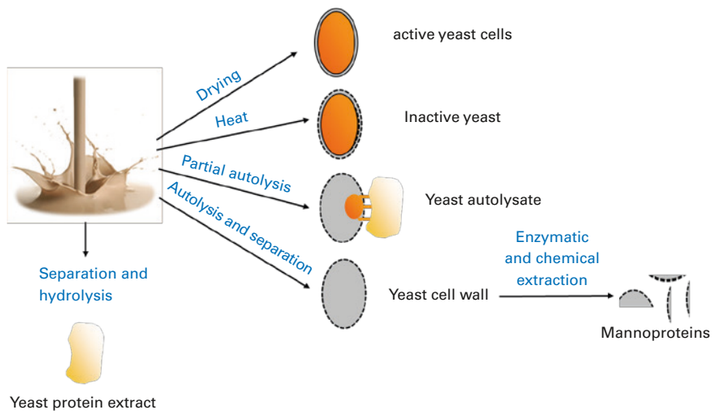
Table 1: Yeast nutrients in grape must and their effect on yeast cells



Yeast cell and nutrient

When it comes to yeast nutrients, grape must ingredients are still somewhat of a mystery. Routine measurements of the sugar concentration and pH value and analysis of organic acids are useless for the purpose of yeast development. There is no correlation between the sugar concentration of a must and the nitrogen concentration (amino acid concentration), nor are essential yeast nutrients such as minerals, vitamins, fatty acids, and sterols analyzed (Table 2). Legislators are trying to compensate this poor knowledge through an approval procedure for yeast nutrient preparations.

Yeast nutrients – „What types are available?"



Nutrients in must	Knowledge of must ingredients available to the yeast	Maximum legal limit
Nitrogen	To some extent, ammonium, amino acid spectrum	Wine production: DAHP 100 g/hl* Sparkling wine production: DAHP 30 g/hl*
Vitamins	No	Vitamin B_1 (thiamin): 60 mg/hl* Partially through yeast cell wall preparations
Minerals	No	The addition of inactive yeasts, yeast autolysates, and yeast cell walls compensates the nutrient deficiency. Max. dosage: 40 g/hl
Unsaturated fatty acid	No	
Sterols	No	

Table 2: Yeast nutrients and maximum legal limits DAHP = diammonium hydrogen phosphate
* German law

Yeast cell wall preparations are the most effective yeast nutrients. These products contain inactive yeasts that compensate to some extent the lack of essential yeast nutrients (minerals, vitamins, etc.) in the grape must.

Application

	Product	Product components	Available nutrients for the yeast cell: Vitamins, Minerals	Available nutrients for the yeast cell: Nitrogen ammonium organic / inorganic	Available nutrients for the yeast cell: Nitrogen Amino acids peptides, proteins	Available nutrients for the yeast cell: Lipids/ sterols	Timing of application for alcoholic fermentation: Rehydrogenation	Timing of application for alcoholic fermentation: Start	Timing of application for alcoholic fermentation: After 1/3	Timing of application for alcoholic fermentation: After 1/2	Timing of application for alcoholic fermentation: Abating fermentation	Effect on the alcoholic fermentation / yeast cells	Max. dosage*
Activator	**SIHA SpeedFerm**	Inactive yeasts	x	x organic	x	x	x					Improved rehydration, higher active yeast cell count up to the end of alcoholic fermentation, assured final fermentation	40 g/hl
Complex nutrients	**SIHA PROFERM® H+²**	Autolysates, DAHP, vitamin B_1	x	x organic x inorganic	x	x		x	x	x		Yeast nutrient for complete yeast nutrition, increased development of the yeast cell count at the beginning of alcoholic fermentation, reduction of off-flavors, assured final fermentation	40 g/hl
Complex nutrients	**SIHA PROFERM® Plus**	Hefeautolysate, DAHP, vitamin B_1	x	x organic x inorganic	x	x		x	x	x		Complete nutrition for the yeast cells, ensured final degree of fermentation	40 g/hl
Organic complex nutrient with added value	**SIHA PROFERM® Fit**	Inactive yeast cells	x	x organic	xxxx tripeptides, glutathione	x		x	x	x	x	For the reductive development of white musts and white wine mashes, enriched with tripeptides (glutathione), high antioxidation potential, freshness and longevity of white wines, protection against browning	40 g/hl
Organic complex nutrient with added value	**SIHA PROFERM® Red**	Yeast autolysate	x	x organic	xxxx amino acids	x		x	x	x	x	Stabilization of red wine color, increased yeast cell count, and assured final degree fermentation over a wide temperature range; the formation of aromas is promoted	40 g/hl
Certified organic, DE-ÖKO-100	**SIHA PROFERM® Bio**	Yeast cell wall	x	x organic	x	x		x	x	x	x	Certified organic yeast cell wall preparation, high yeast cell count, assured and clean fermentation, selective adsorption of medium-chain fatty acids (fermentation inhibitors)	40 g/hl
Inorganic synthetic nutrient	**SIHA Gärsalz**	DAHP		xxxx inorganic				x	x			Fast yeast reproduction at the beginning of alcoholic fermentation	100 g/hl
Inorganic synthetic nutrient	**SIHA Gärsalz Plus**	DAHP, vitamin B_1, cellulose	xxxx (vitamin B_1)	xxxx inorganic				x	x			Fast yeast reproduction in particular for highly pre-clarified musts (NTUs <10)	50 g/hl
Inorganic synthetic nutrient	**SIHA Vitamin B_1 (Sticks oder Pulver)**	vitamin B_1	xxxx (vitamin B_1)				x	x				Reduction of the formation of SO2 bond partners (acetaldehyde, alpha-ketoglutarate and pyruvate), particularly for grapes affected by botrytis	60 mg/hl

* German law

Application

A measurable indicator for the alcoholic fermentation is free assimilable nitrogen (FAN). It is the sum of ammonia and amino acids (without Proline) in grape musts. Table 3 shows how much additional nitrogen is necessary to guarantee a complete alcoholic fermentation considering FAN and sugar concentration.

Example:
If FAN in grape must is between 121 and 150 mg/l at a sugar concentration of ≤ 95 °Oe, the addition of 40 mg/l free assimilable nutrient is necessary.

Complex yeast nutrients

The opposite of anorganic fermentation salt, such as ammonium (in the form of ammonium salts) complex yeast nutrients helps to fulfill the complete yeast nutritional demand.

Therefore, especially at low nutrient concentration in grape musts, Eaton recommends complex yeast nutrients.

Benefits:
- Better fermentation performance
- Better stress tolerance
- Better aroma liberation (fermentation bouquet ↑, off-flavors ↓)

Individual yeast nutrients

Fermentation salt, like DAHP or ammonium salts in general, reduction in the formation of off-aroma reduces the production of higher alcohols (fruity aroma and fermentation bouquet), but cannot ensure the sufficient nutrition of the yeasts until the end of the alcoholic fermentation.

	FAN classes in grape musts			
	90 – 120 mg/l	121 – 150 mg/l	151 – 180 mg/l	181 – 210 mg/l
Must quality	**Additional, free assimilable nutrient dosage**			
≤ 95 °Oe ≤ 13% alcohol by volume	70 mg/l	40 mg/l	20 mg/l	0 mg/l
95 – 102 °Oe 13 – 14% alcohol by volume	100 mg/l	70 mg/l	40 mg/l	20 mg/l
≥ 102 °Oe ≥ 14% alcohol by volume	130 mg/l	100 mg/l	70 mg/l	40 mg/l

Table 3: Guideline for free assimilable nutrient dosage with respect to FAN and sugar concentration

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