

Innovation og overblik op til høsten



WINE YEASTS



WINE BACTERIA



NUTRIENTS/PROTECTORS



ENZYMES



SPECIFIC INACTIVATED YEASTS



CHITOSAN



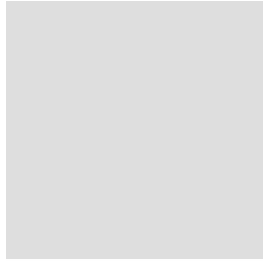
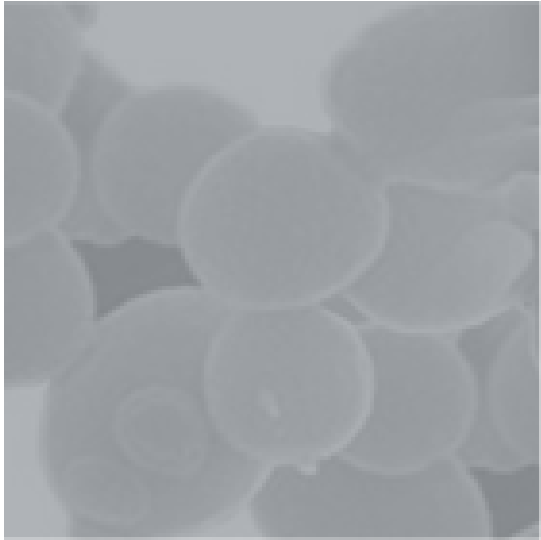
VINEYARD SOLUTIONS

LALLEMAND

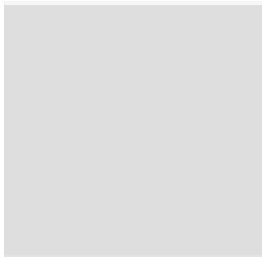
LALLEMAND OENOLOGY

Original *by culture*

Visionary biological solutions / www.lallemandwine.com

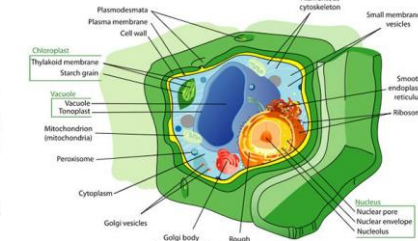
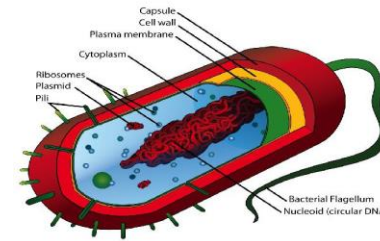
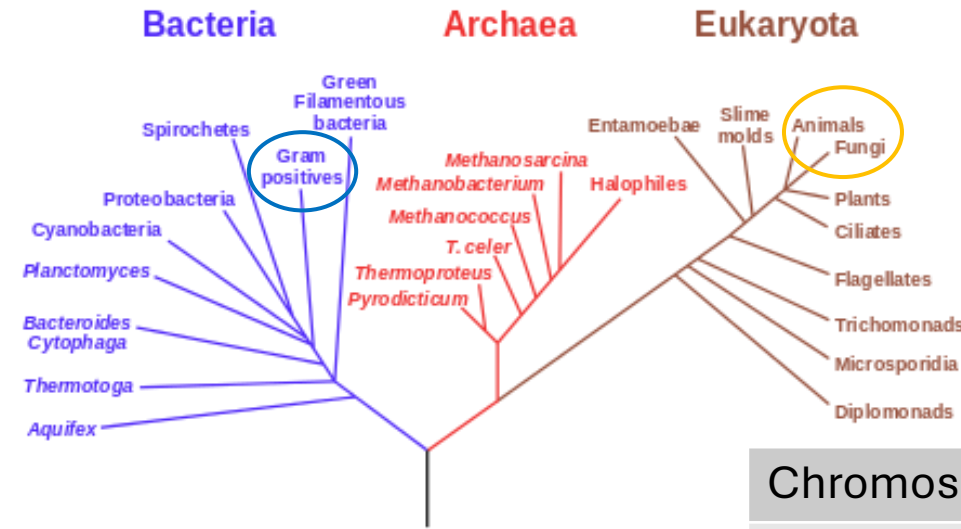


WELCOME TO
LALLEMAND



Yeast & Bacteria

Differences between them?



	Prokaryote (Bacteria)	Eukaryote (Yeast)
Chromosome	One	Many
Nucleus	No	Yes
Size	1-10 μm	10-100 μm
Metabolism	Growth and transformation	Growth, respiration, fermentation, transformation

Oenococcus oeni

Saccharomyces cerevisiae

Our story

Founded in Montréal
by Fred A. Lallemant
at the end of the
19th century



Yeast
production
started in
1923



**Over 4,700
employees**
globally



48 plants including
27 yeast and
9 bacteria plants



**A worldwide
presence**



Owned by the Chagnon family since
1952



Lallemand around the world

North America

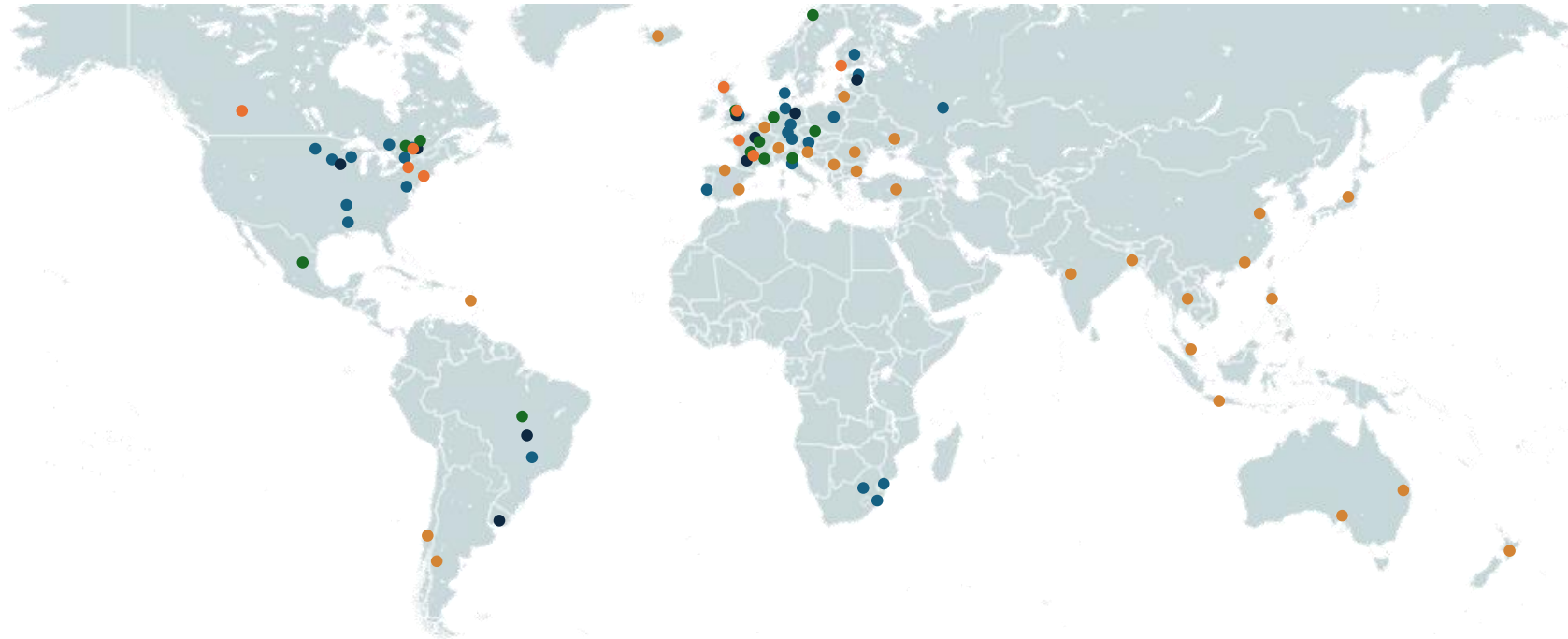
- 9 yeast plants (2 downstream)
- 2 bacteria plants
- 3 other plants
- 5 research labs

Europe

- 14 yeast plants (1 downstream)
- 5 bacteria and fungi plants
- 8 other plants
- 6 research labs

Africa, Asia, South America and Australia

- 4 yeast plants (2 downstream)
- 2 bacteria and fungi plants
- 1 other plants
- 1 research lab



- Yeast plants
- Bacteria / Fungi plants
- Other plants
- Research labs
- Commercial / Distribution

Solutions and know-how for a world of microorganisms

 ANIMAL NUTRITION	 COFFEE	 OENOLOGY
 BAKING	 COSMETICS	 PHARMA
 BIOFUELS	 DISTILLED SPIRITS	 PLANT CARE
 BREWING	 FERMENTATION MEDIA	 SAVOURY INGREDIENTS
 COCOA	 HEALTH SOLUTIONS	 SPECIALTY CULTURES

Yeast products

Fresh yeast (compressed)

Baking

Liquid yeast (cream)

Baking, ethanol, pharmaceutical

Active dry yeasts

Baking, fermented beverages, animal nutrition, ethanol pharmaceutical, nutraceutical

Organic Yeast (fresh, dry, inactive)

Baking, oenology, bio-ingredients

Inactive dry yeasts

Baking, fermentation media, human nutrition, animal nutrition

Mineral-enriched inactive yeasts

(Se, Fe, Cr, Zn, Mn, Mb)

Human nutrition, animal nutrition

Specific yeast derivatives

(glucans, mannans)

Fermentation media, human nutrition, animal nutrition

Yeast extracts

Savoury applications, fermentation media



Bacteria products

Bacteria freeze-dried

Baking, oenology, agriculture, human nutrition, animal nutrition, pharmaceutical, dairy, fermented meat

Bacteria dried by atomisation

Specific applications

Bacterial lysates

Specific applications

Bacteria deep frozen pellets

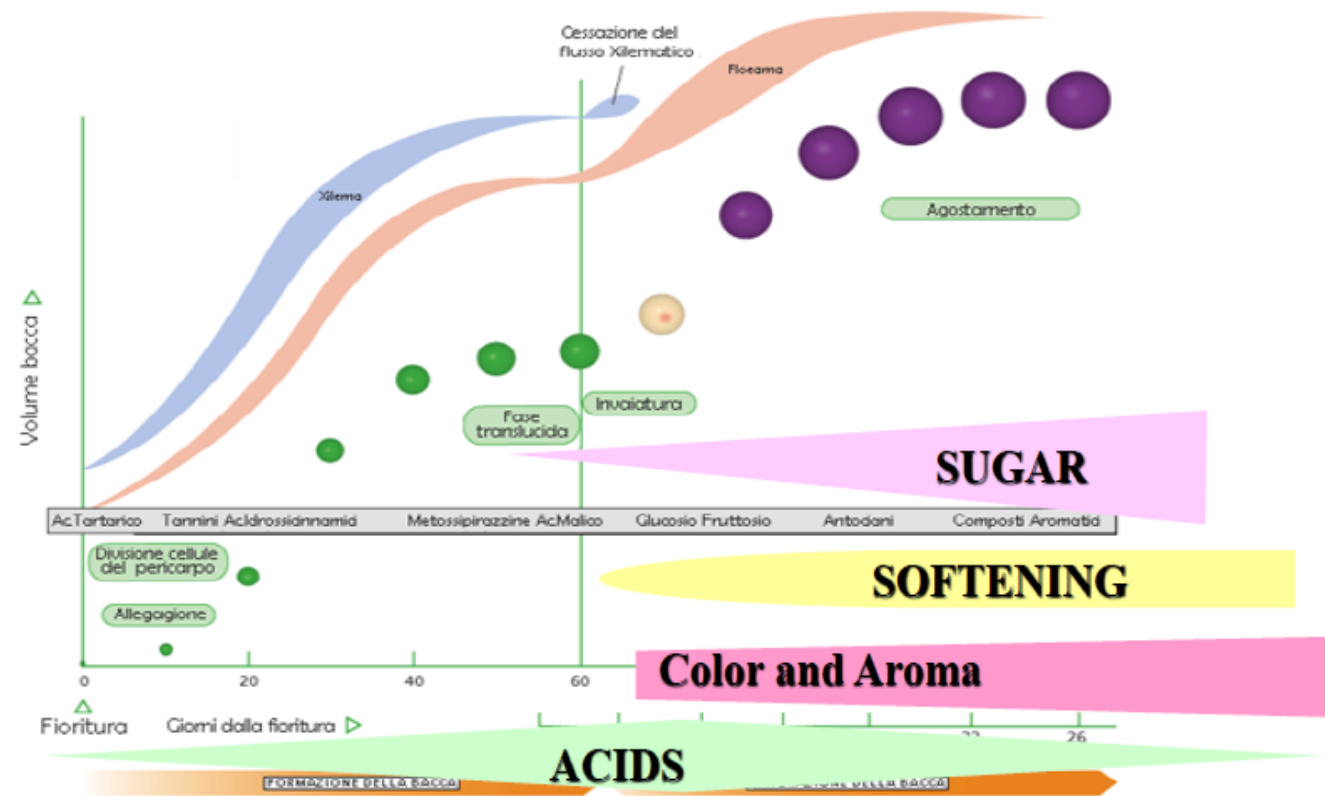
For dairy cultures only



LALLEMAND OENOLOGY PORTFOLIO

SYNERGISTIC ACTION TO REVEAL YOUR WINES' INDIVIDUALITY





FROM FRUIT SET TO VERAISON

- The skin increase his thickness because of cell division

AFTER VERAISON

- The skin increase his thickness because of the increase of the cell walls



- One of the biggest challenge of oenology and winemaking recently
 - > **reduce SO_2 use while preserving wine quality, especially in white and rosé because of oxidation risks**
- Organic and low chemical trend

Pre-fermentative steps in white and rosé wines: benefits and risks

- Pre-fermentative steps in white and rosé wines are various: skin contact, pressing, stabilization, clarification, settling, etc.
- They can increase significantly wine quality when well managed (increasing release of precursors, optimizing grape expression, etc.)
- But they can also be detrimental when badly managed
 - Risk of microbiological contamination
 - Risk of oxidation
 - Risk of alcoholic fermentation start during pre-AF steps

LEVEL²
SOLUTIONS

LEVULINE[®] SYMBIOSE[™]

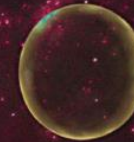


FLAVIA[™]
aromatic



NOUVEAU
LAKTIA[™]
acidity

BIODIVA[™]
complexity



Go to the next level

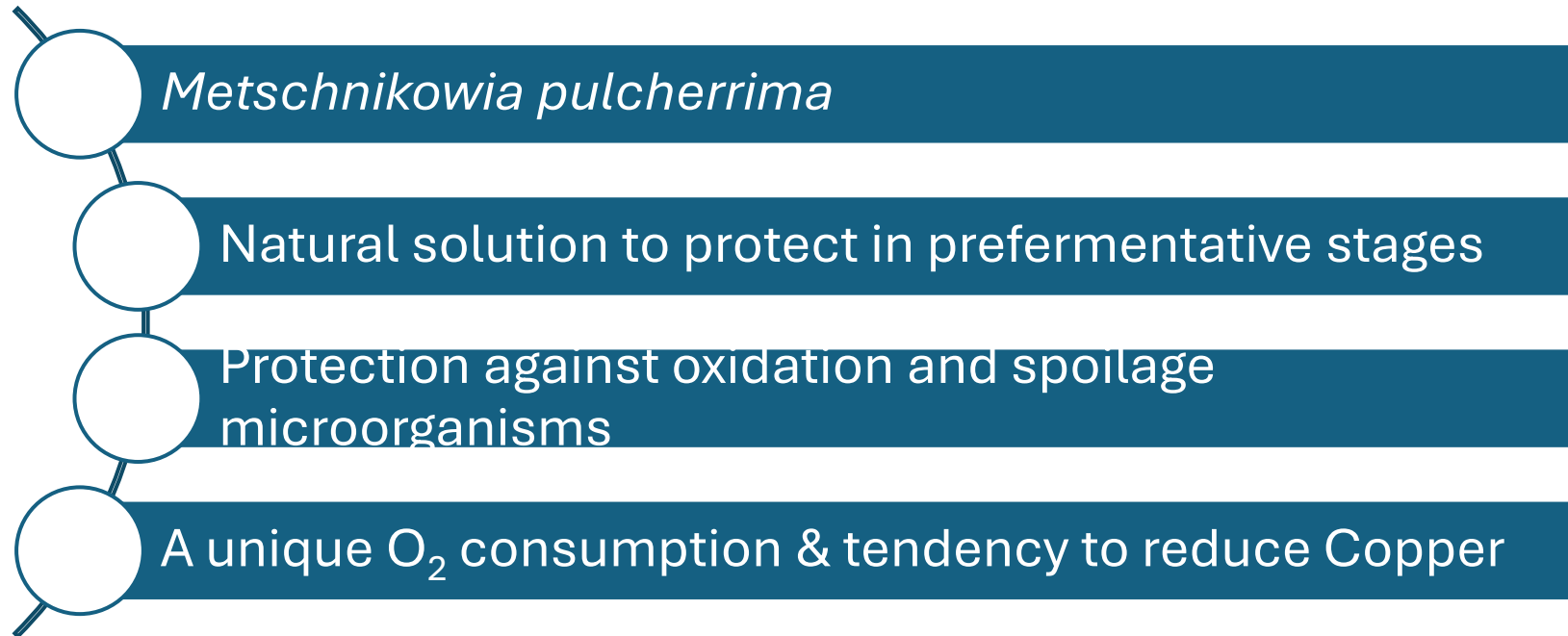
LEVEL2[®] TD



LALVIN ICV
TANDEM[®]



LEVEL²[™] INITIA[™]

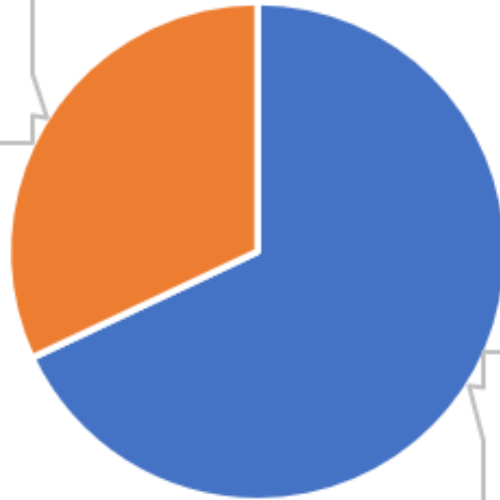


Bioprotection is not just a fancy word. For us, it is science.

Natur eller SO₂ ?

Yeast Population in the must

Hanseniaspora
32%

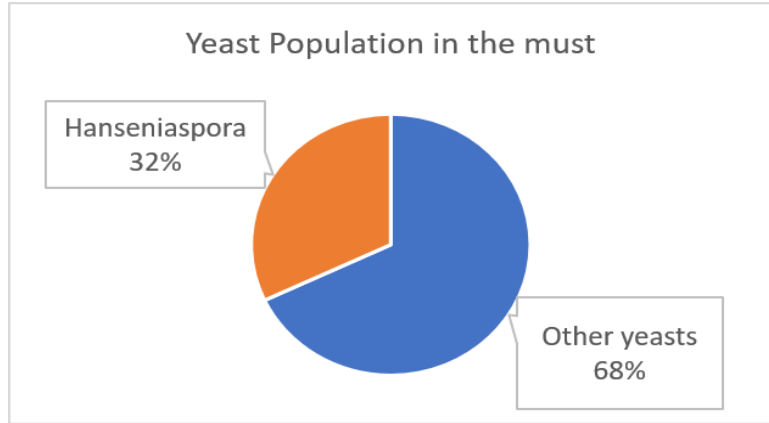


Other yeasts
68%



5 days
at
10°C

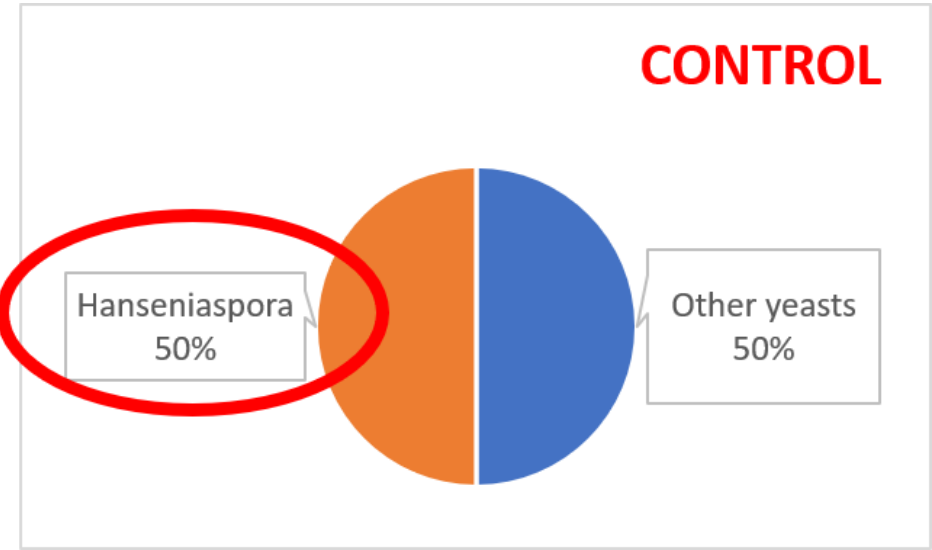
Natural inhibition



5 days
at 10°C.

• Powerful antimicrobial action

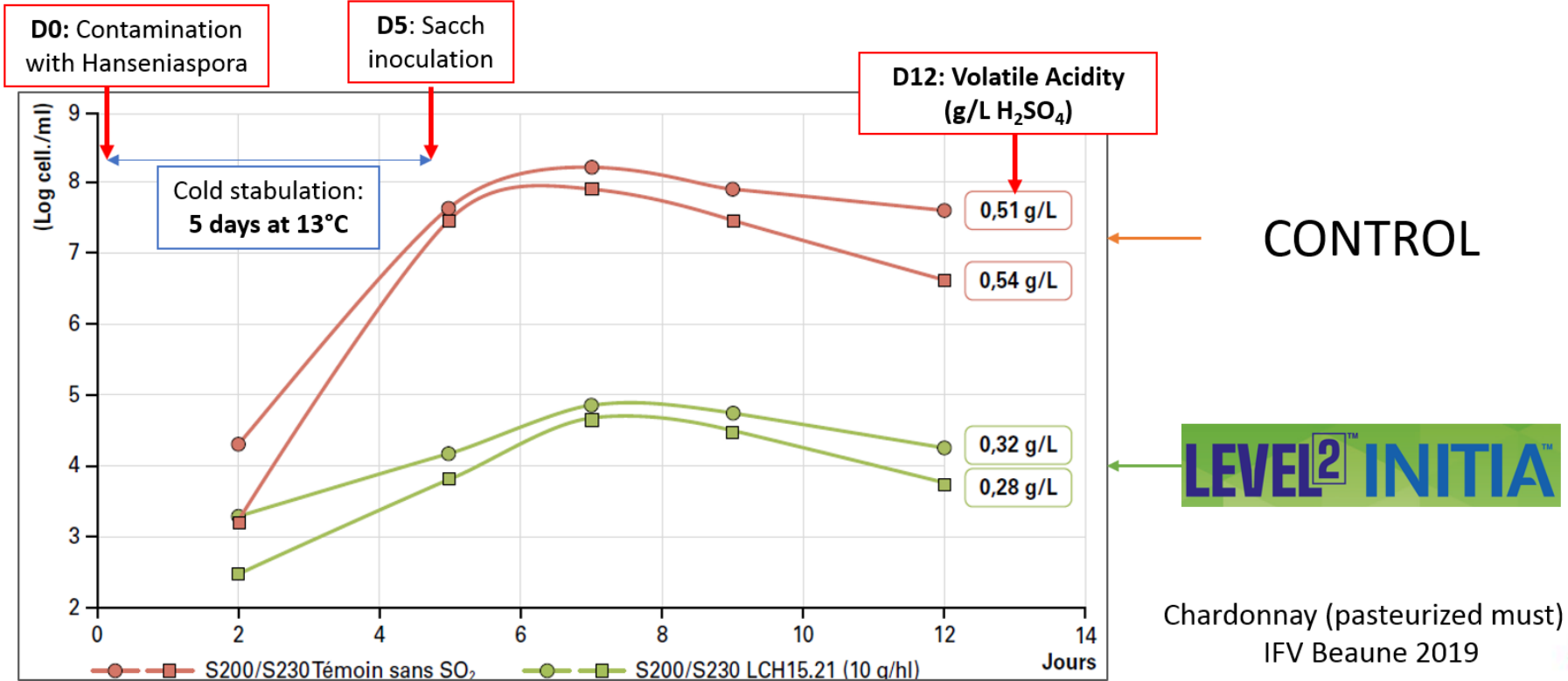
Against Hanseniaspora & other contaminants



Powerful antimicrobial action



Against *Hanseniaspora*



CONTROL



Chardonnay (pasteurized must)
IFV Beaune 2019

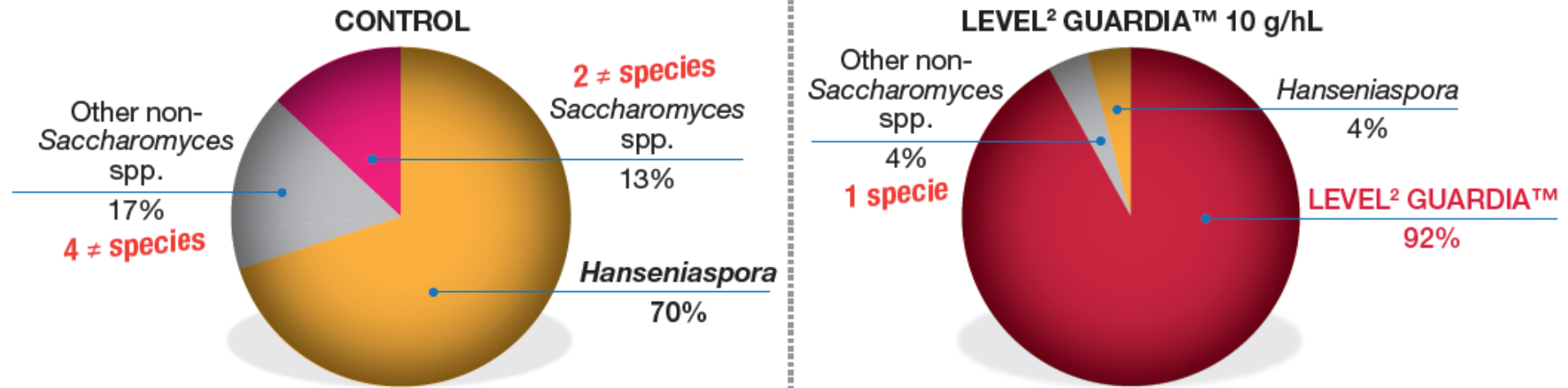
LEVEL²
GUARDIATM
Metschnikowia pulcherrima



**Active bioprotection
for red wines**

Control a wide range of contaminants

Pilot trial. Garnacha 2020, INCAVI (Spain), 100kg. No SO₂ addition
Implantation controls 5 days of cold soak at 10°C



Powerful antimicrobial action & good implantation
even at 10°C

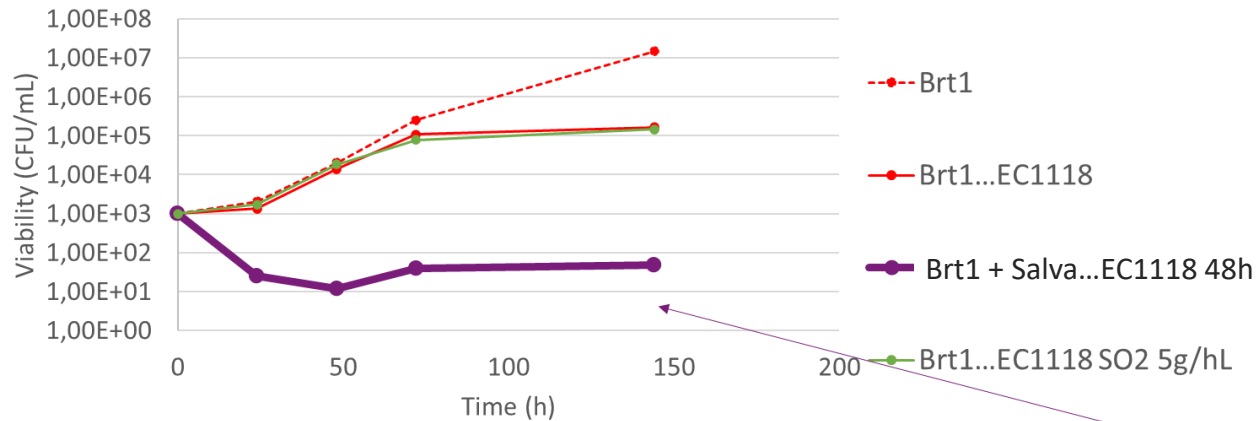


Why is Level2 Guardia different?

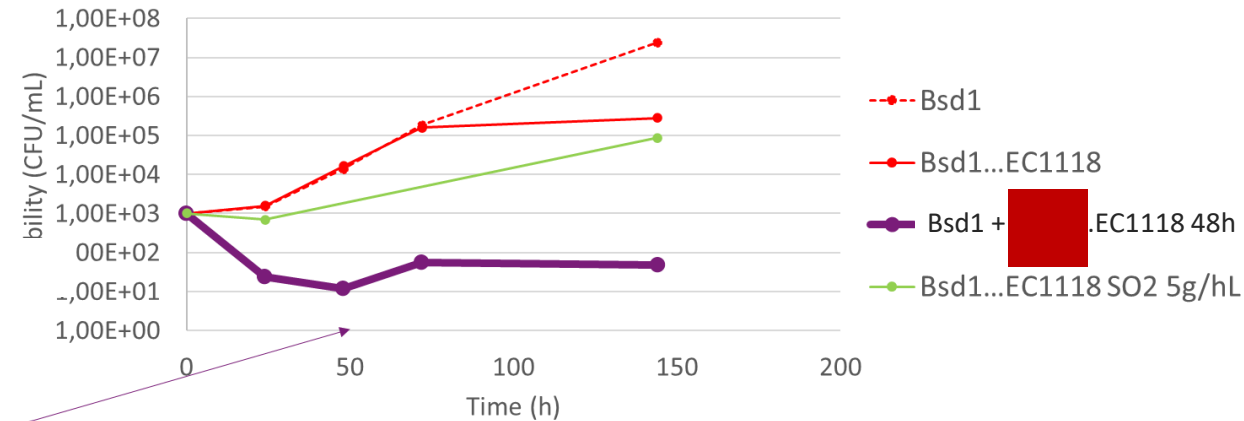
- Not only thanks to early colonization and growth
- But also because of its powerful capacity to chelate iron thanks to its high pulcherimic acid production
- Iron depletion limits other microorganisms growth
- Bioprotection is not just a fancy word. For us, it's science.

Is the new LEVEL² Salva™ efficient against other *Brett* strains?

Brett Brt1 (resistant to SO₂)



Brett Bsd1 (sensitive to SO₂)



Proven efficiency of LEVEL² SALVA on different *Brettanomyces* strains

LEVEL² SALVA more efficient than SO₂, even with sensitive *B.b*



NO
BRETT
INSIDE

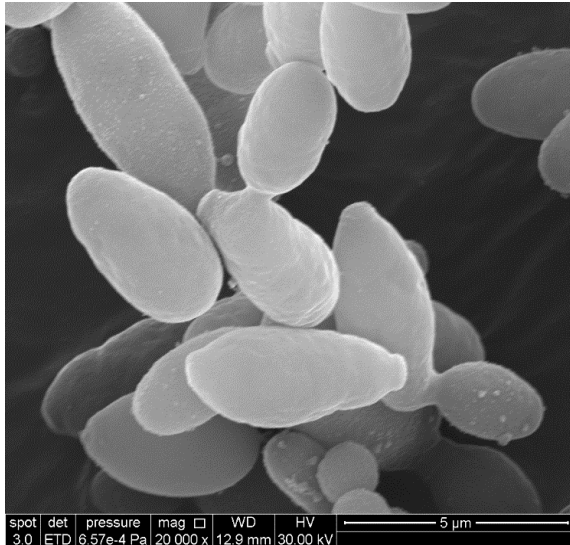
Chitosan of fungal origin

A new tool to control *Brettanomyces*

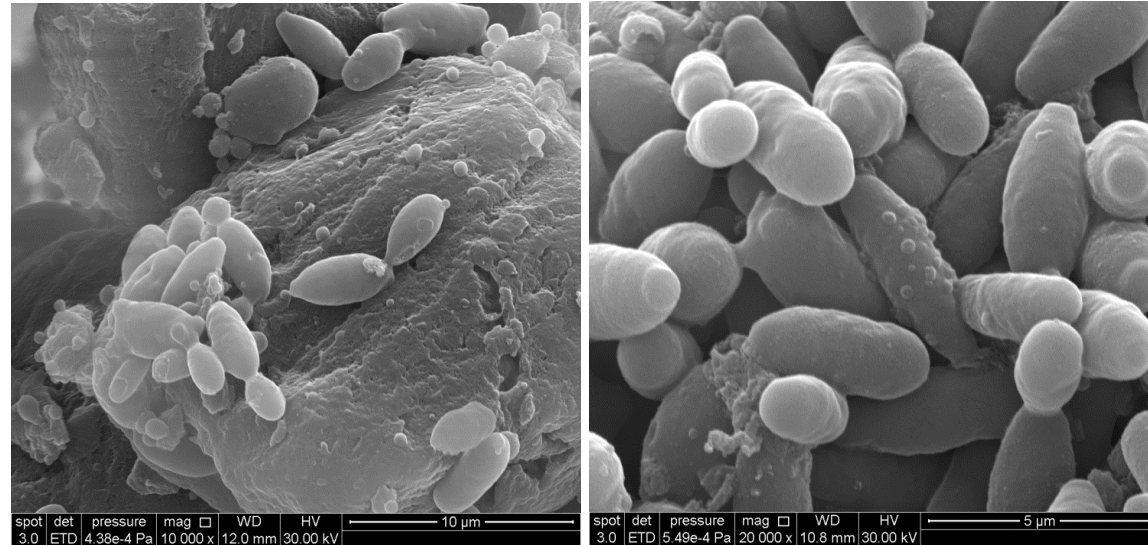
Chitosan of fungal origin as a tool to control *Brettanomyces*

Up-date on No Brett Inside

- Action on Brett : New results from Dr. C. Edwards, WSU



Scanning electron micrograph of *B. bruxellensis* from barrel sediment in wines without No Brett inside added



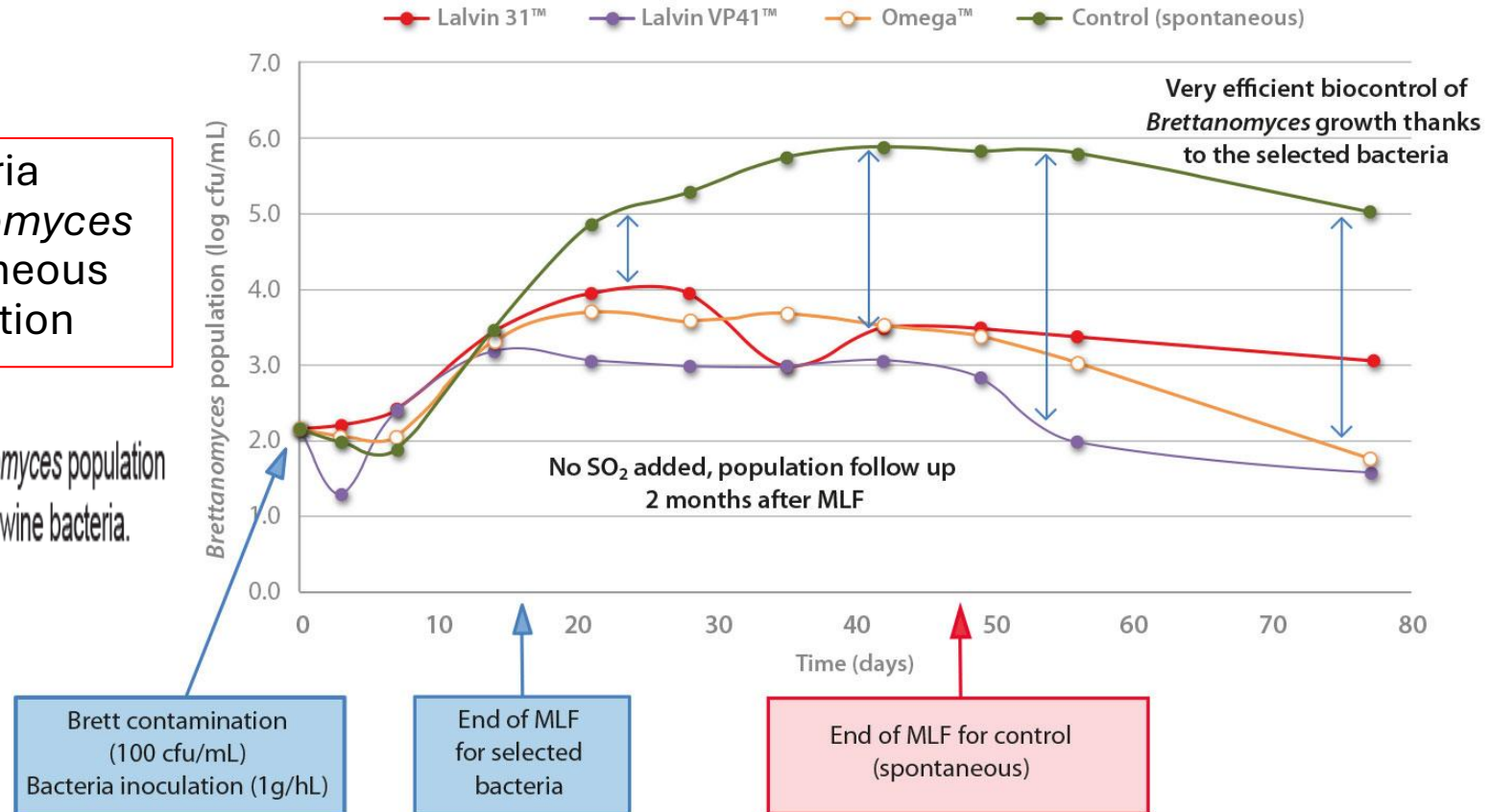
Scanning electron micrograph of *B. bruxellensis* from barrel sediment in wines with 4 g/hL no Brett inside added

Microbiological spoilage and contamination

Early wine bacteria inoculation for malolactic fermentation

Influence of bacteria inoculation on *Brettanomyces* growth versus spontaneous malolactic fermentation

Biocontrol of *Brettanomyces* population with various selected wine bacteria.





- ✓ Fermentative performance:
 - Fast and clean!
 - Good implantation
 - Low VA
 - High Alcohol tolerance
- ✓ Low nitrogen demand
- ✓ Low to no SO2 production
- ✓ Excellent MLF compatibility
- ✓ Bright red fruit, clean aromas, soft mouthfeel
- ✓ No reduction/sulfur off flavors perceived

For sulfur compound management

LALVIN persy

YSEQ

A new generation of wine yeast to express aroma persistence of your wine

LALLEMAND

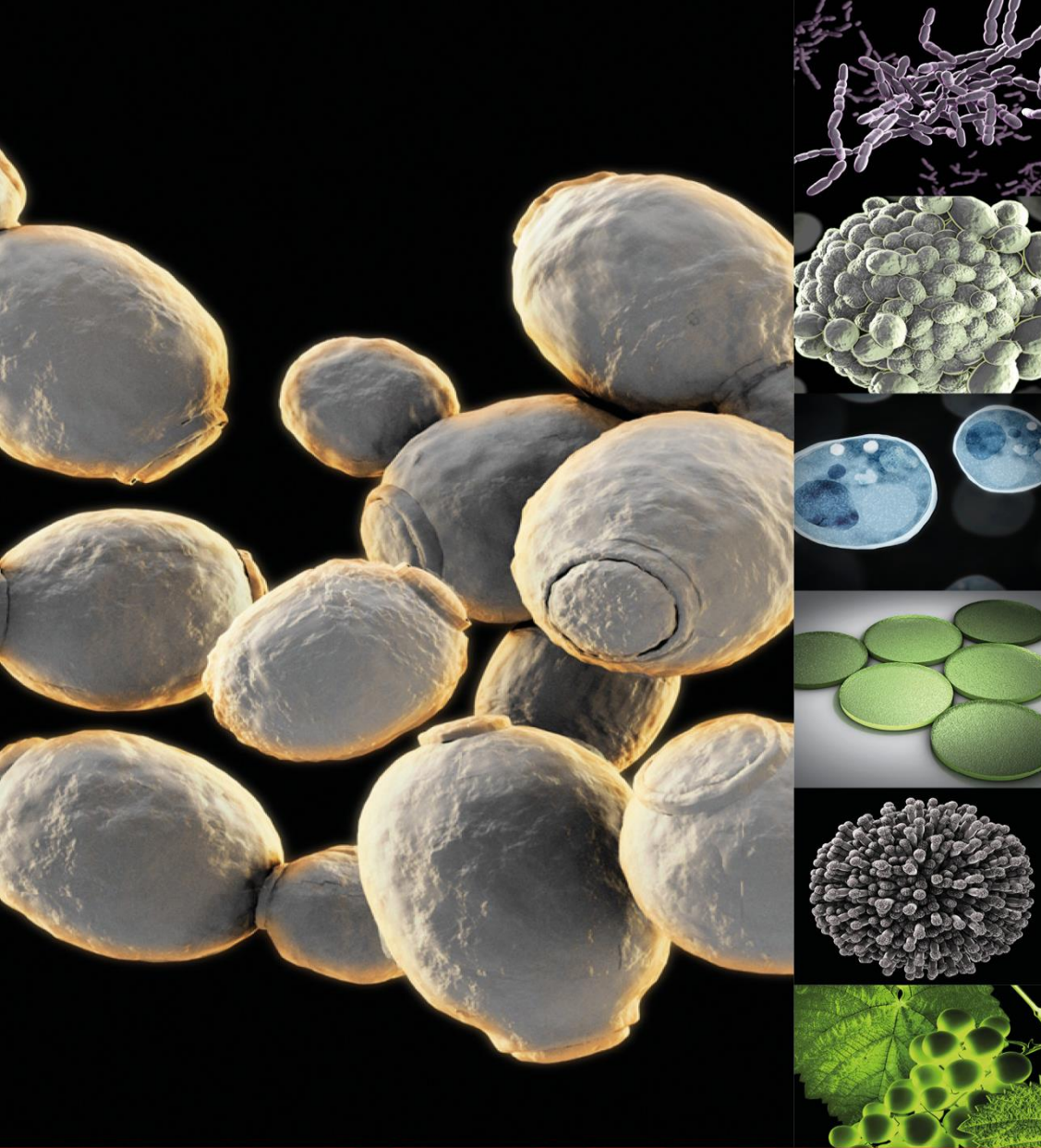
LALLEMAND OENOLOGY
Original by culture

AM RESIST **AM DEFENSE** **SULFUR PROTECTORS** **STRESS BACKBONERS** **SMPs** **DEFENSE** **WINE STABILIZERS**

Visionary biological solutions
Being original is key to your success. At Lallemand Oenology, we apply our passion for innovation, maximize our skill in production and share our expertise, to select and develop natural microbiological solutions. Dedicated to the individuality of your wine, we support your originality, we cultivate our own. www.lallemandwine.com

LALVIN ICV SunRose™



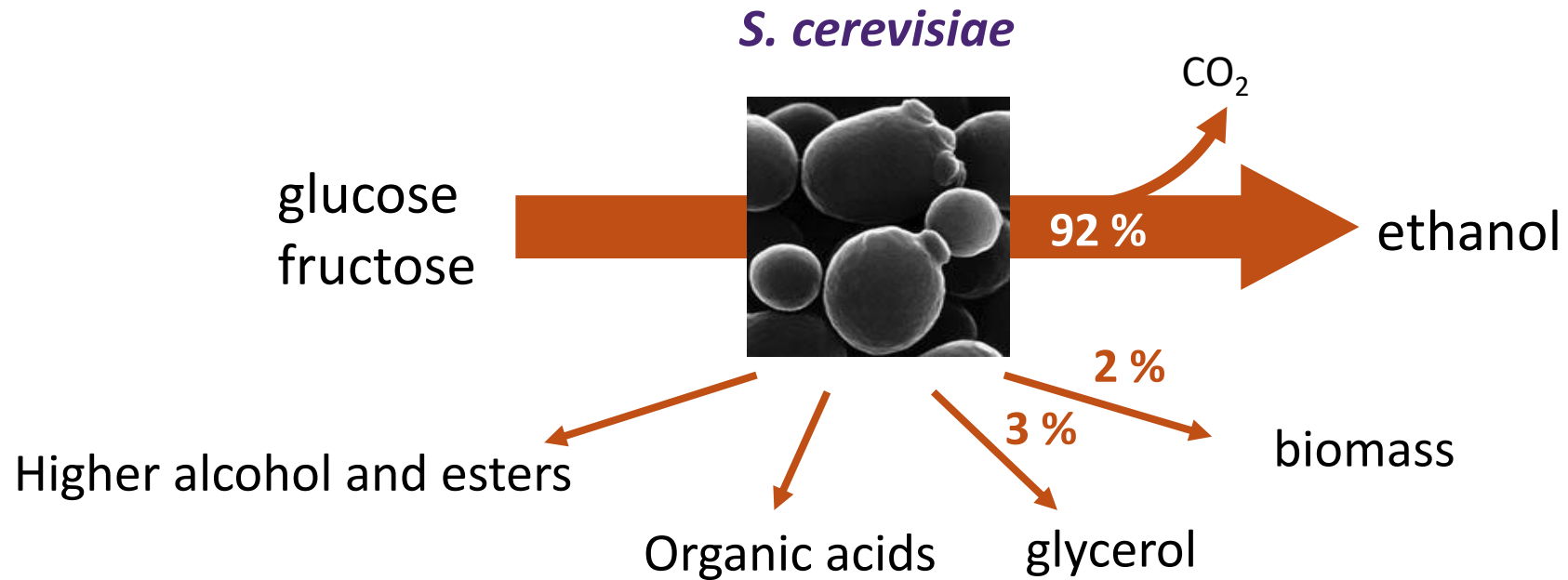


YEAST

The trustworthy!

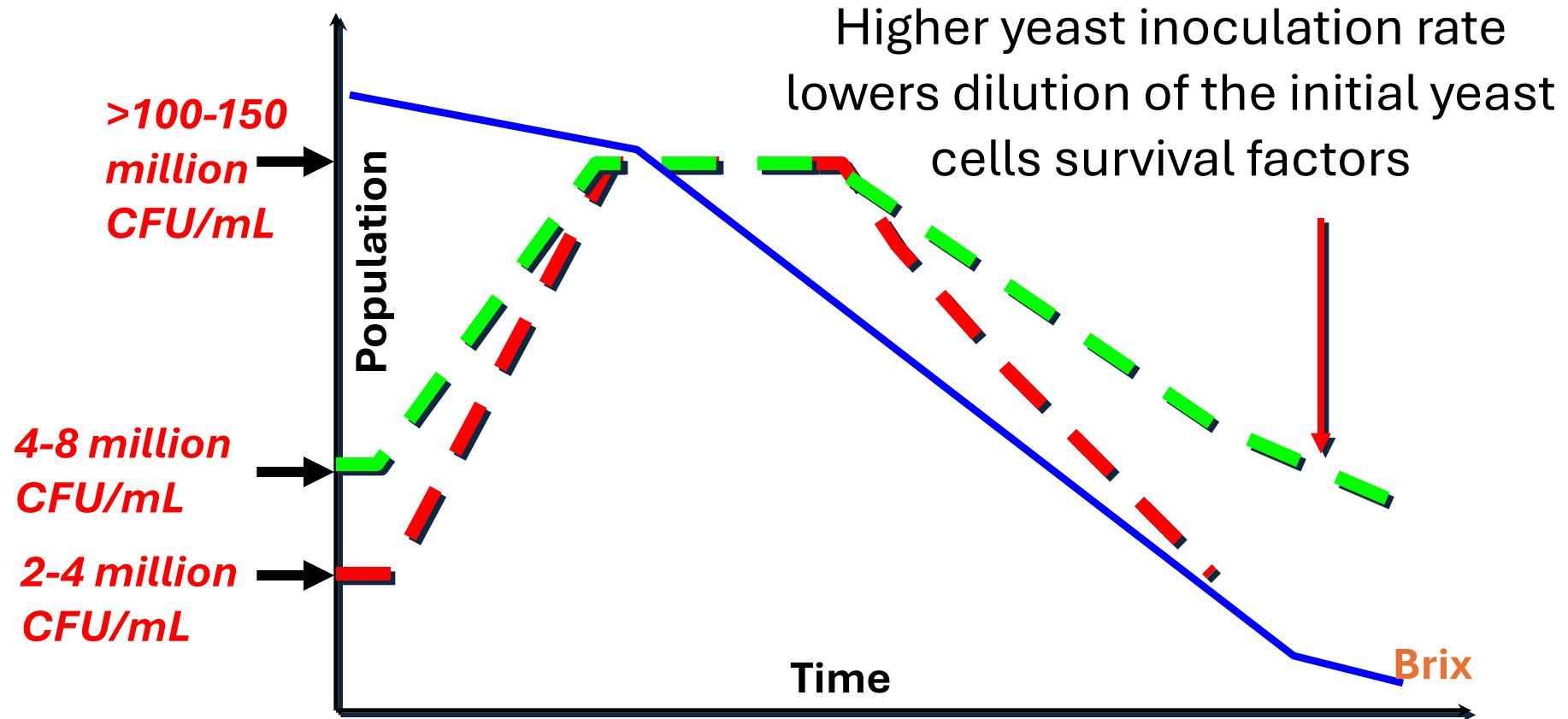


Yeast sugar metabolism

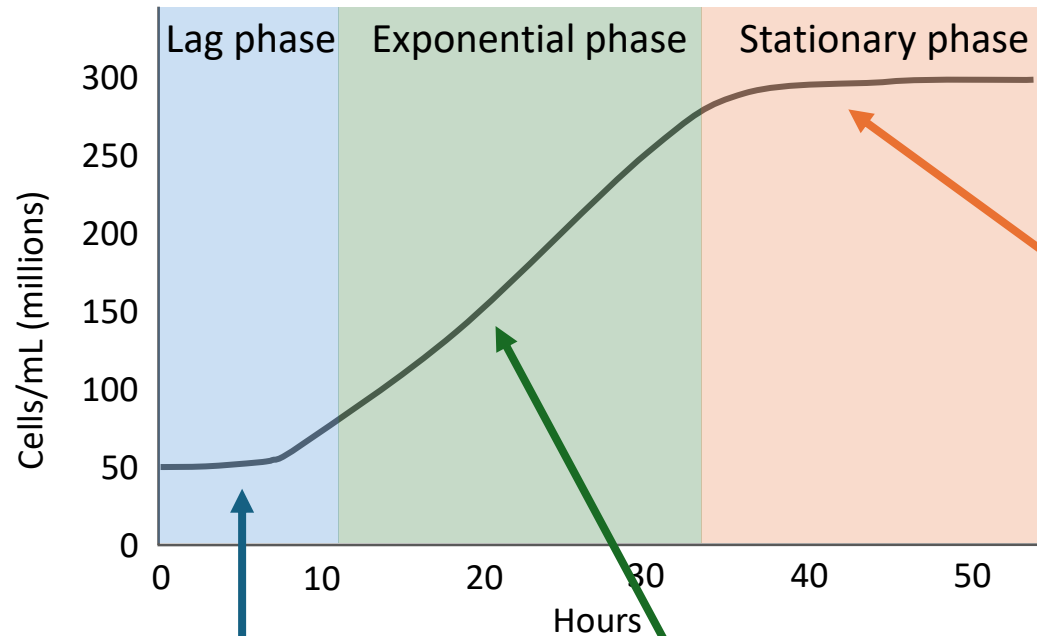


1° alcohol \leftrightarrow 16,8 g/l of glucose

Normal Fermentation Curve



The fermentation – What are the yeast doing?



Phase 1 (lag phase)

Yeast adapting to the environment

(grape must/mash/apple)

Phase 2 (exponential phase)

Yeast focused on energy production from sugar and cell growth to achieve a sufficiently **high** enough population of **actively metabolising** (fit) cells to complete fermentation of all sugar present

Phase 3 (stationary phase)

Active yeast population has to collectively work against increasing toxicity (e.g. alcohol & saturated fatty acids) and **complete fermentation**

Yeast Vitality versus Viability

- Essential nutrient reserves are transferred for mother to daughter cells
 - The vitality of the mother cells is paramount to the vitality of these future generations, those that complete alcoholic fermentation

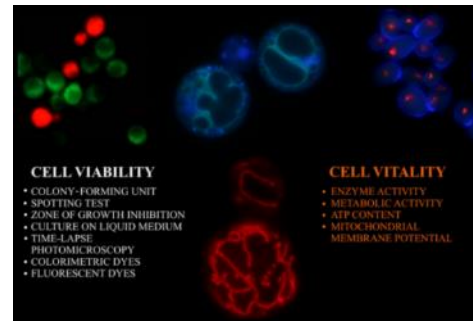
- Yeast vitality

- Metabolic state of health – the fitness of the yeast cell
- VERY difficult to measure and very difficult to react to.



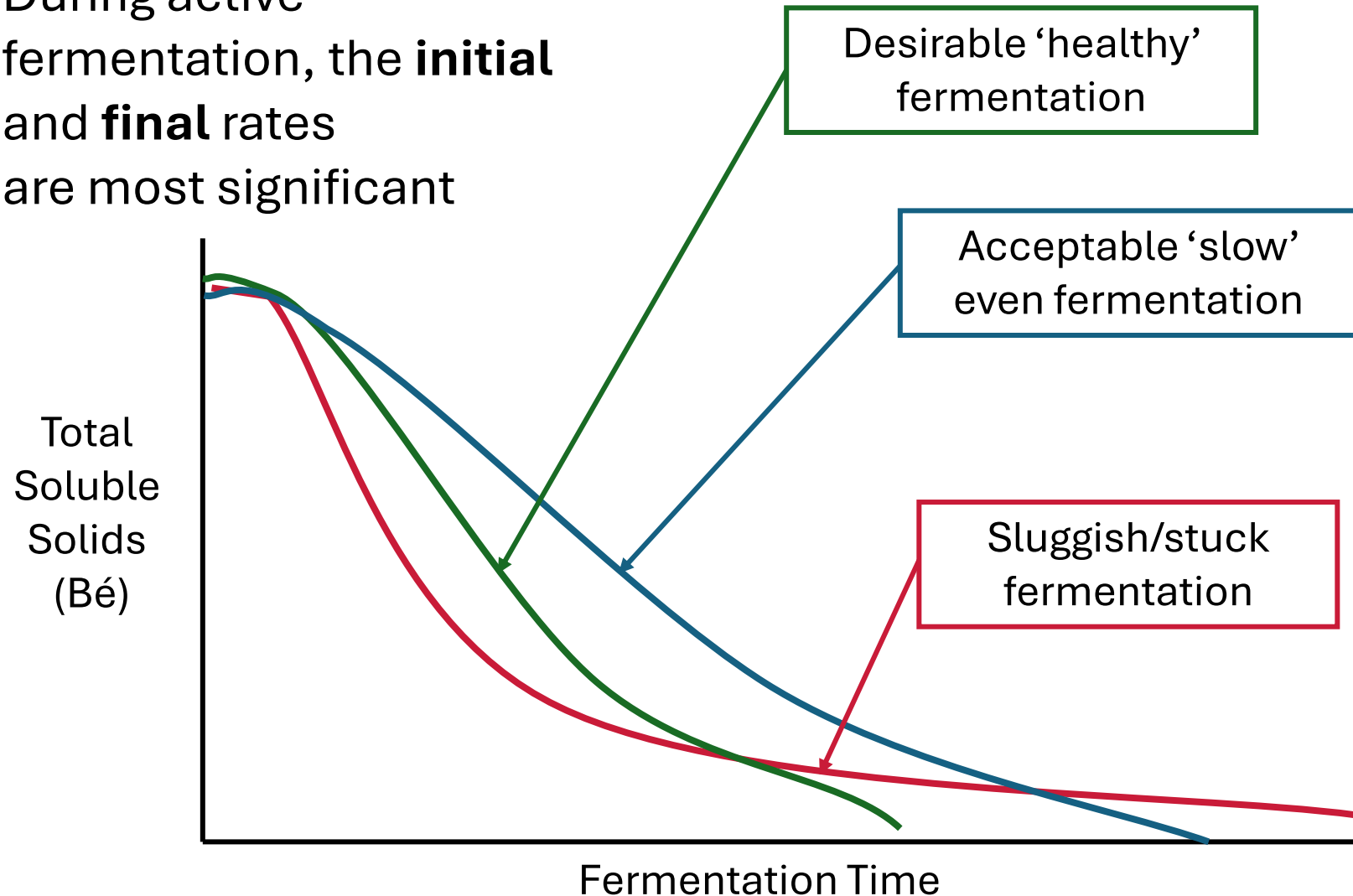
- Yeast viability

- Measured at the beginning of fermentation & used to indicate the number of live cells only.



Yeast fermentation patterns

- During active fermentation, the **initial** and **final** rates are most significant



Active dry yeast & Protection of the cell membrane

- ADY

- Contain ~ 8% water (reduction in cell volume)
- This is insufficient for active metabolism
- They must be rehydrated to allow reabsorption of the water lost during drying



Before



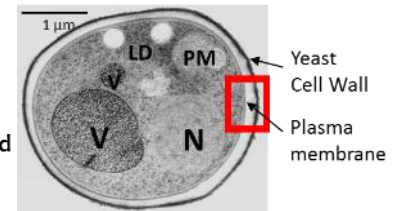
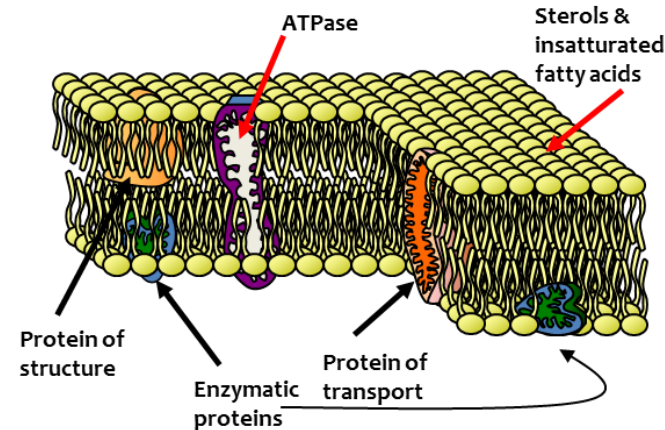
After

Beker & Rapoport 1987

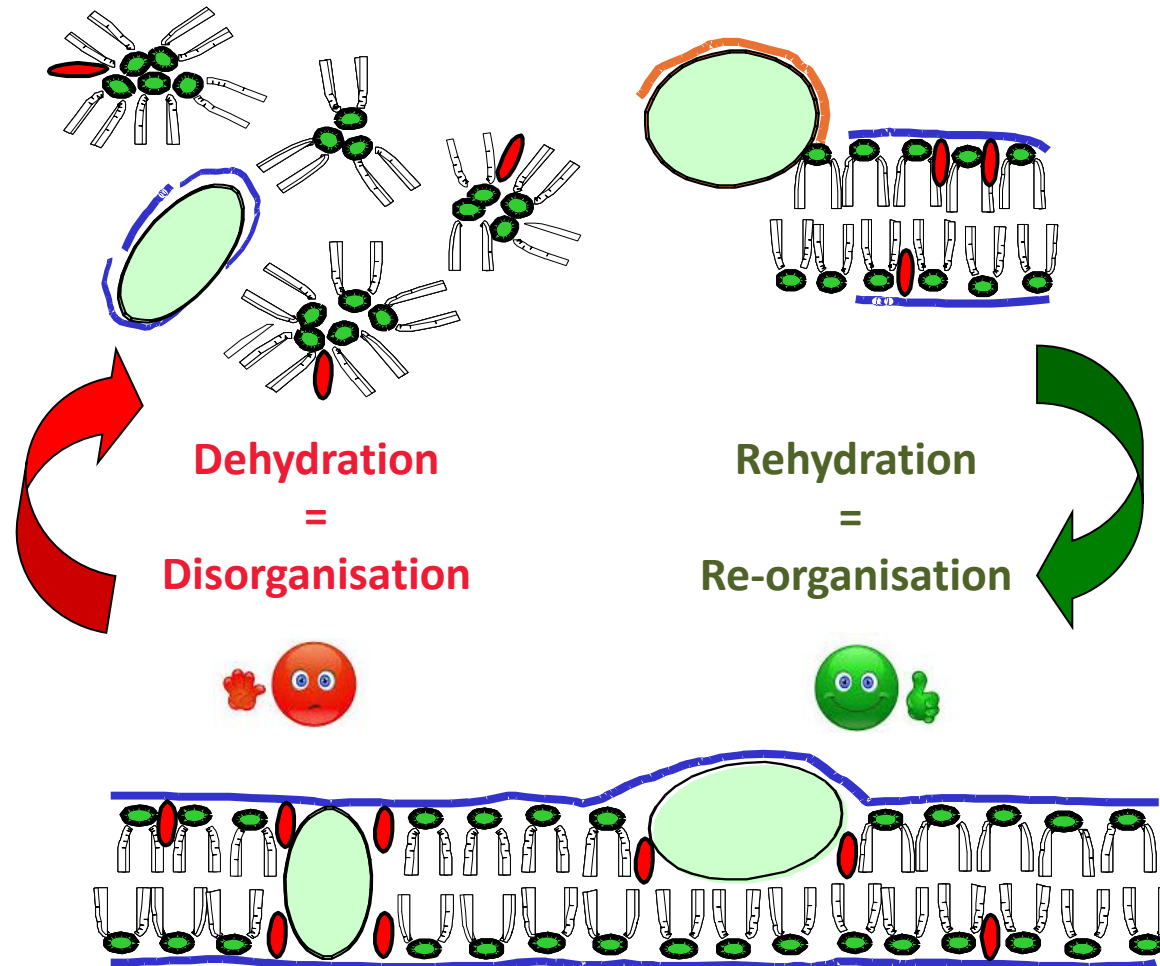
➤ Important to have time to get back a functioning cell

- What is the yeast trying to do:

- Membrane integrity
- Maintain cell viability
- Increase ethanol tolerance



What happens to the yeast cell membrane?



➤ Restoring membrane integrity

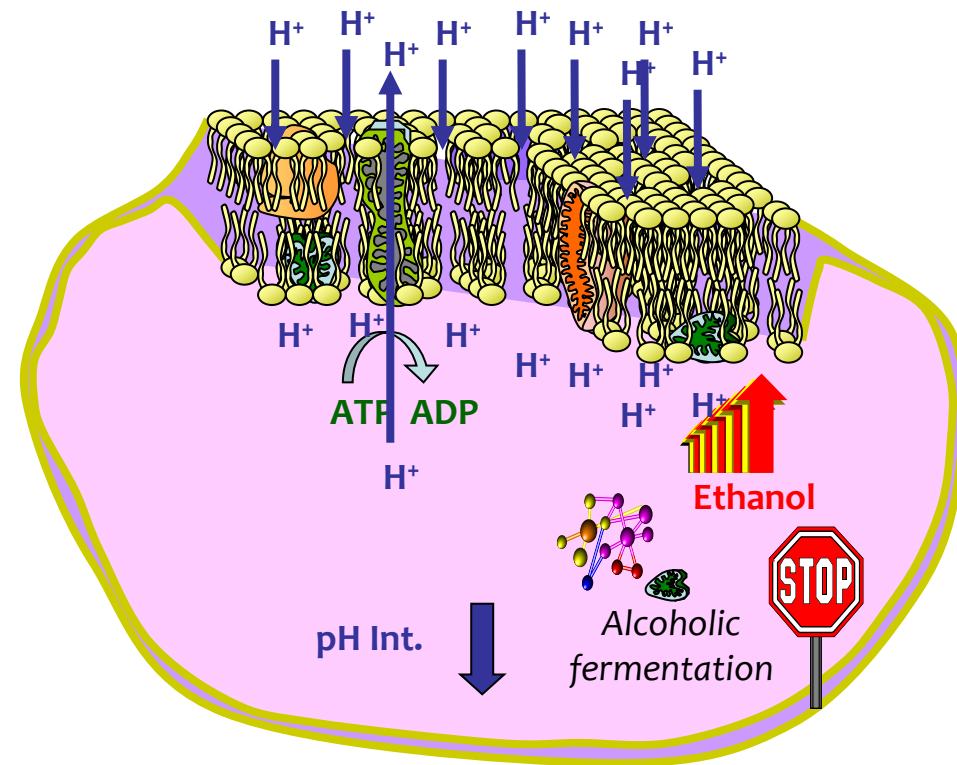
ATPase pump – regulates internal pH

- Especially important in the last ½ - ⅓ of AF
- Helps maintain internal cellular pH to 2-3 units higher grape must/wine pH
 - This is done by actively pumping out H⁺ through the ATPase pump, which needs energy supplied through good nutrition

- Ethanol ↑
- Membrane integrity is compromised
- Internal acid protons ↑
- ATPase has to work harder to get them out

➤ Cell death

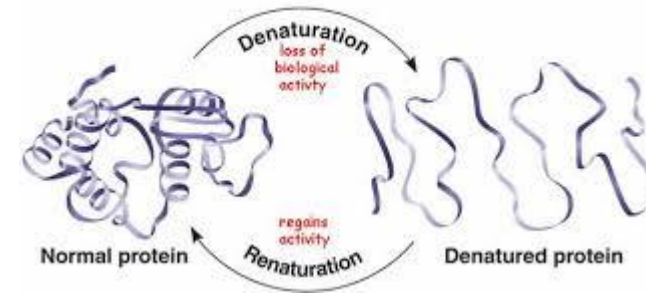
➤ Alcoholic fermentation ↓



Why is protection necessary?

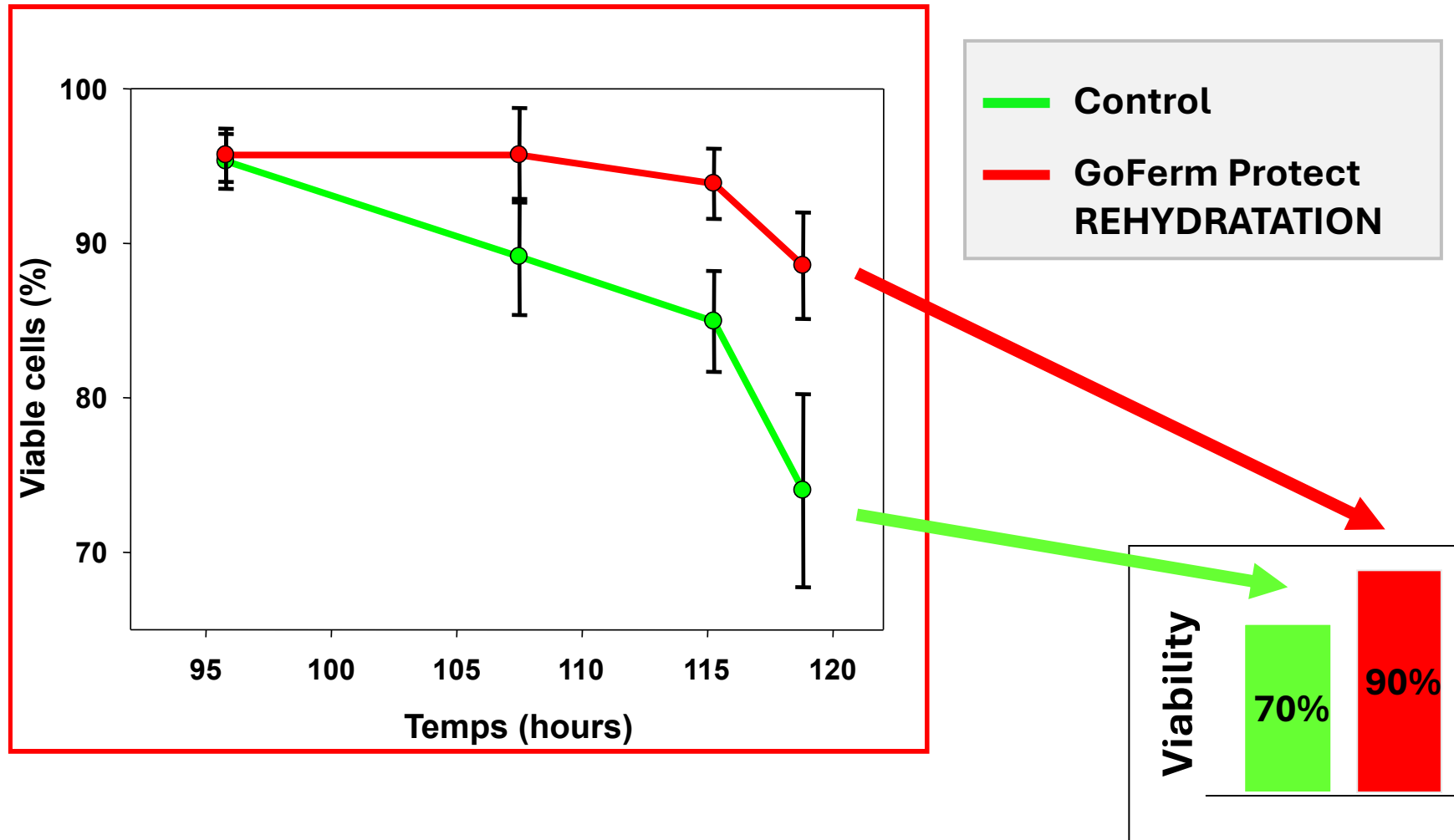
➤ Because of ethanol (the yeast's worst enemy)

- Ethanol causes;
 - Protein denaturation
 - Modification of protein action
 - H⁺ penetration is more easy
 - H⁺ release needs more energy



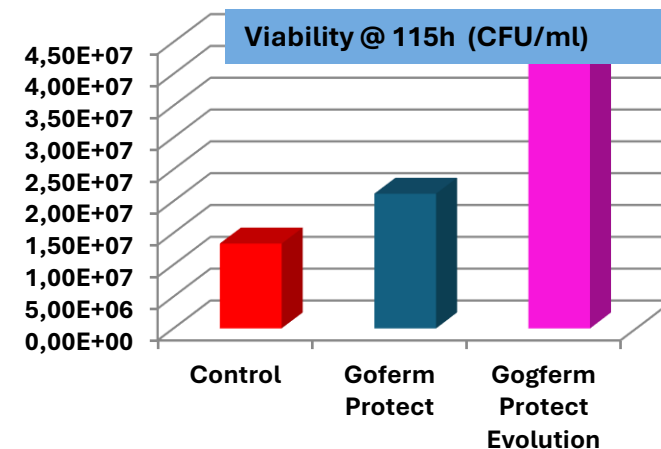
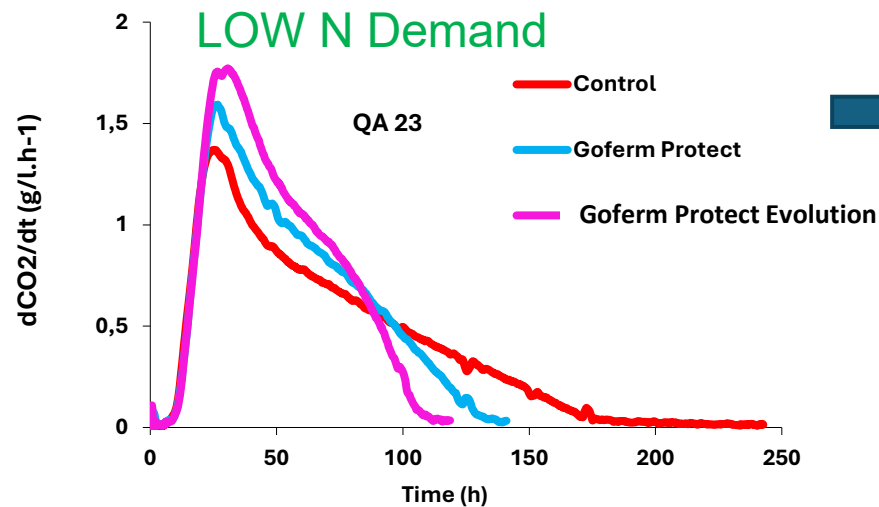
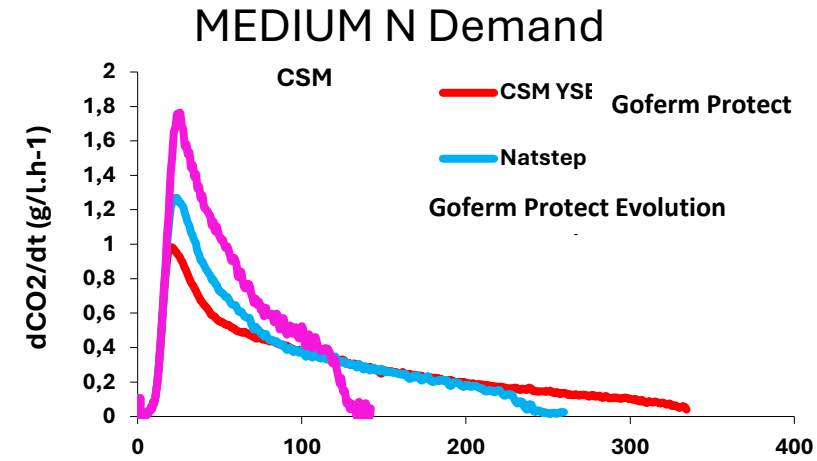
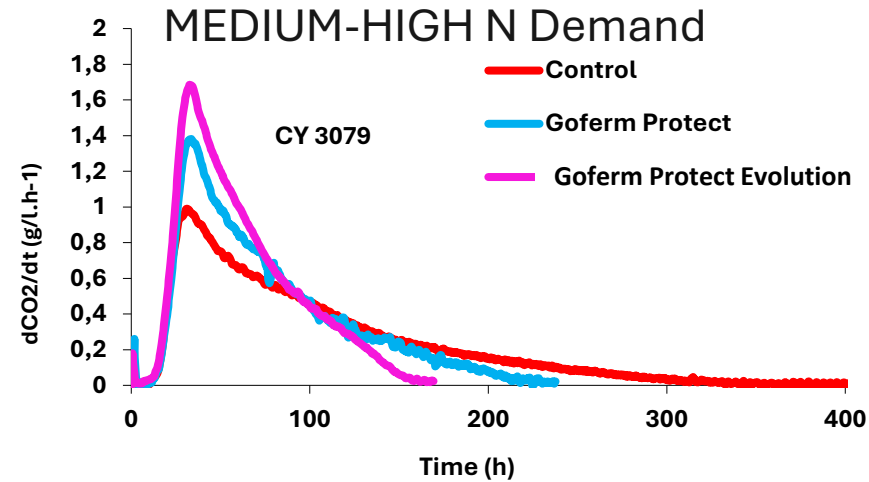
All leads to CELL DEATH ☹️

Impact of yeast protection on viability at the end of AF



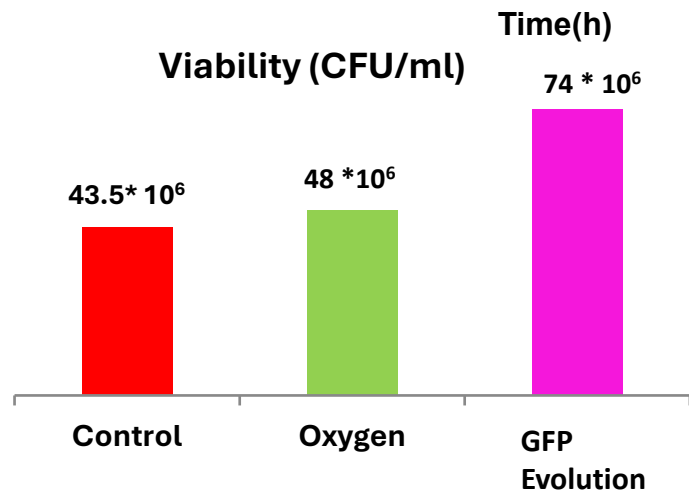
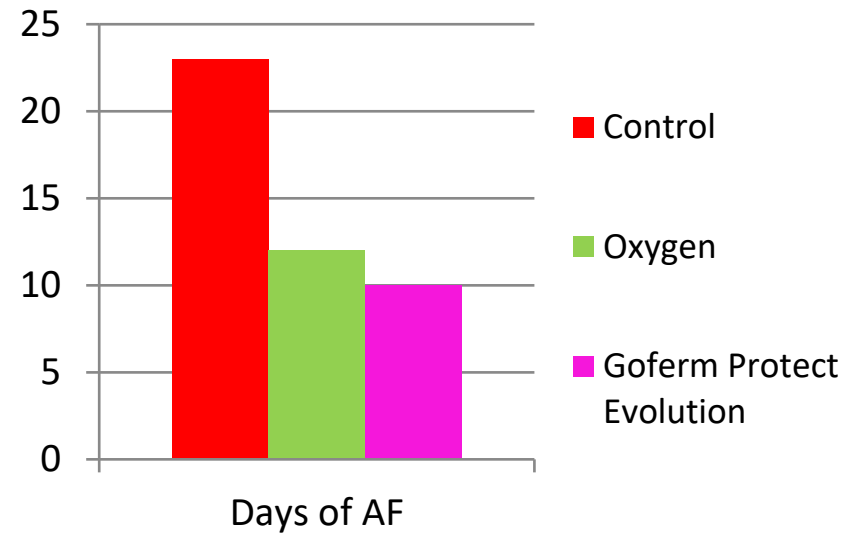
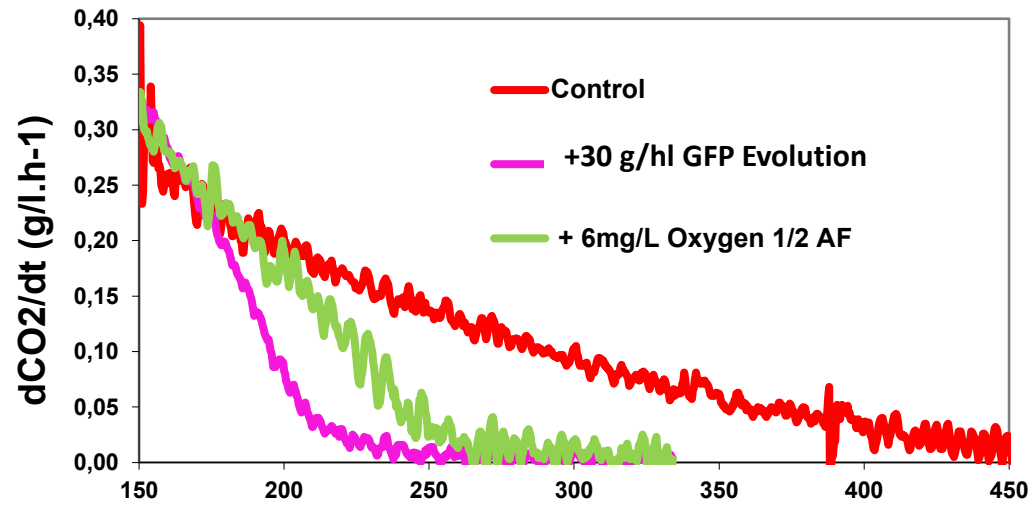
Impact of level of sterols in rehydration

High sterols deficiency conditions at 24°C - Protection effect on AF



GoFerm Protect Evolution versus Oxygen addition

Chardonnay, 20°C, high clarification



- More effective than O₂ during AF
- Enhancement of fermentation security and fermentation robustness
- Significant increase in viability, vitality flavour and aroma.

GO-FERM PROTECT EVOLUTION

Autolyzed yeast supplying vitamins, minerals, and sterols



Powder
(original)
formulation

GO-FERM STEROL FLASH

Autolyzed yeast supplying vitamins, minerals, and higher levels of sterols



Microgranulated
(new) formulation

Rehydration nutrient for healthier yeast, improved fermentation kinetics, cleaner fermentations, and improved varietal expression



GO-FERM STEROL FLASH saves *serious* time during rehydration

GO-FERM™ & GO-FERM PROTECT EVOLUTION™

Using *hot water* during rehydration means multiple acclimatization steps (15-20 min each) are necessary before adding yeast to cold juice or must.



TOTAL TIME:
≥ 1 hour

GO-FERM STEROL FLASH™

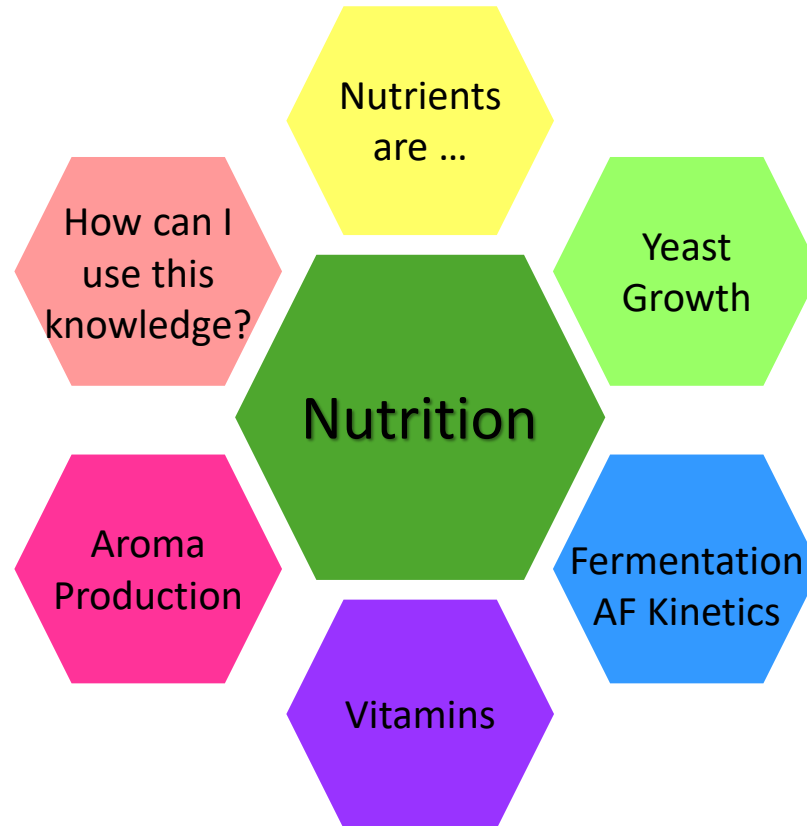
Using *cool water* eliminates the need for acclimatization steps. Dissolve GO-FERM STEROL FLASH in water, rehydrate yeast, and inoculate!



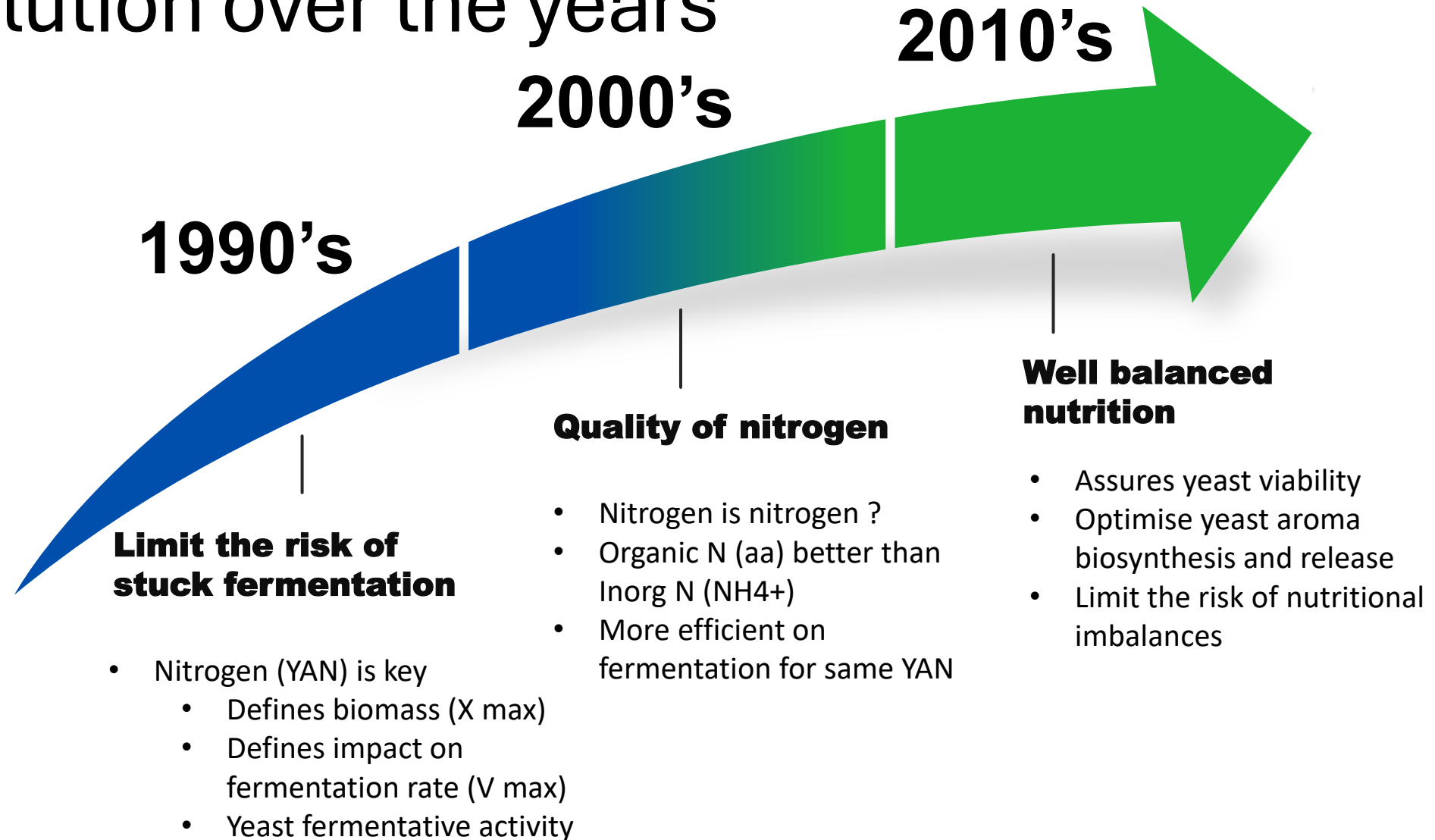
TOTAL TIME:
20 min

Gær..... næring

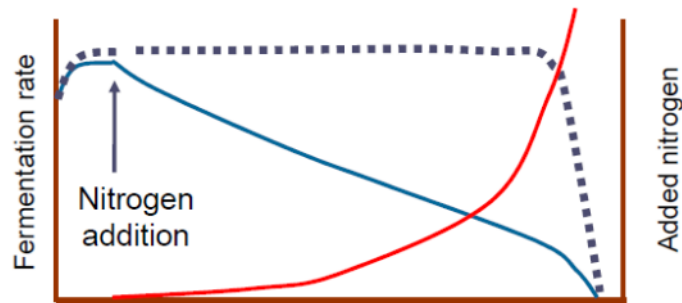
Nutrition is multifaceted



Yeast Nutrition Management Evolution over the years

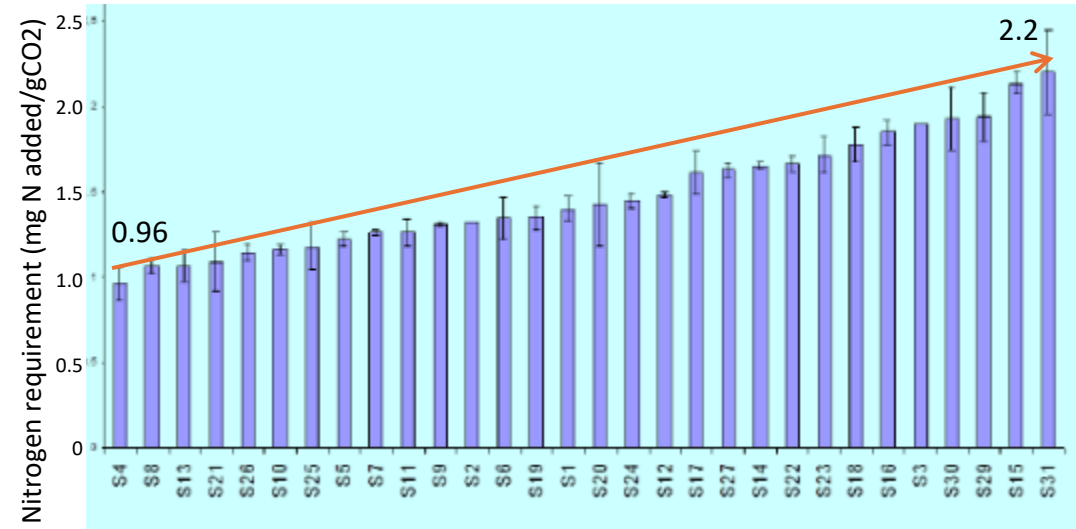


Yeast Nitrogen needs



The amount of N to get the same AF kinetics

- In exactly the same conditions
- Very significant differences



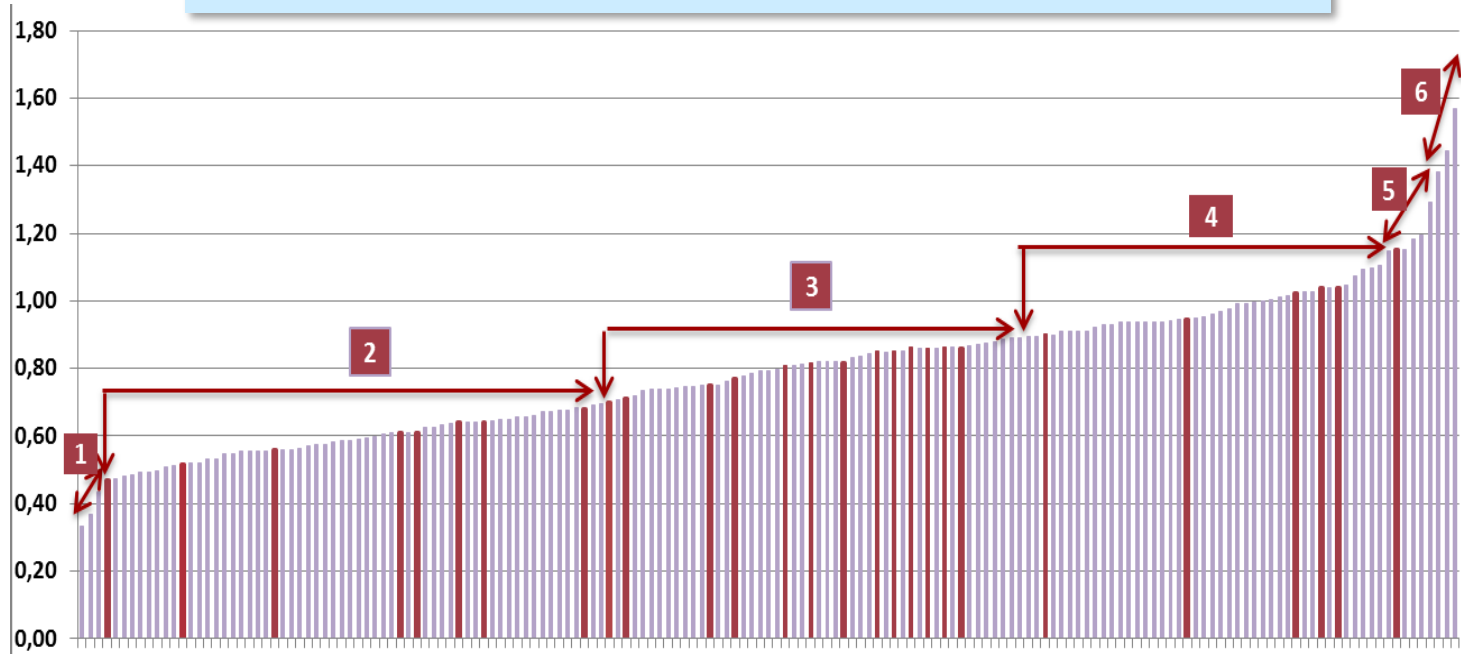
Julien et al AJEV 51, 215-222 (2000)

➤ Nitrogen needs are yeast strain dependent

Yeast nitrogen requirements

Yeast nitrogen needs to ferment a nitrogen deficient must (100mg/L YAN)

mg of YAN necessary to consume 1g of sugar (T°: 24°C)

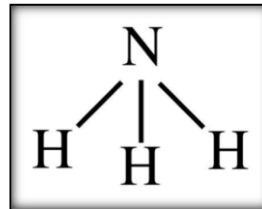
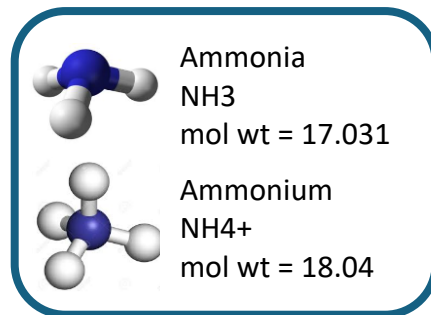


- Some yeasts need 4 times more N than others to ferment a deficient nitrogen must, at the same rate

What is assimilable Nitrogen?

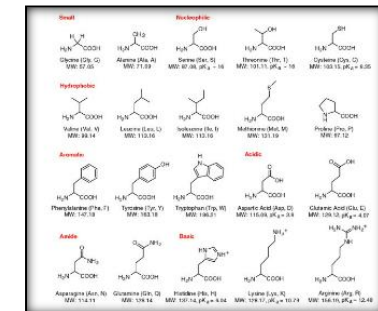
- Ammonia (Inorganic N)

- Simple compound
- Preferentially used
- Fast = junk food
 - Only lasts for a bit
 - Does not provide lots of nutrition or balanced food



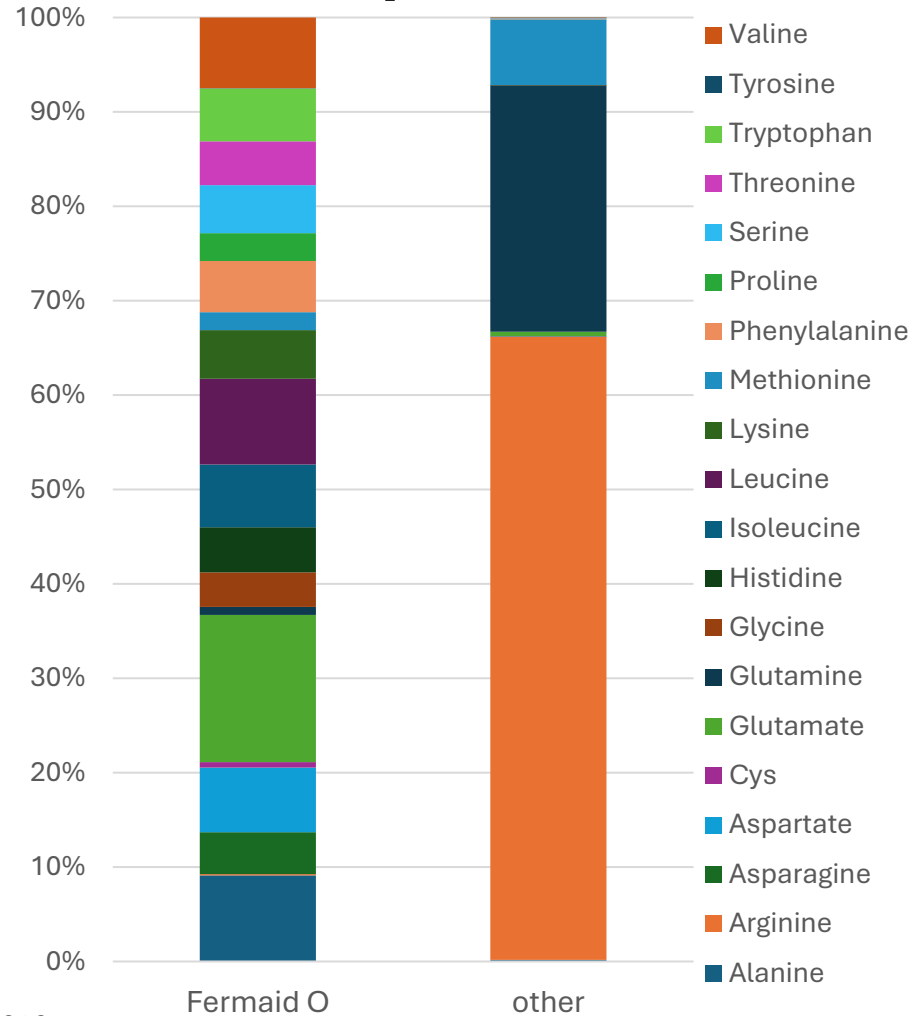
- Amino acids (Organic N)

- Meaning amino acids & peptides
- Some are more preferentially used than others
 - Easy
 - Intermediate
 - Less so
- Also equals order of uptake



➤ **Essential for protein synthesis**
Yeast growth & metabolism

Amino acid composition of Nutrient products

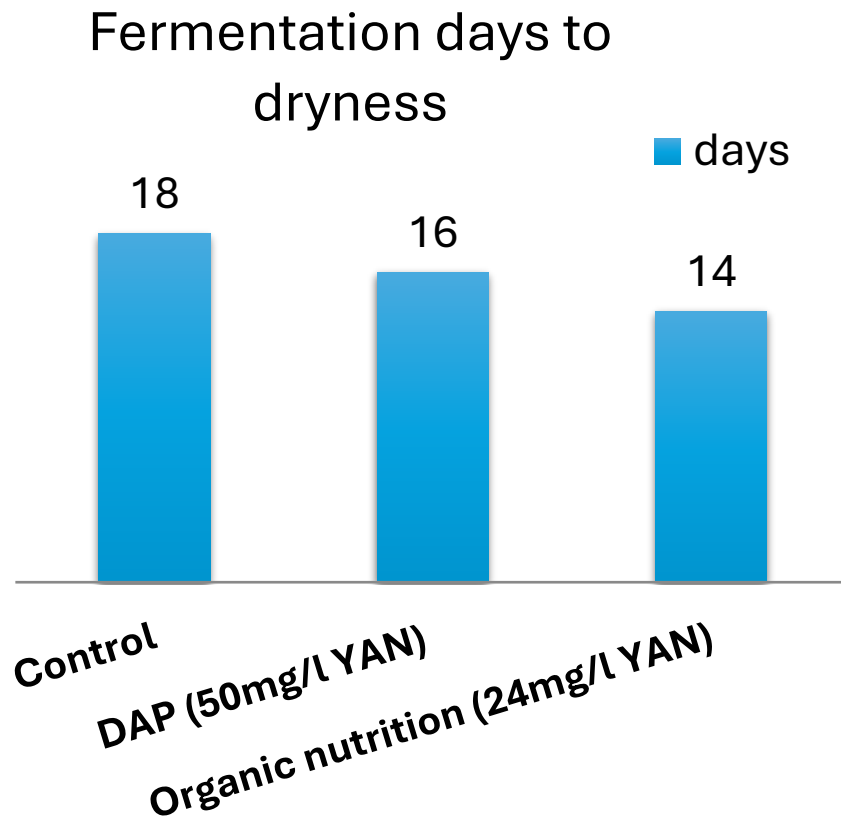


- Disproportionate amino acid composition

➤ *Fermaid O* provides a more broad & complete amino acid composition for yeast growth and metabolism

Scrimgeour et al, 2019

Nitrogen source – Efficiency on fermentation



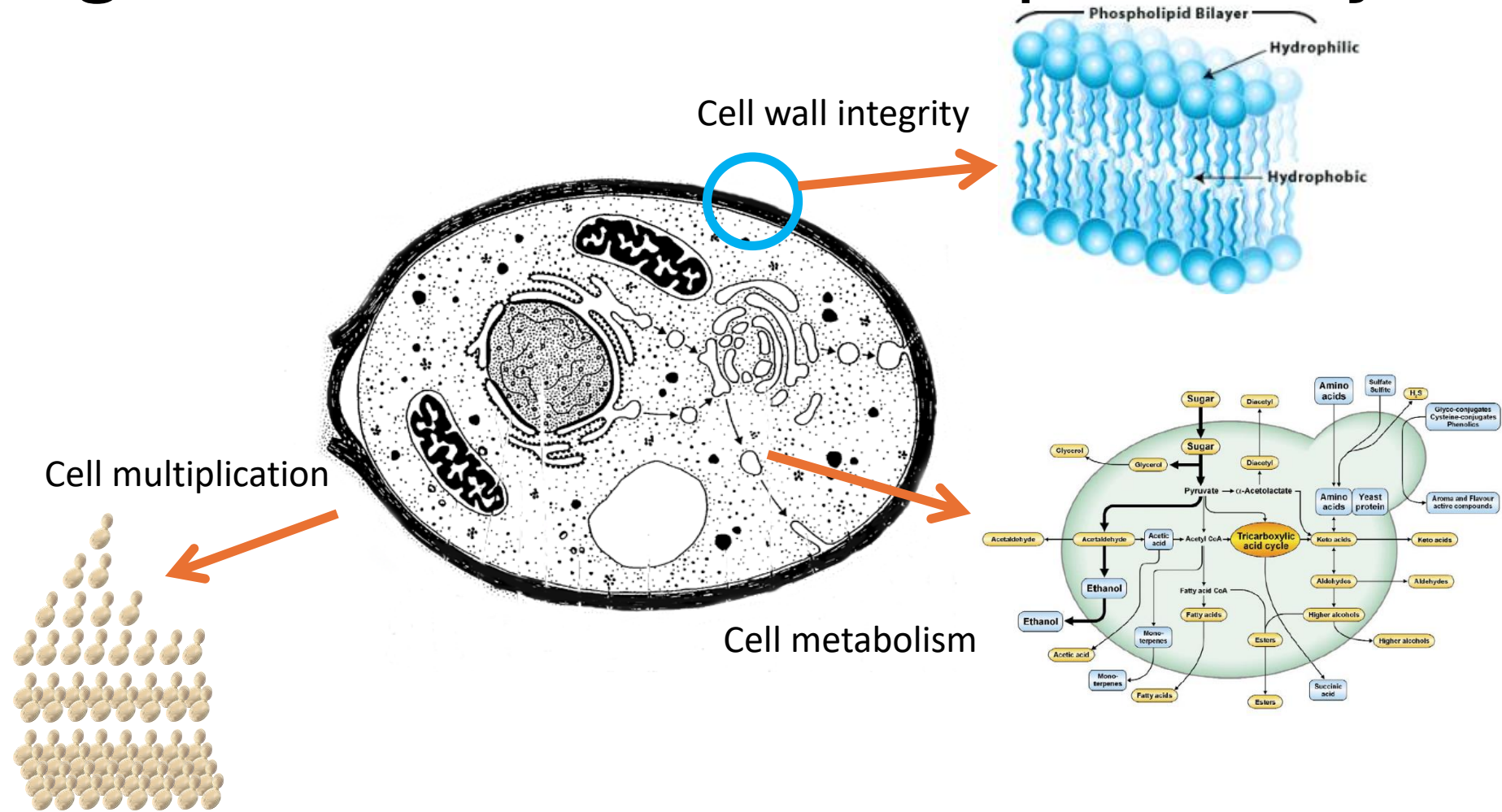
⇒ Organic nutrition is 2 times more efficient than inorganic nitrogen to complete fermentation.

Adelaide Hills, 2010
Chardonnay



The Australian Wine
Research Institute

Nitrogen affects numerous aspects of yeast

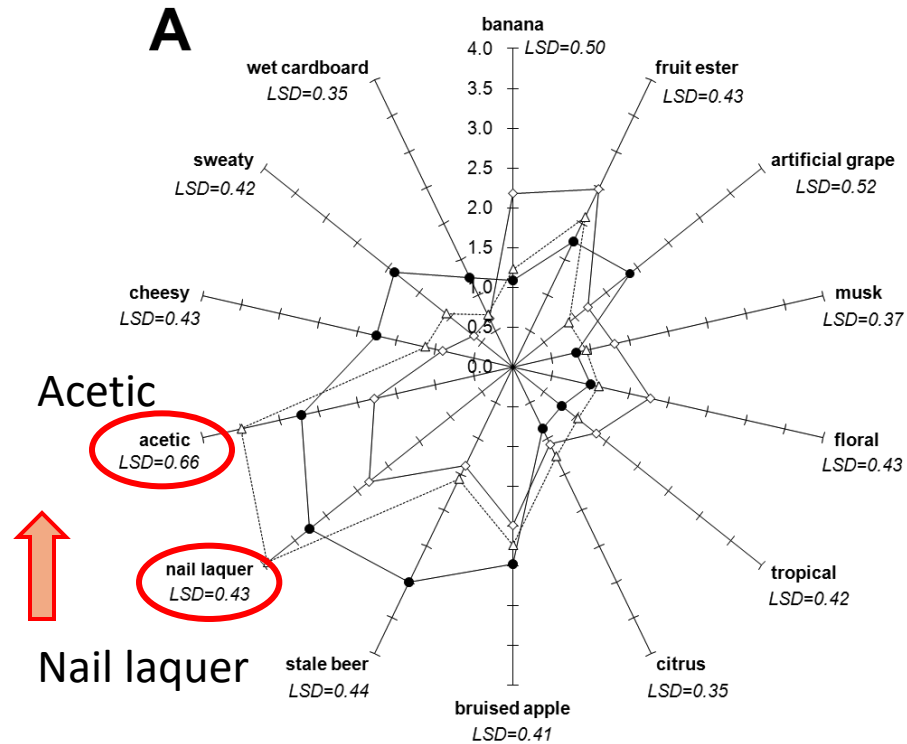


Nitrogen source impacts on wine sensory profile

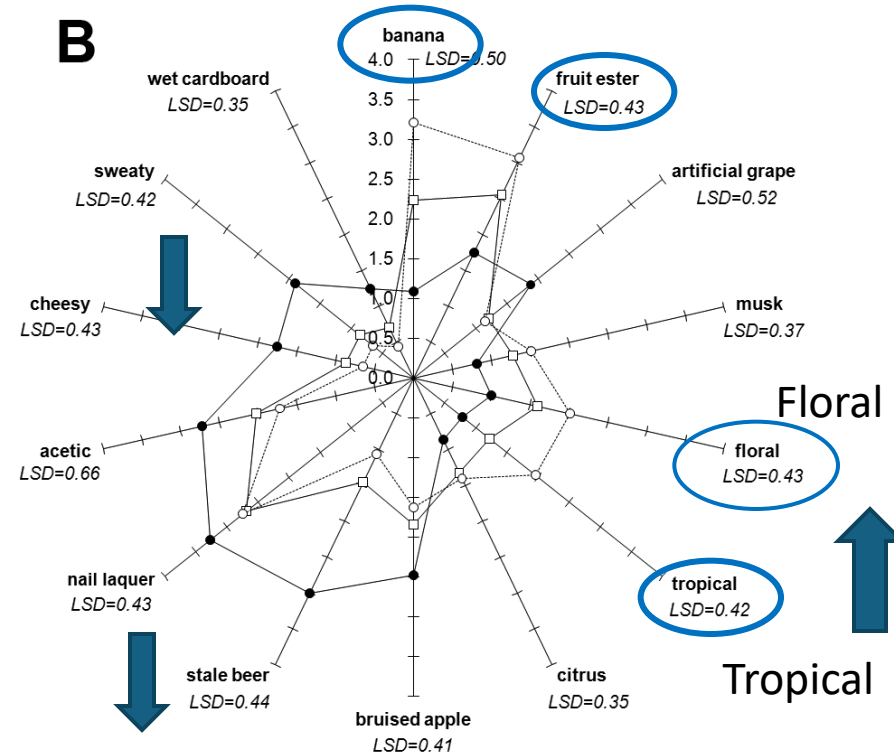


The Australian Wine Research Institute

+ Ammonium



+ Amino acids

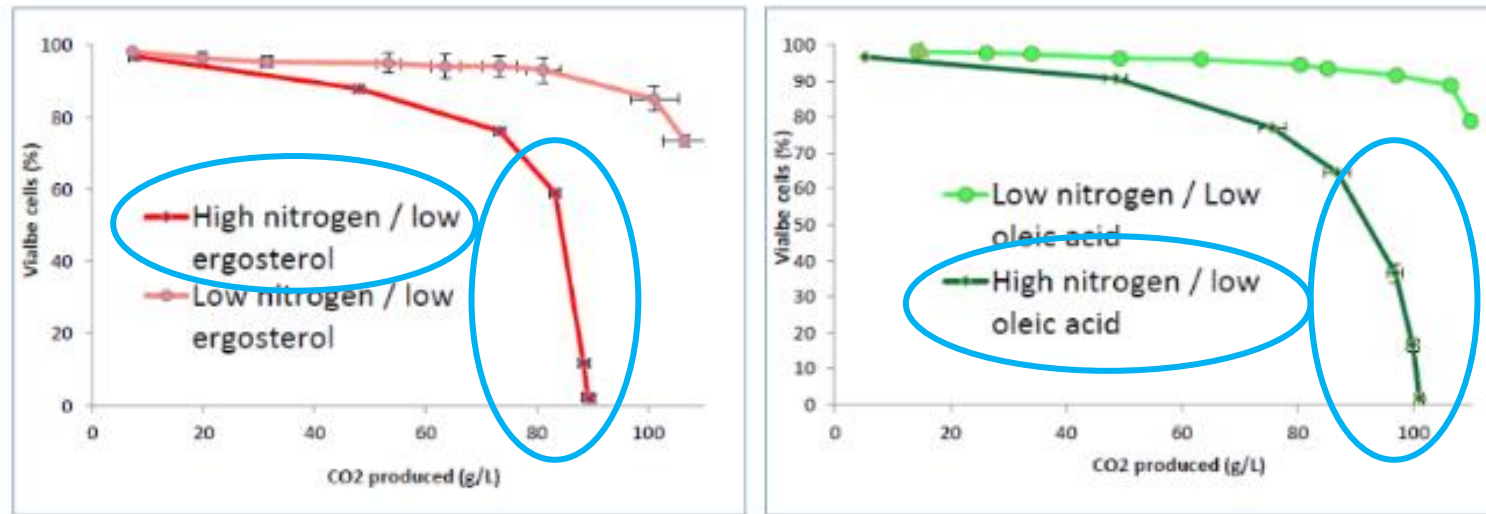


● Control (160) ○ NH₄⁺ (320) △ NH₄⁺ (480) □ AAC (320) ○ AAC (480)

Henschke, 2010

Nutritional imbalances

Impact of lipids on yeast viability

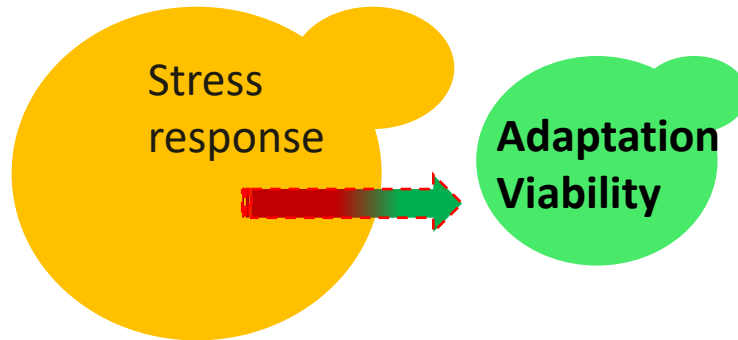


Duc C., 2017
(PhD Lallemand – INRA)

- Lipid source starvation triggers cell death in a nitrogen-dependent manner
- *GoFerm Protect Evolution will prevent/limit this risk*

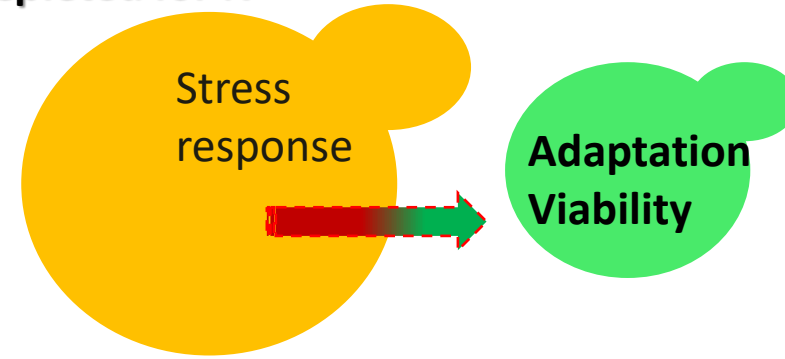
Nitrogen has an important role in signalling a stress response & yeast cell death

Matrix depleted for nitrogen



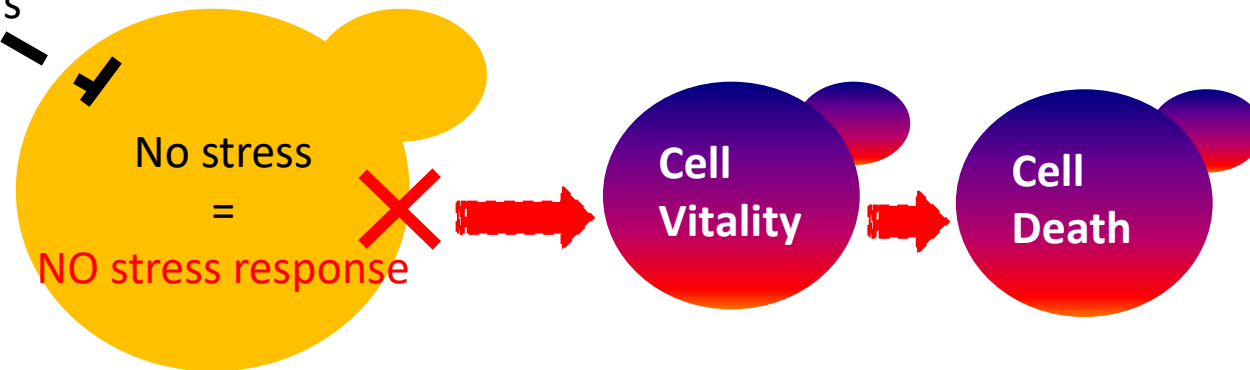
N- starved cells

Depleted for N



**Micro nutrient-starved cells
Vitamins & Minerals**

Amino acids
High NH_4^+



**Micro nutrient-starved cells
Vitamins & Minerals**



Stimula

DISCOVER THE SENSORY GALAXY

Natural Solutions that add value to the world of winemaking / www.lallemandwine.com





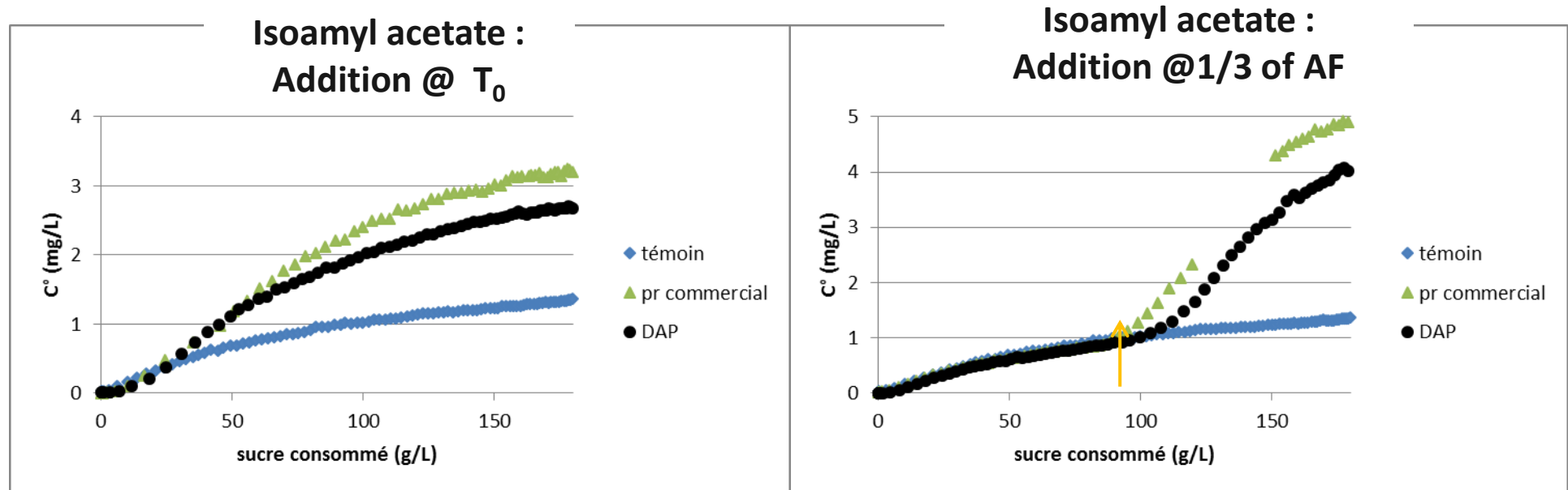
A Balance composition

- **Different nitrogen sources (100% yeast autolysate):** to guaranty a **balance nutrition** & optimize the aromatic metabolism
- **High vitamins content** (pantothenate) to avoid H₂S & increase thiols revelation
- **High minerals content (Mg)** to increase ethanol resistance (higher toxicity with high T°)

Objectives

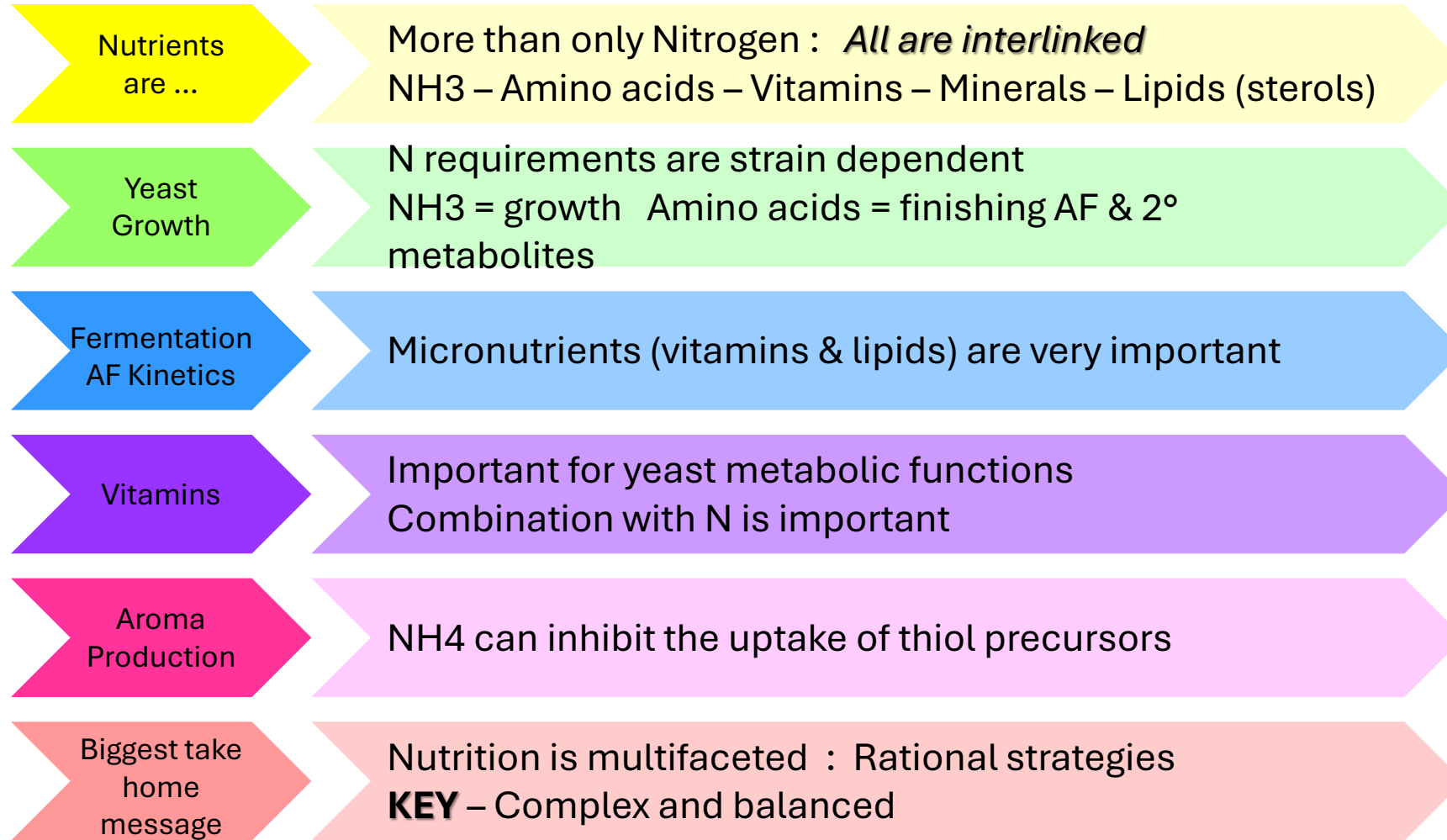
- To respect **and enhance** the varietal
- Remove the mask (off-flavors : H₂S)
- To stimulate yeast metabolism of aromas synthesis (better precursors uptake) = **Addition at the beginning of the AF**
- Nutritional balance : **free aas, peptides, vitamins & minerals.**

Esters synthesis : Impact of timing of nutrient addition (Stimula Chardonnay)



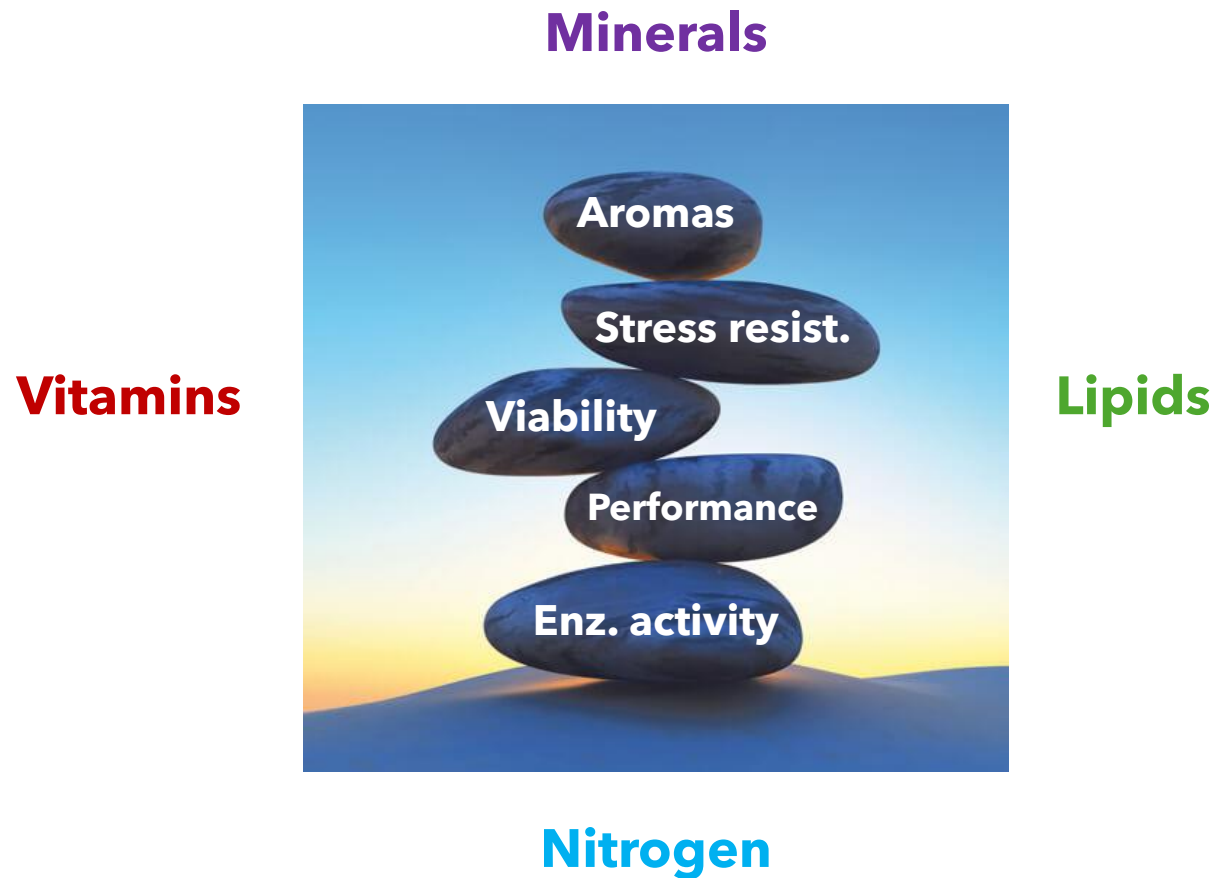
- Nitrogen addition impacts on the esters synthesis
- **Addition @ 1/3 : higher efficiency: +40%** compared to addition at t=0
- **Stimula Chardonnay**: more efficient than DAP

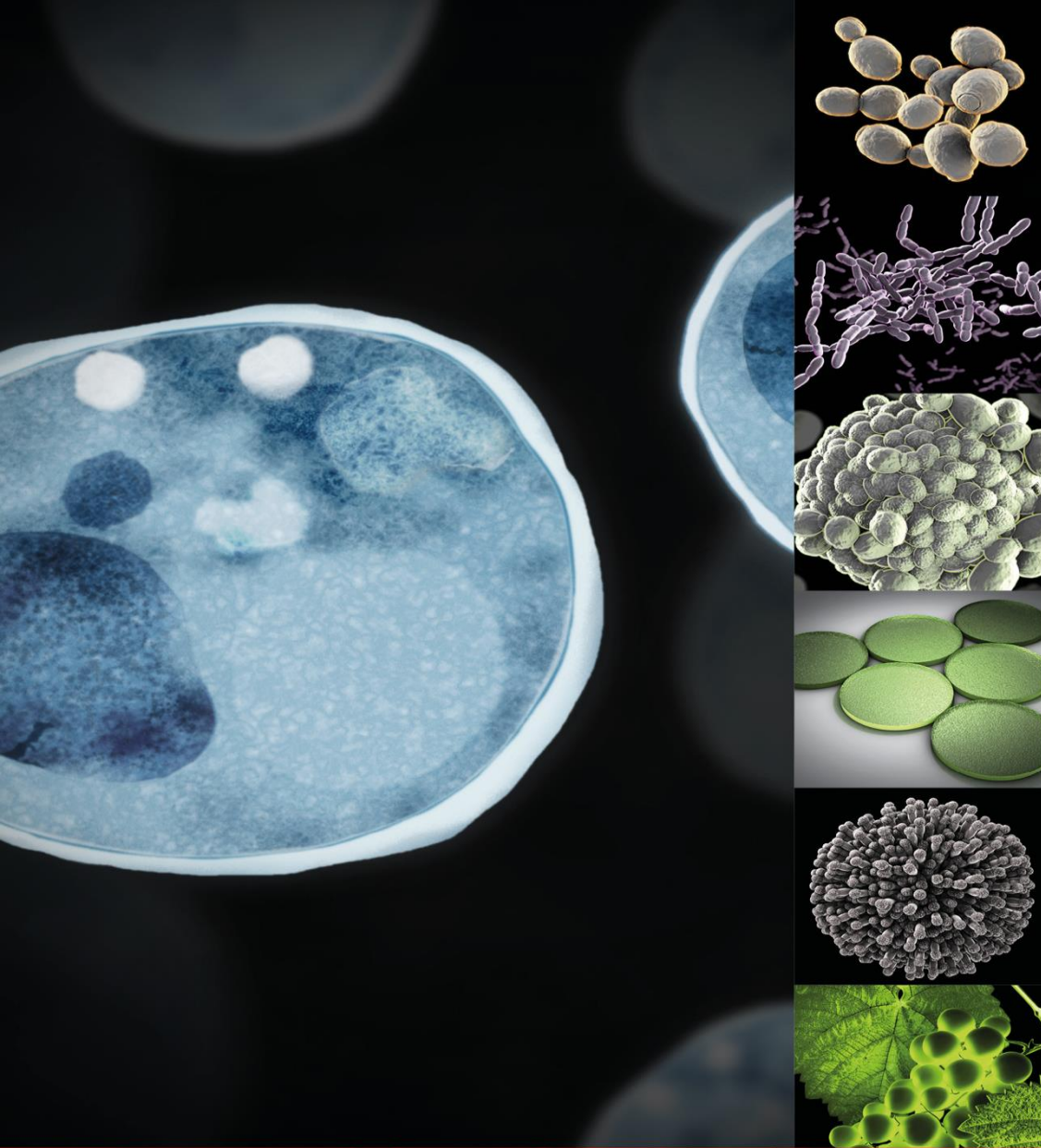
Nutrition is multifaceted



All is a question of balance

Nitrogen, **YAN management** during the AF is important...but **not enough**
The **notion of balance** and synergy between **micro-nutrients & nutrients** is **key**

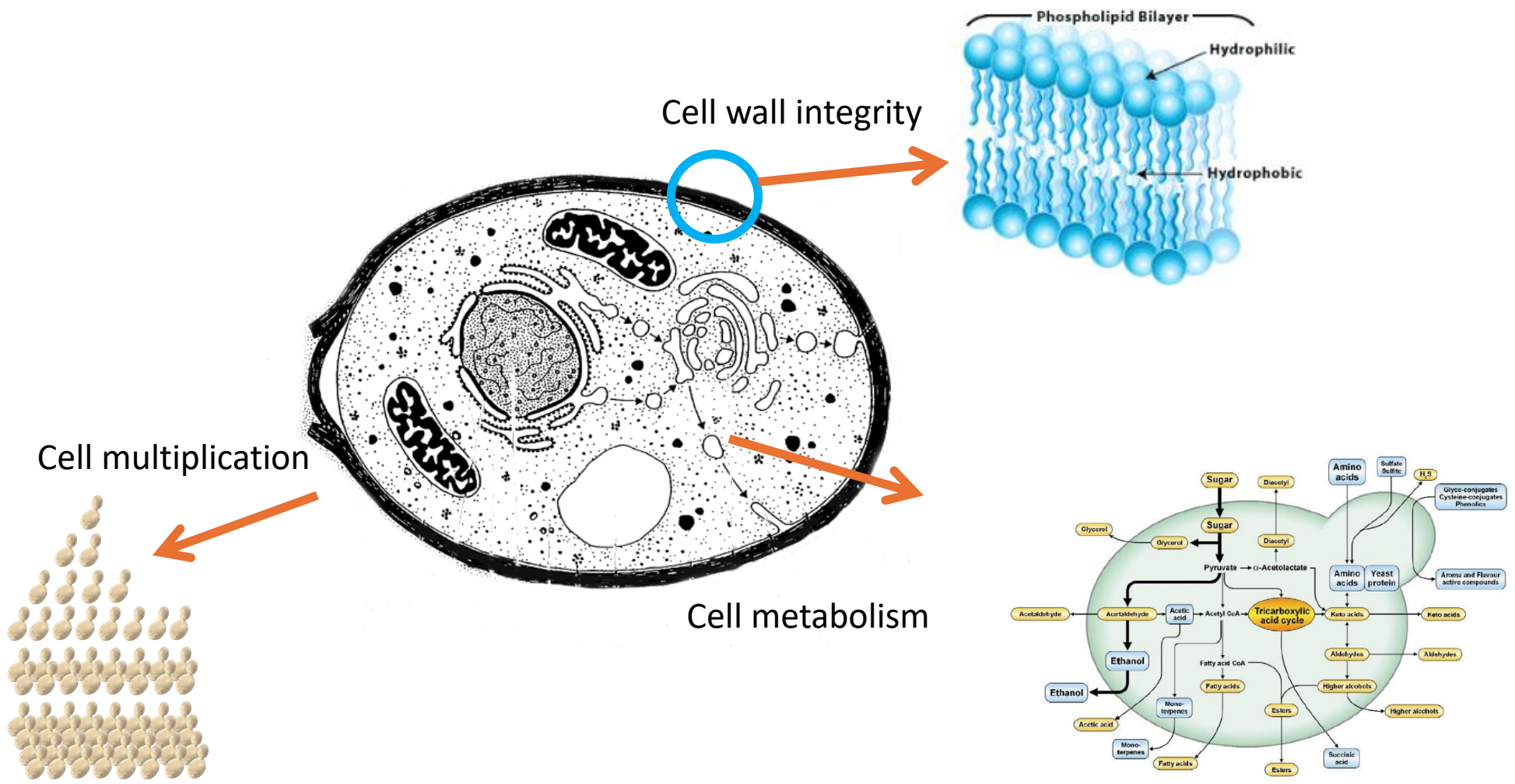




Specific Yeast Derivatives

Der er guld!







Oxidation

- Oxidant trap
- Increased GSH content



Microbiological spoilage/contamination

Bioprotection tools



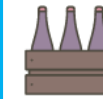
Fermentation management

- Avoid yeast stress
- Reduce acetaldehyde
- H₂S and SO₂ production



Microbiological stabilization

Reduce microbial contaminants



Oxidation

Scavenge dissolved oxygen



THE KING OF NATURAL ANTIOXIDANTS

GLUTASTAR
GET SUPREME HIGH POWER

LALLEMAND
LALLEMAND OENOLOGY
Original by nature

Veterinary biological solutions
Being original is key to your success. At Lallemand Oenology we apply our passion for innovation, maximize our skill in production and share our expertise to create and develop natural and innovative solutions. Our focus is the technology of your wine, we support your integrity, we cultivate our team. www.lallemmand.com



PURE-LEES™

LONGEVITY™

Pure anticipation

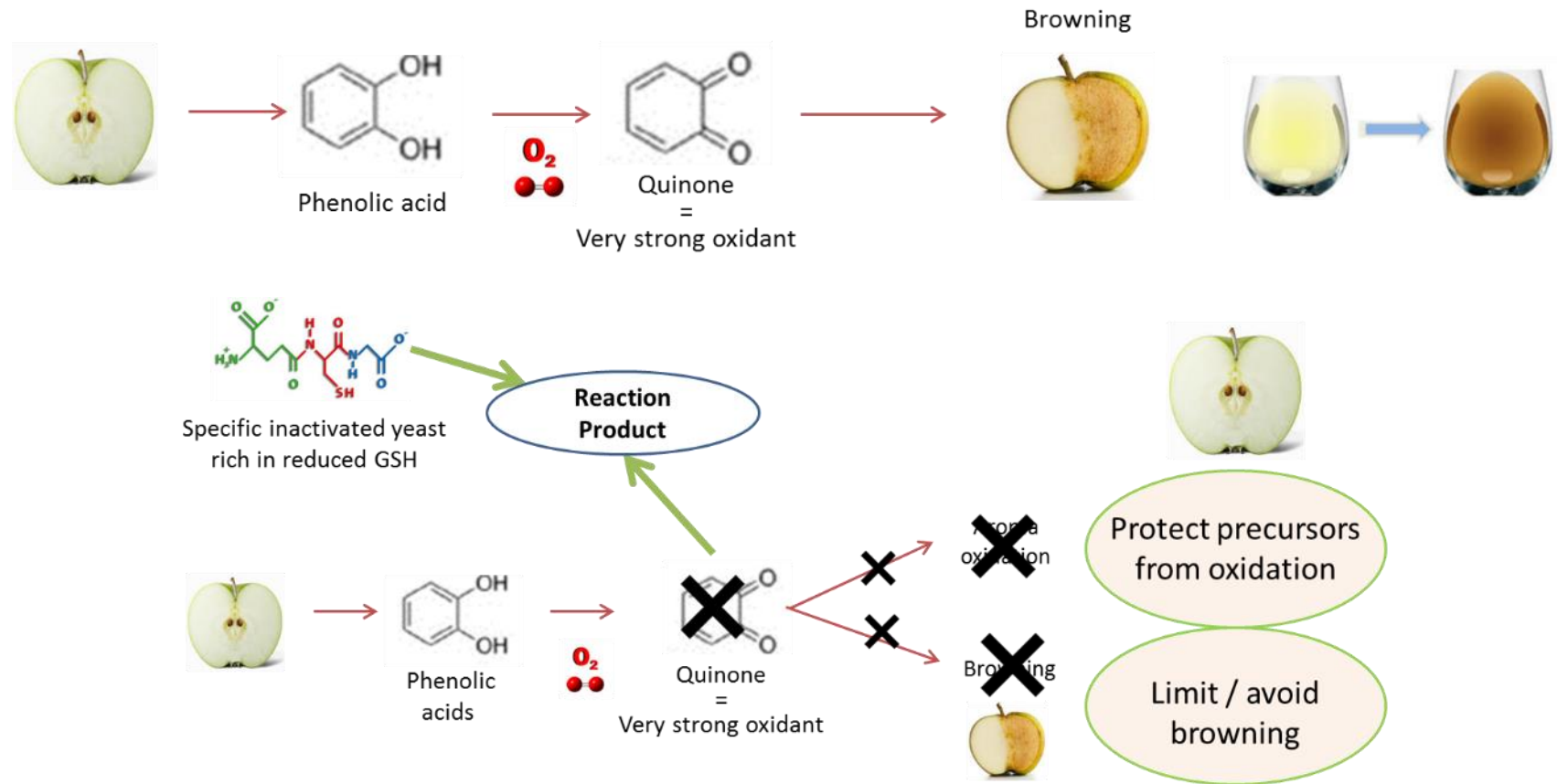
Protect wine against oxidation
High potential O₂ consumption
Helps to manage wine aging

In collaboration with **INRA**

Lallemand Oenology: Natural Solutions that add value to the world of winemaking / www.lallemmandwine.com

LALLEMAND

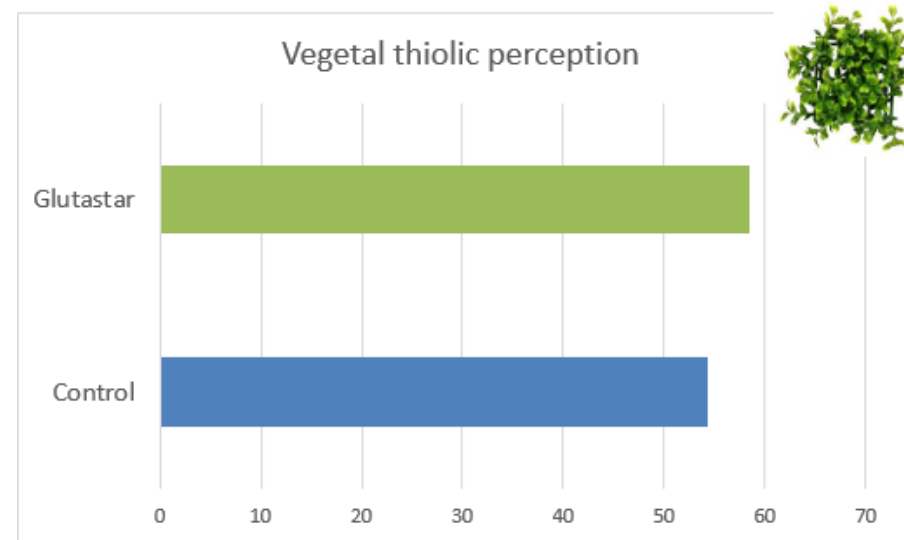
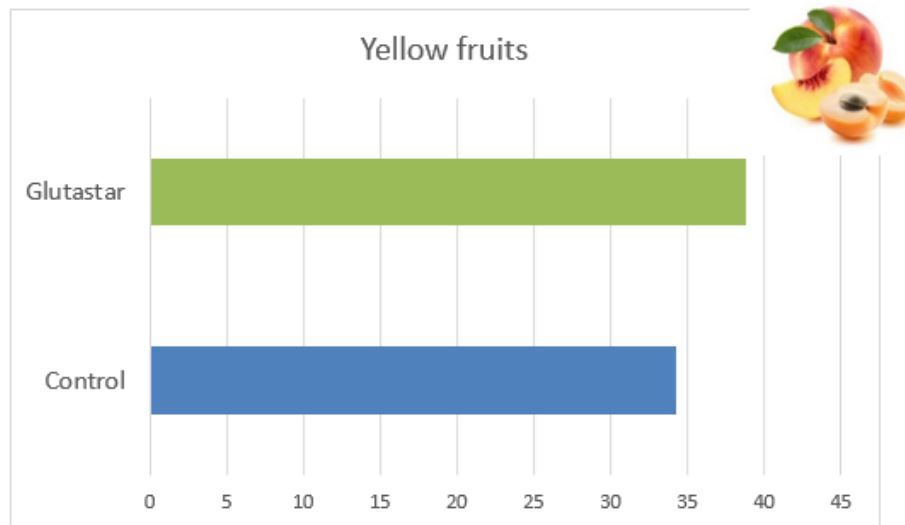
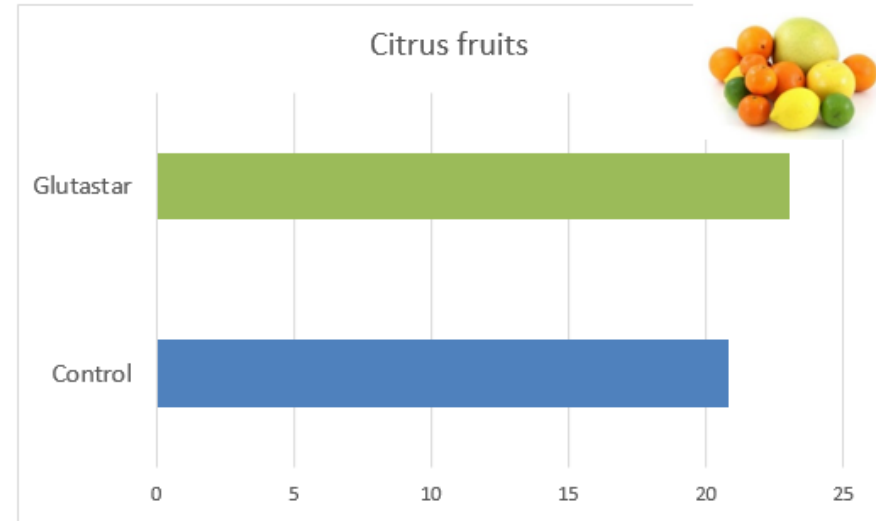
Wine oxidation



- SYD (with GSH) competes with aroma compounds that could bind to quinone (etc).
- SYD (with GSH) binds quinones leaving the aroma compounds free

Glutastar benefits... **3 years** after bottling

- **Sauvignon blanc 2018**, pilot scale (1 hL, IFV Val de Loire, France)
- 2 g/hL of SO₂ addition in the must, classical settling (24h at 8°C)
- Control (no addition) vs Glutastar (30 g/hL) added before settling



From nucleophiles diversity to (real) wine stability

Positive organoleptic impact & color preservation



Wines 1 & 3 with GLUTASTAR addition:
Clear different color: less brown
Organoleptic impact: better mouthfeel



IIS Ciuffelli Todi

Grechetto 2019
(IIS Ciuffelli Todi, Italy)

Addition of 30 g/hL of
GLUTASTAR during tank filling

CAUDALYS™

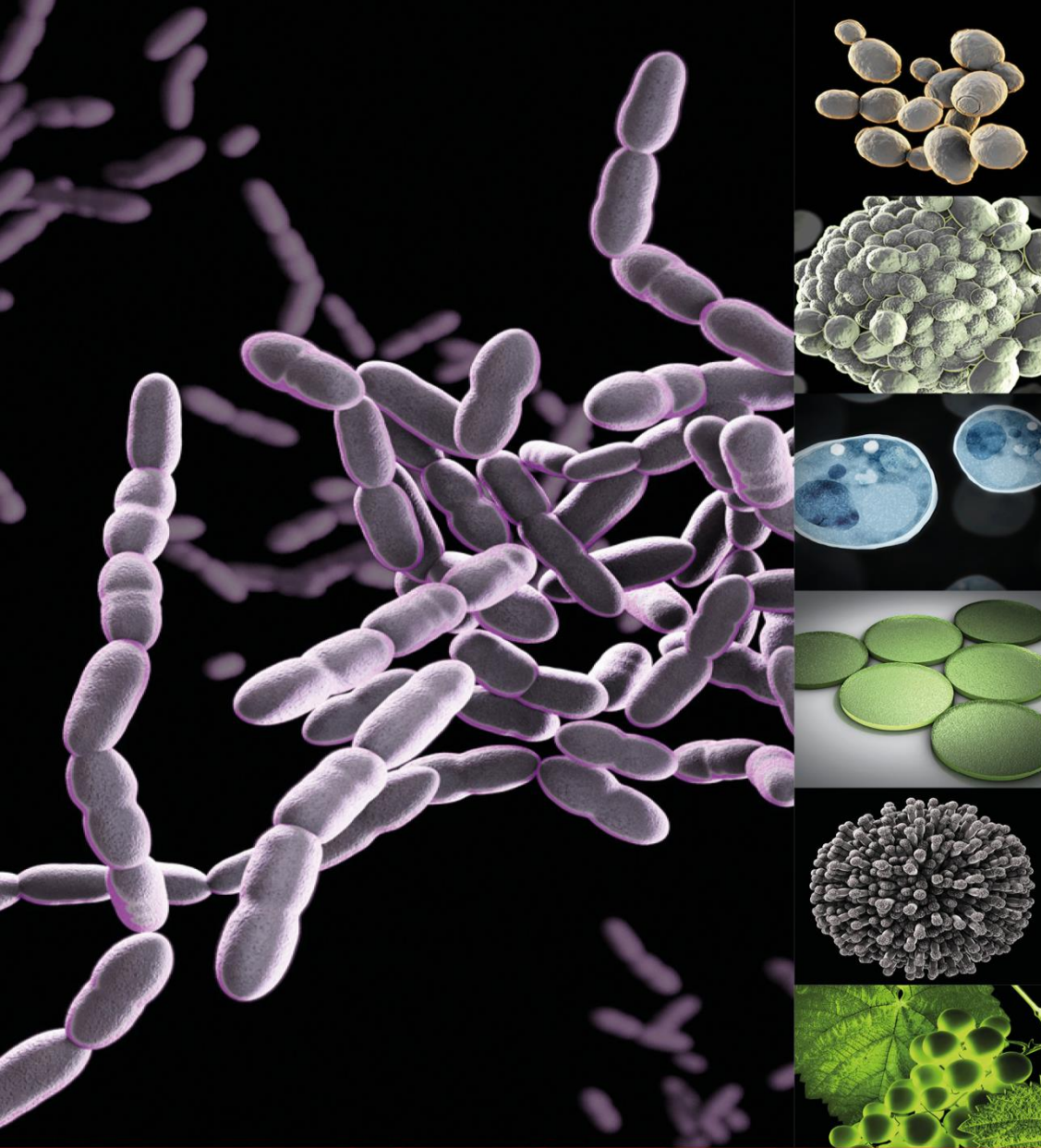
A new Specific Inactivated Yeast
from non-*Saccharomyces Torulaspora delbrueckii*
process

for aromatic length, crispy and minerality notes
in **rosé wines**

How to use it ?

CAUDALYS™

- In must at the beginning of AF from 10 to 30 g/Hl
- In wine from 5 to 15 g/Hl / contact time around 7 days
- Sparkling wine : tirage from 5 to 10 g/Hl
- Suspend in 10 times its weight of water or must/wine



Bakteria



Why is *O. oeni* the main species used for MLF?



Lactobacillus plantarum
Lactobacillus mali
Lactobacillus kefir
Lactobacillus lindneri
Lactobacillus brevis
Lactobacillus buchneri
Lactobacillus kunzei
Lactococcus lactis
Enterococcus faecium
Enterococcus avium
Enterococcus durans
Enterococcus hermanniensis
Leuconostoc mesenteroides
Pediococcus parvulus
Pediococcus damnosus

(*Oenococcus oeni*)

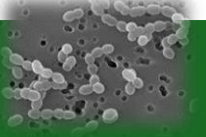

L. plantarum
L. sanfranciscensis
L. casei
P. parvulus
L. hilgardii ...
***O. oeni* 0-10%**

L. plantarum
P. parvulus
L. hilgardii
***O. oeni* 80-100%**

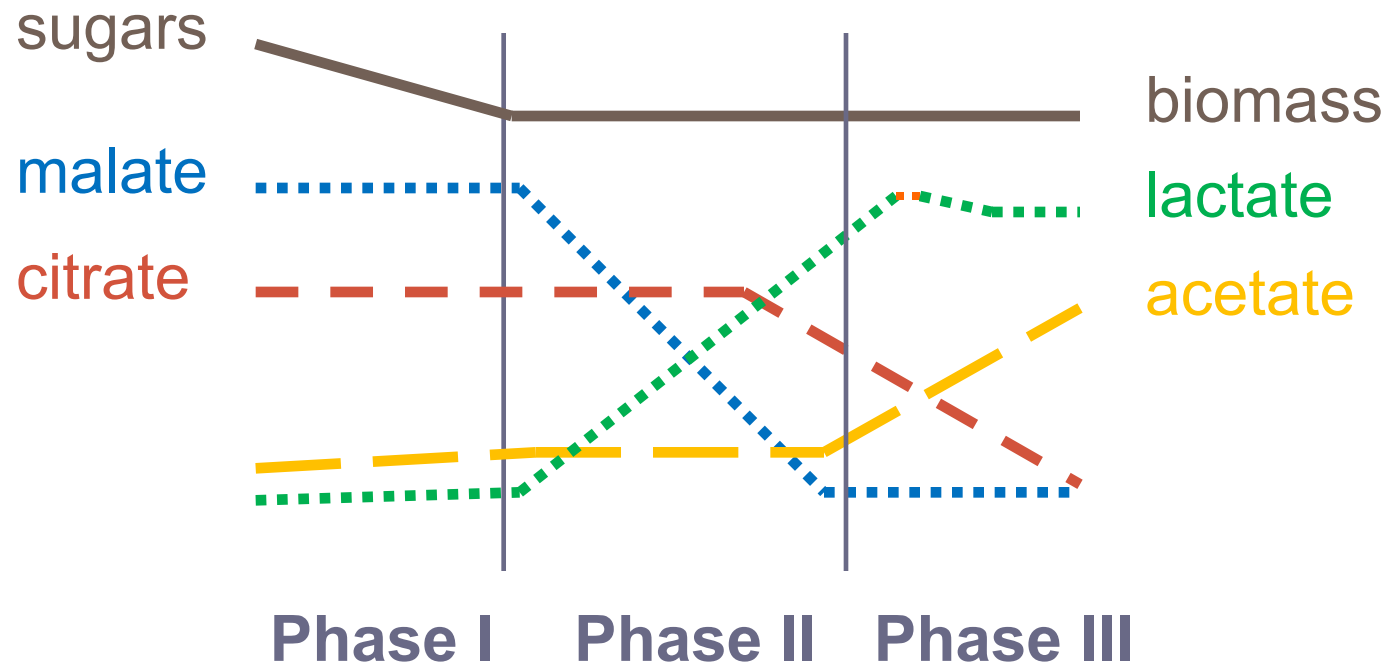
(Lactobacilli)
 (Pediococci)
O. oeni

Lactobacilli
 Pediococci
(*O. oeni*)

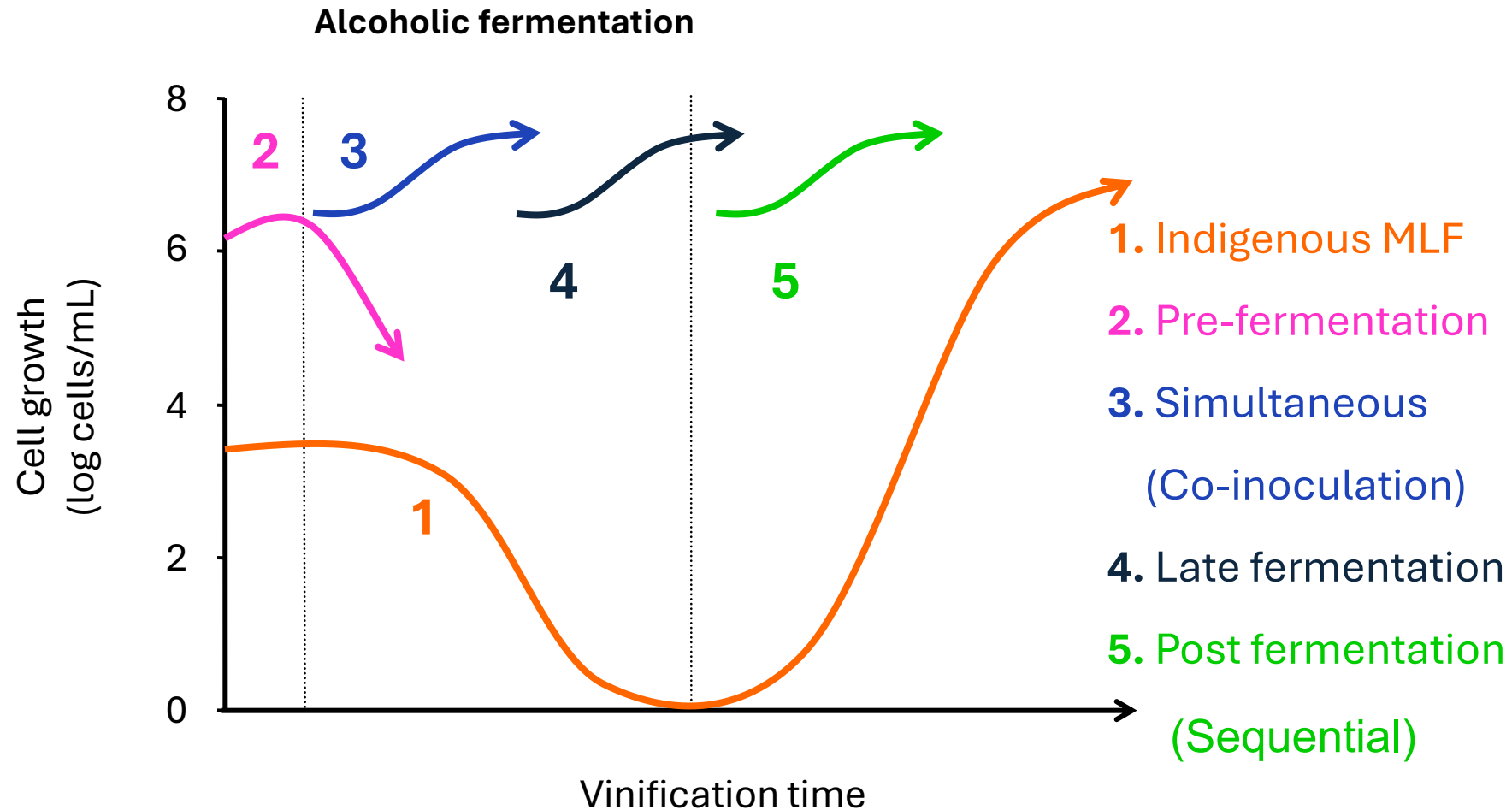
O. oeni & *L. plantarum* have different features

	<i>O. oeni</i> 	<i>L. plantarum</i> 
pH	Tolerates 2.8-4.0	Prefers > 3.5
ethanol	Tolerates up to 17%	Survives up to 10%
temperature	Conduct MLF at low °C	Grows best at 20+°C
SO ₂	Up to 60 ppm Total SO ₂	Up to 50 ppm Total SO ₂
acetic acid	Minimal increase of VA	Produces no VA
	Suite of enzyme activities	Suite of enzyme activities
aroma	Enhance aroma profile of wine	Enhance aroma profile of wine
	No off-flavours	Produces bacteriocins
Sugar fermentation	Heterofermentative	Homofermentative

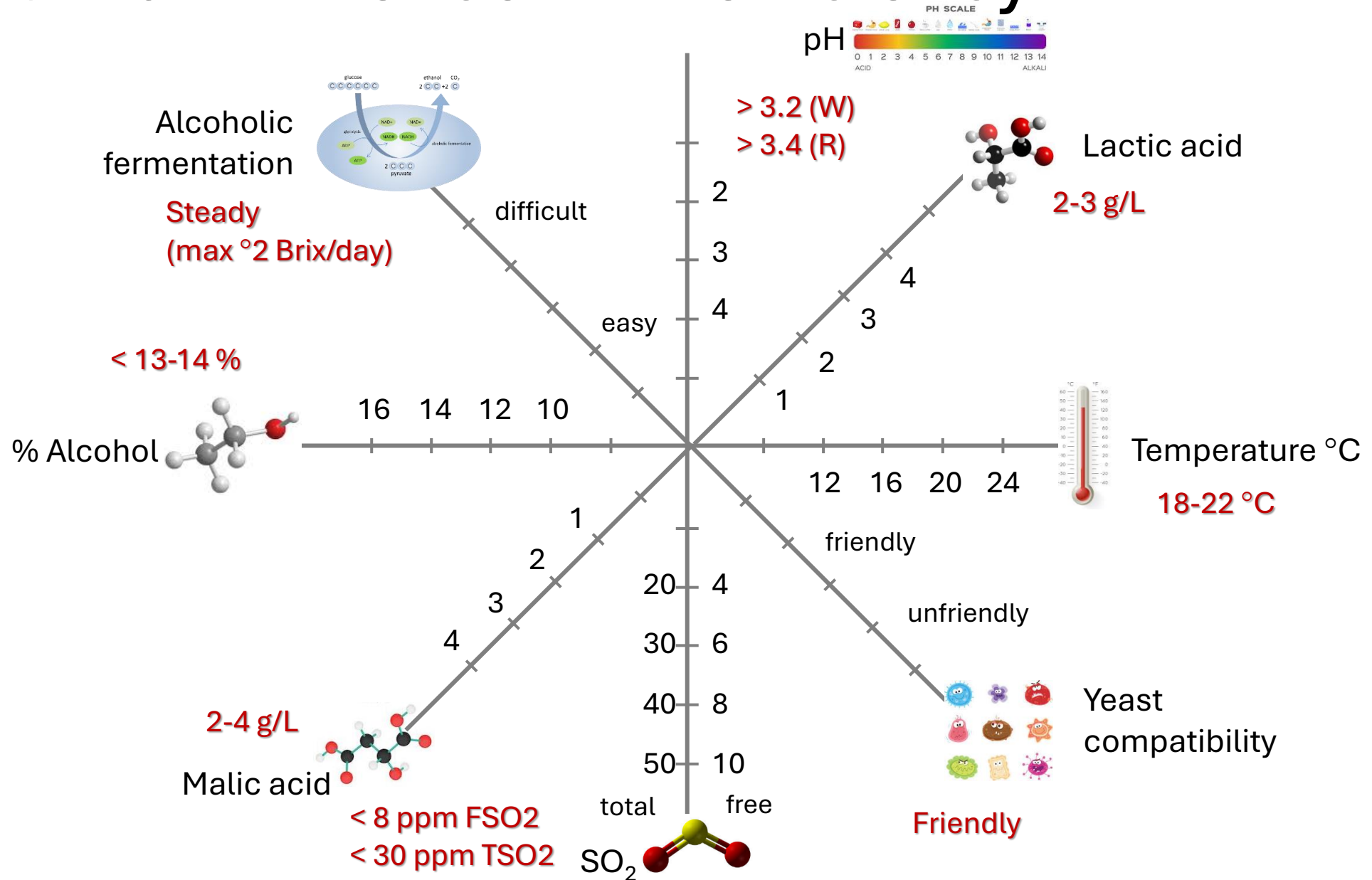
Metabolism of sugars & organic acids during MLF



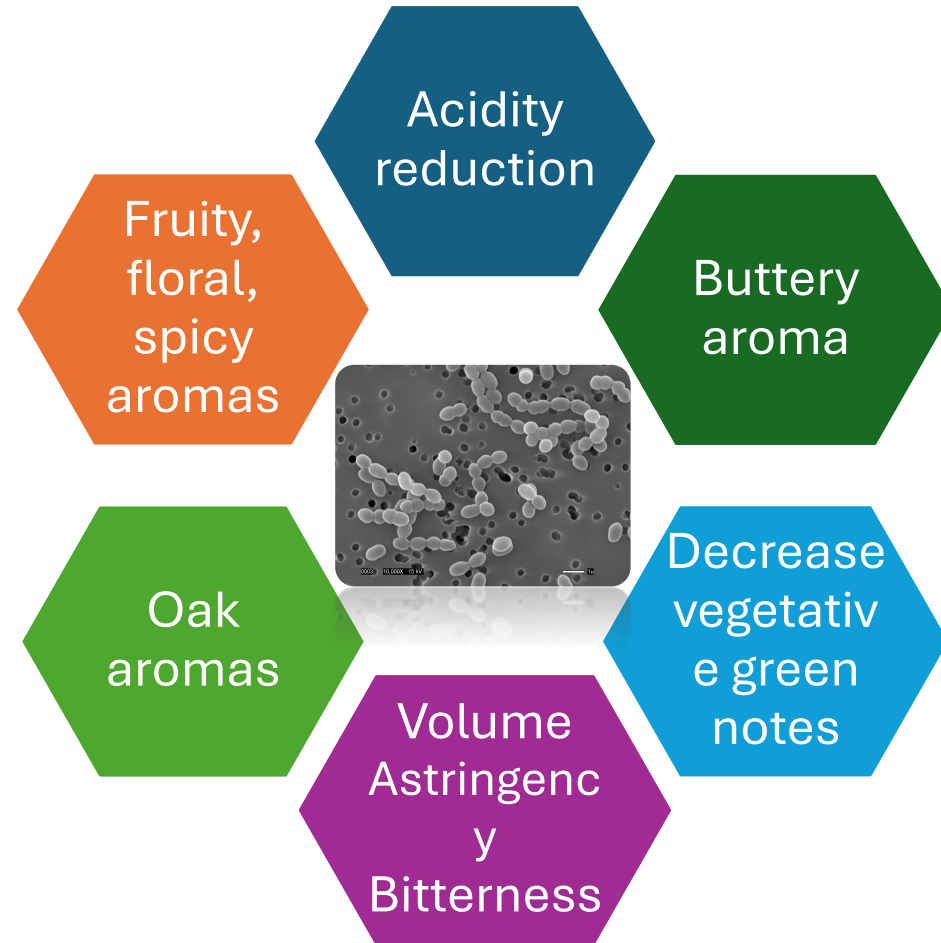
Inoculation regimes for MLF induction



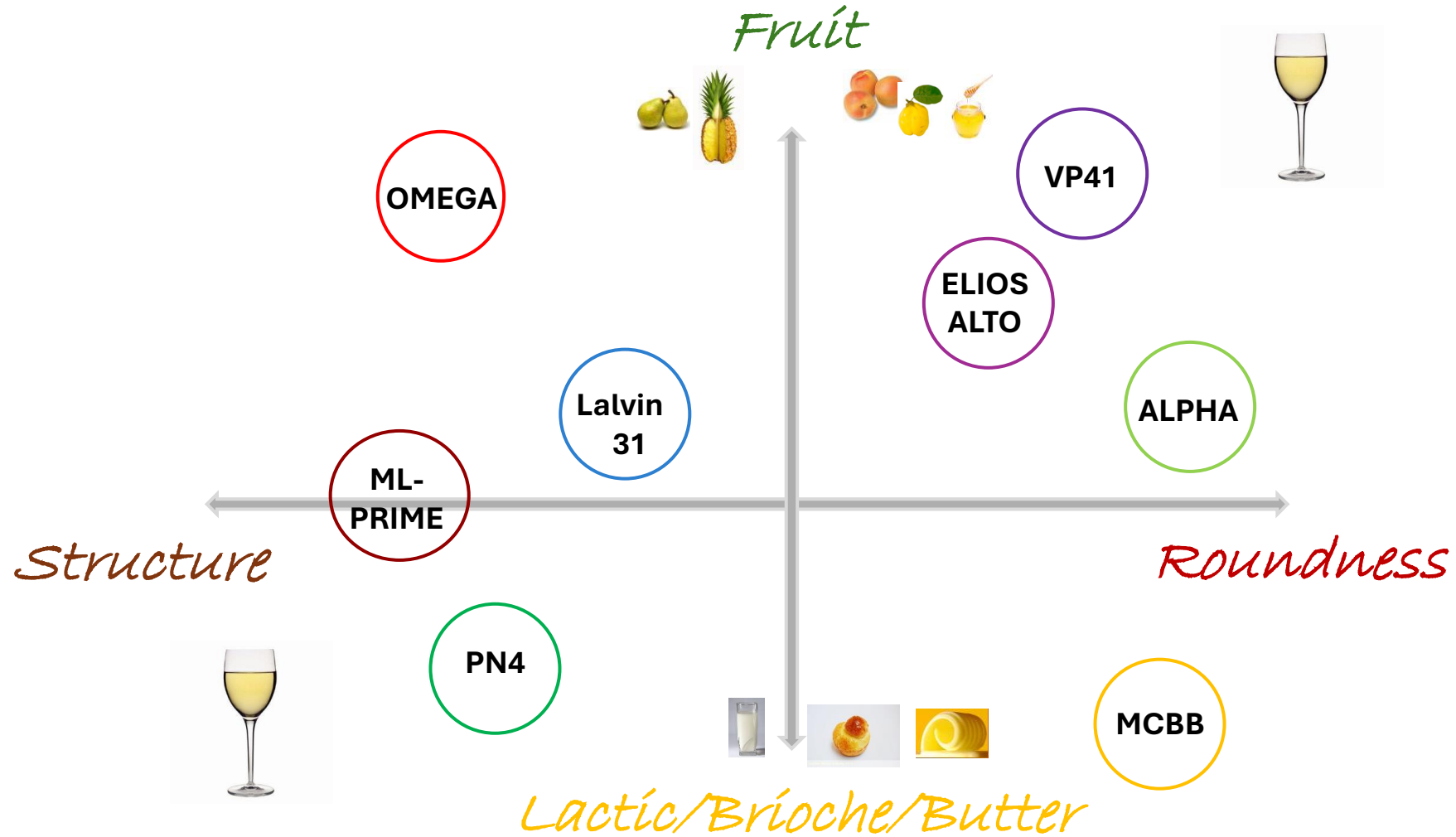
Factors that influence MLF efficiency



SENSORY INFLUENCE OF WINE BACTERIA




UNPARALLELED SENSORIAL DIVERSITY OF OUR WINE BACTERIA – SEQUENTIAL INOCULATION IN WHITE WINES



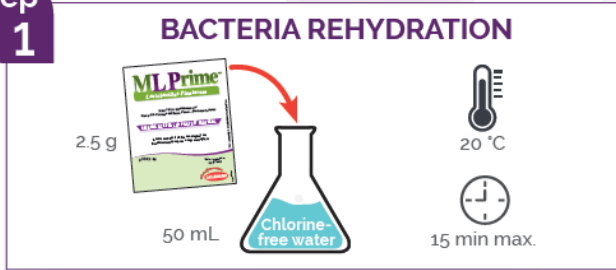
Help with difficult MLFs

- Potential as curative use for stuck MLF
 - Do a specific Lab pre-test (fermentability test) using 2.5 g ML Prime
 - Sequential inoculation
 - Temperature is a key factor
- Test:
 - Single dose
 - Double dose
 - Cf with VP41

 **LAB PRE-TEST PROTOCOL**
For a successful malolactic fermentation with **ML Prime™** inoculated in wines


A powerful pre-test at lab scale to determine the success of malolactic fermentation completion with ML Prime™ in red wines and white wines when used in post alcoholic fermentation inoculation.

step 1 **BACTERIA REHYDRATION**



2.5 g
50 mL
Chlorine-free water
20 °C
15 min max.

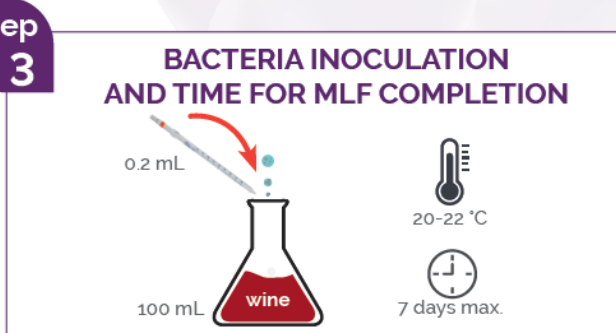
step 2 **BACTERIA SUSPENSION VOLUME FOR MLF TEST INOCULATION**



Rehydration volume	Bacteria suspension volume	Test wine volume
50 mL	0.2 mL	100 mL
50 mL	2 mL	1000 mL
50 mL	1.5 mL	750 mL

0.2 mL
Bacteria suspension
water + ML Prime

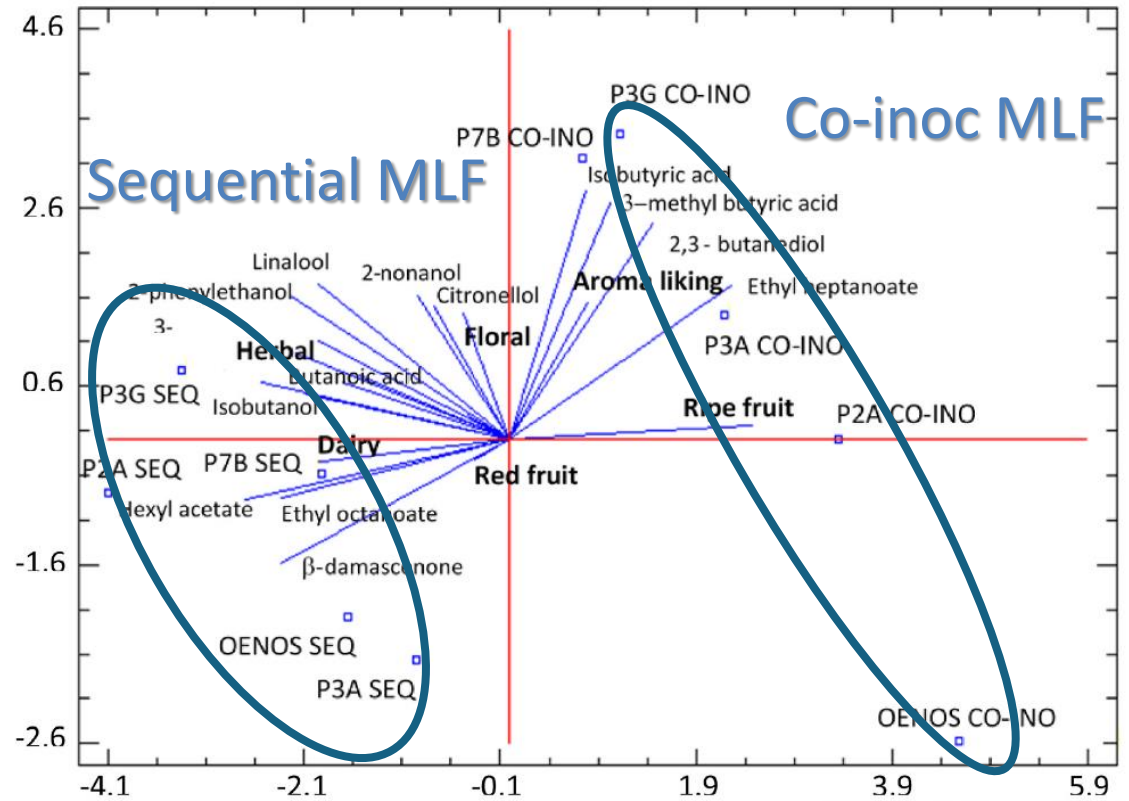
step 3 **BACTERIA INOCULATION AND TIME FOR MLF COMPLETION**



0.2 mL
100 mL
wine
20-22 °C
7 days max.



Timing of ML bacteria inoculation



➤ *Co-inoculation: more ripe fruit aromas, less herbal and dairy notes*

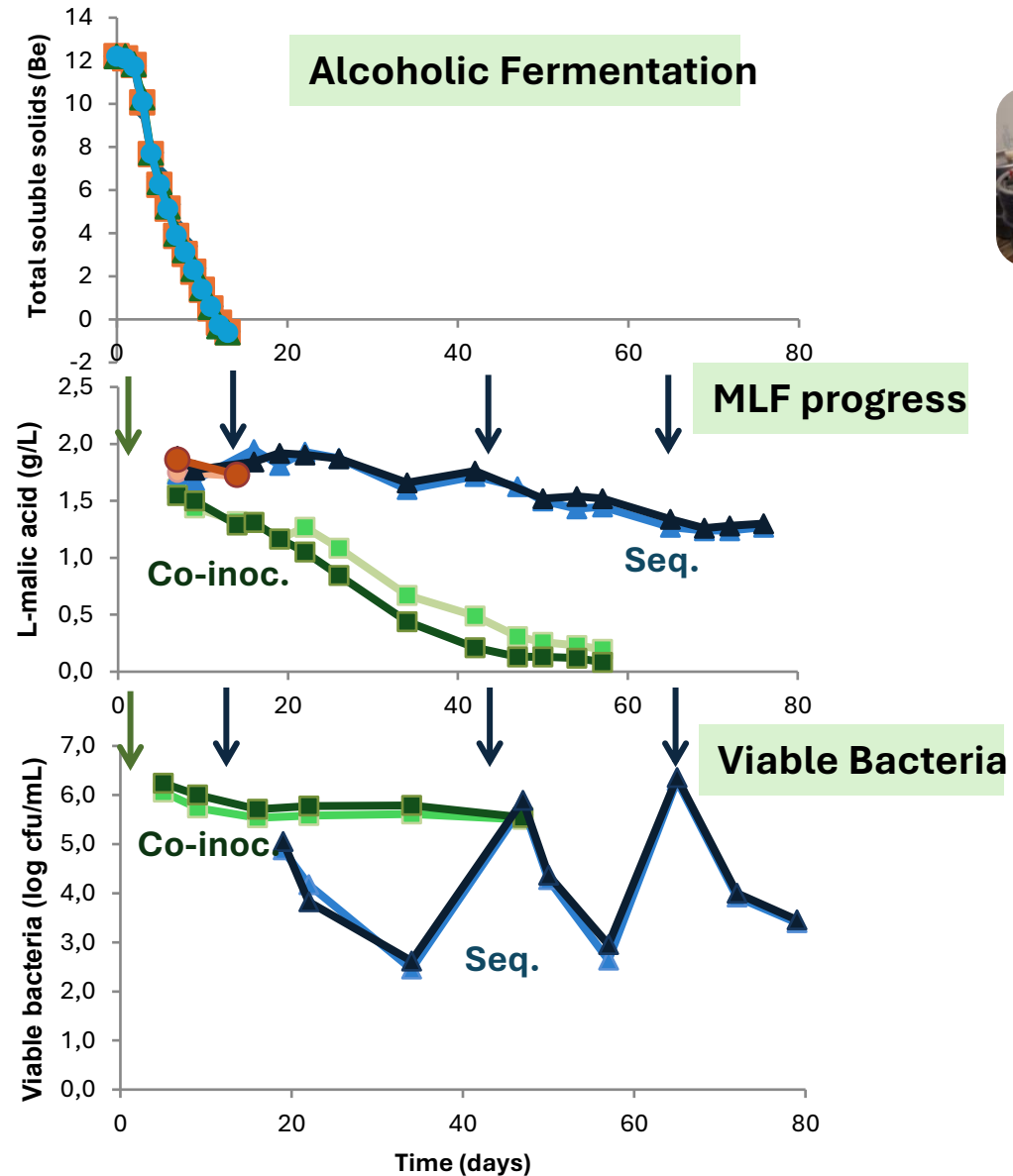
Co-inoculation to overcome some difficult wine conditions

2012 Chardonnay, Eden Valley

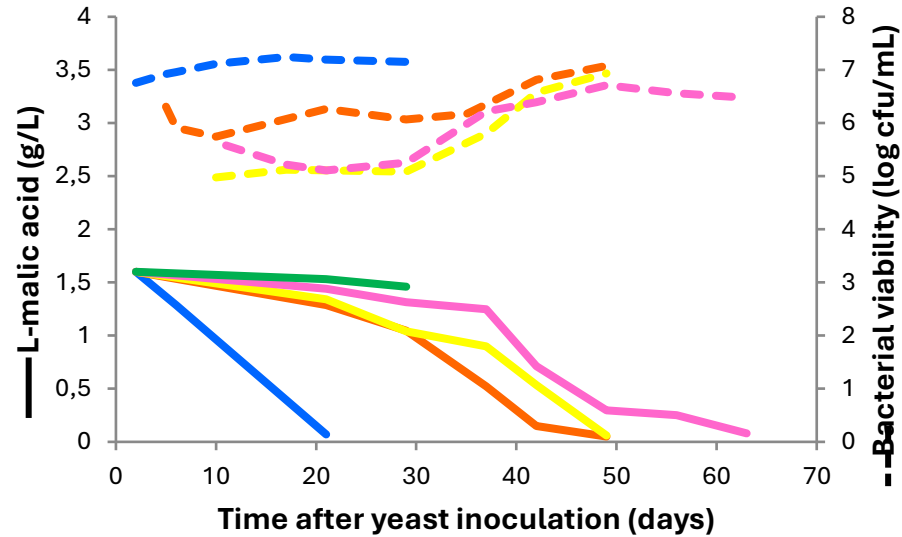
Baume	12.2 °Be
pH	3.25
TA	5.4 g/L
YAN	177 mg/L
malic acid	2.1 g/L
FSO ₂	13 mg/L
TSO ₂	57 mg/L



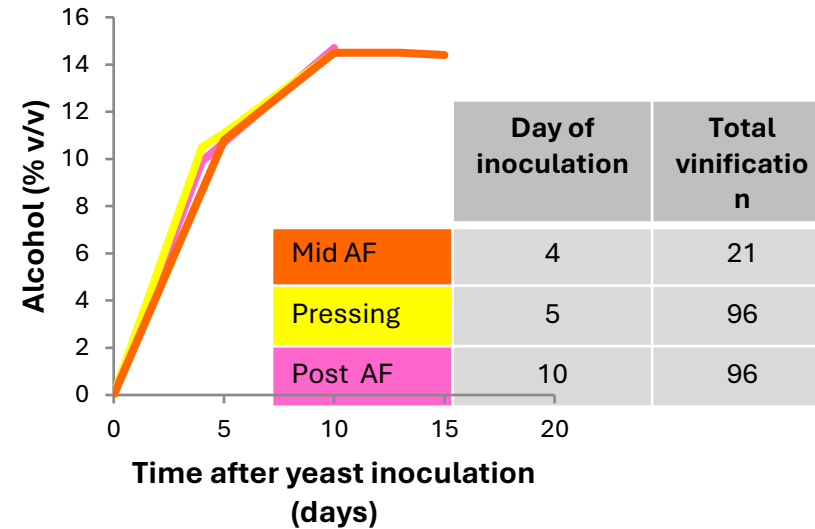
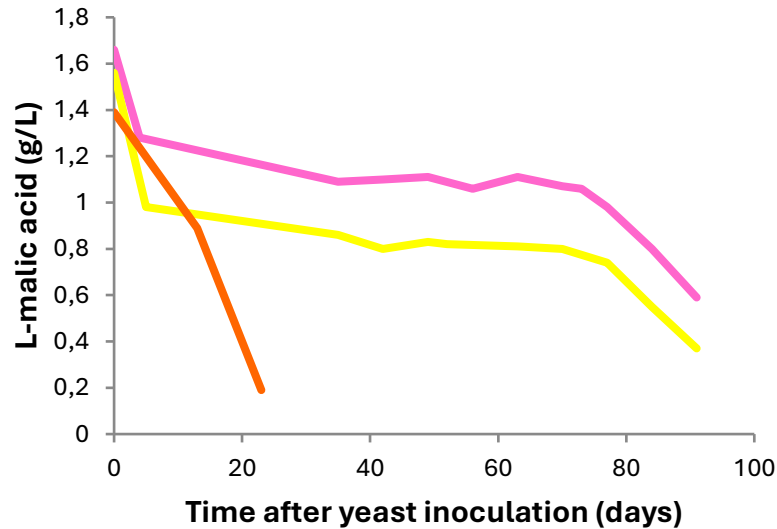
Co-inoculation can help bacteria adapt to 'harsh' wine composition



MLF kinetics



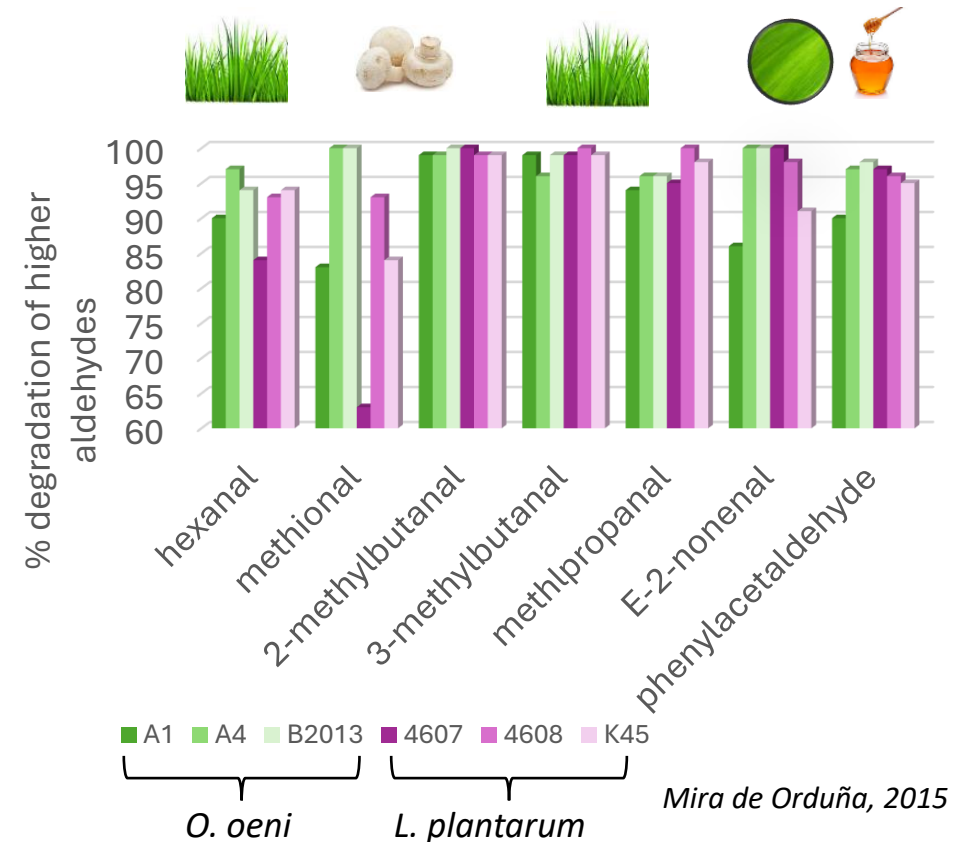
	Day of inoculation	Total vinification time (days) [AF+MLF]
Co-inoculation	1	21
Mid alcoholic	4	44
Pressing	7	44
Post alcoholic	10	62
No MLF	-	9



	Day of inoculation	Total vinification
Mid AF	4	21
Pressing	5	96
Post AF	10	96

Can ML bacteria impact vegetative aromas in red wine?

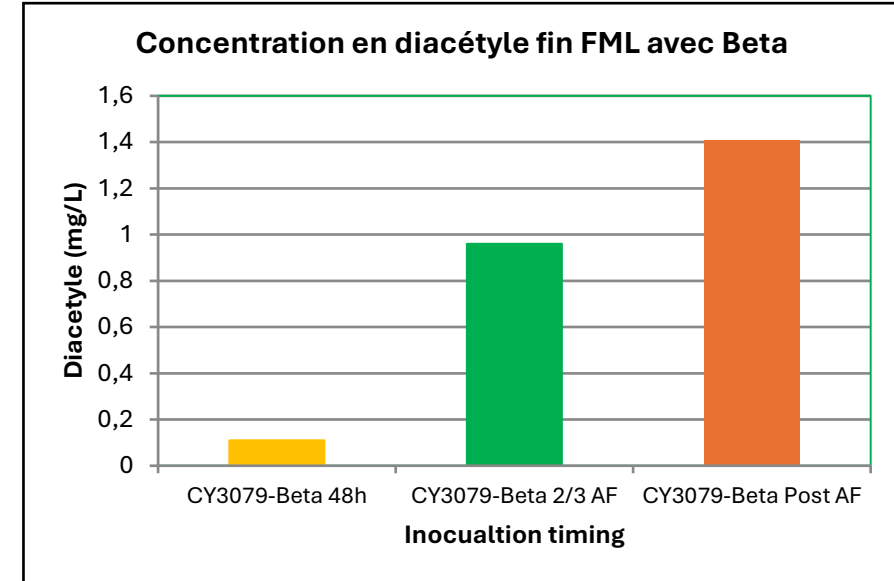
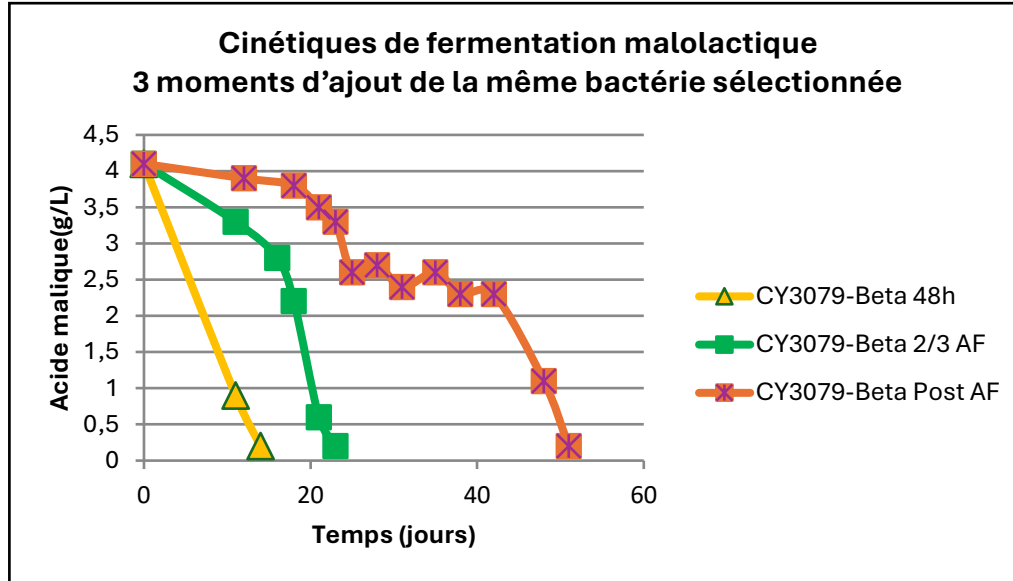
- Overall, wine consumers **prefer wines with fruity** rather than green, herbaceous or vegetarian aroma profiles
- Pyrazines** have been identified as one of the most important groups of aromatic compounds responsible for the vegetative green aromas in wine.
- There are also a number of short-chain aliphatic aldehydes that are also associated with vegetative cognition.



➤ *ML bacteria can break down some higher aldehydes, which could reduce green & herbaceous notes, which in turn could enhance fruity characters in red wine*

Diacetyl – production depends on the timing of inoculation

Oenococcus oeni



In co-inoculation: very low diacetyl production even with the highest producer of diacetyl

In presence of yeasts (reductive condition and diacetyl reductase activity from the yeast) diacetyl is converted in acetoin and 2,3-butanediol.

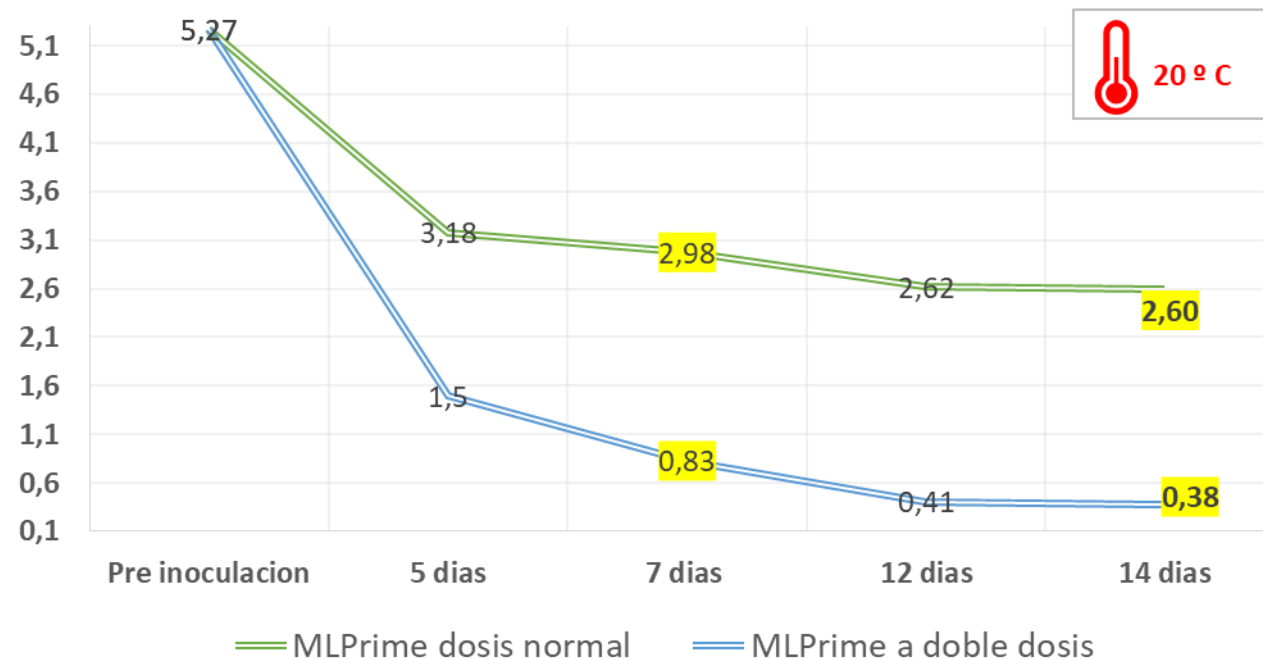
Help with difficult MLFs

High malic acid (> 5 g/L)

Initial Analyses

M.A. (g/L)	5.27
L.A. (g/L)	0
V.A. (g/L)	0.2
SO2 F (mg/L)	0
SO2 T (mg/L)	18
Ethanol (%)	12

KINETICS OF MALIC ACID DEGRADATION

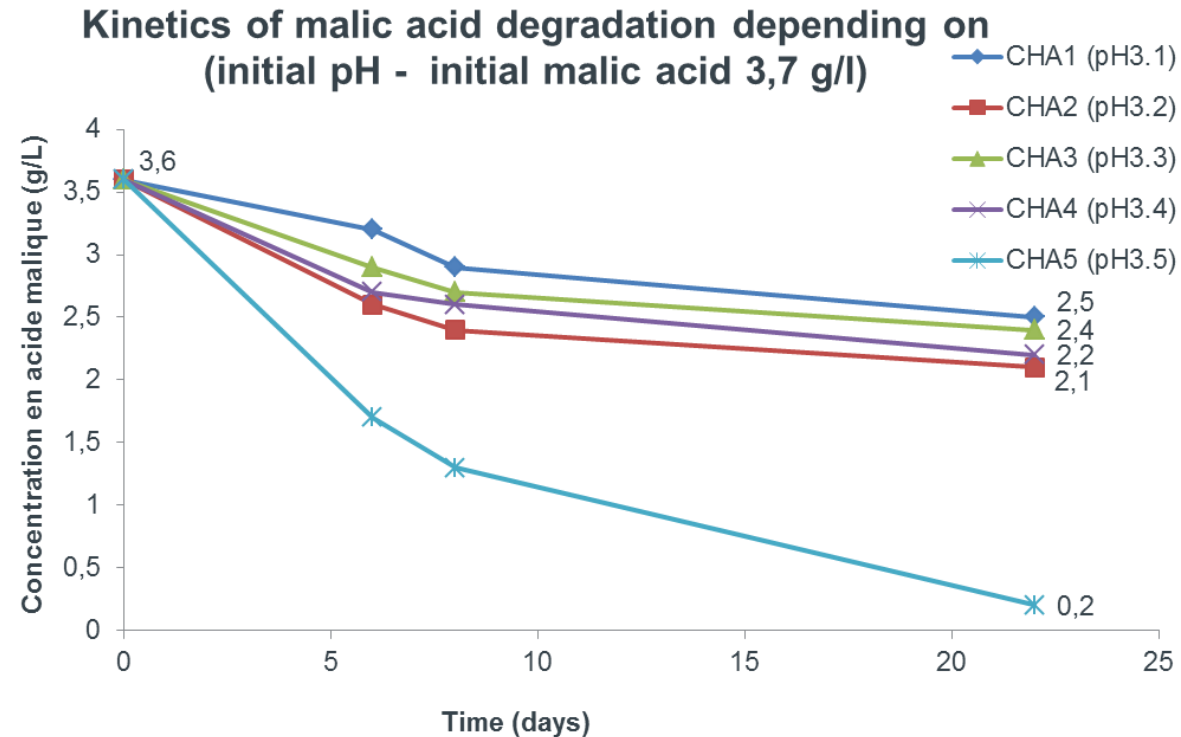


TXACOLI 2021

Partial deacidification – Co-inoculation

co-inoculation / direct inoculation / normal dosage

Must	
TAP (%vol)	11,2
Sugar (g/l)	189
TA (g/L)	4,94
pH initial	3,17
malic acid (g/L)	3,6
Nitrogen (mg/L)	193



- ML Prime achieves a partial malic acid degradation (~ 30%) down to a « normal » malic acid content at pH from 3.1 to 3.4
- At pH > 3.5 a complete malic acid degradation was achieved

Stor tak!

