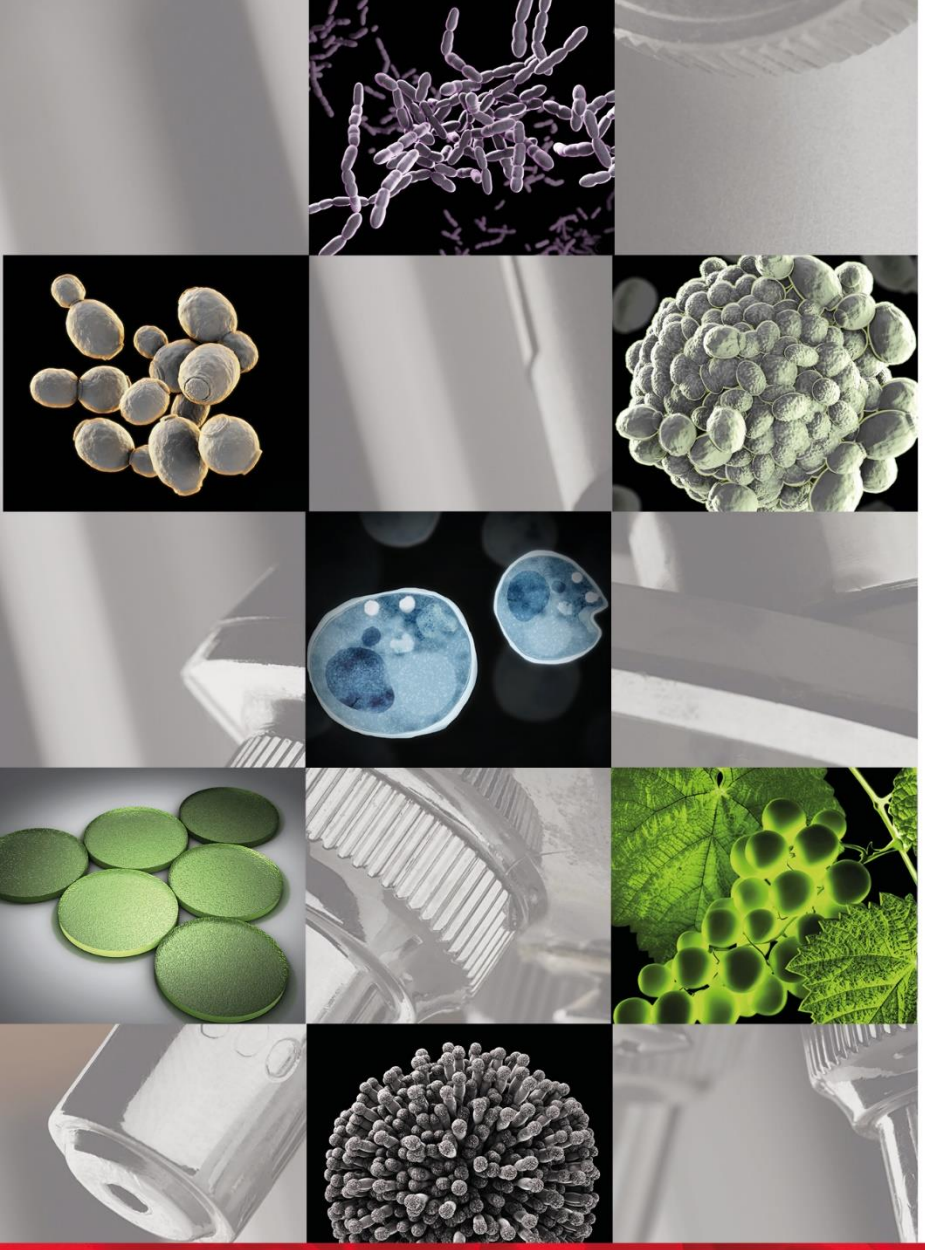


Einsatz von innovativen Hefeprodukten auf das Aromaprofil und die Langlebigkeit von Weißweinen

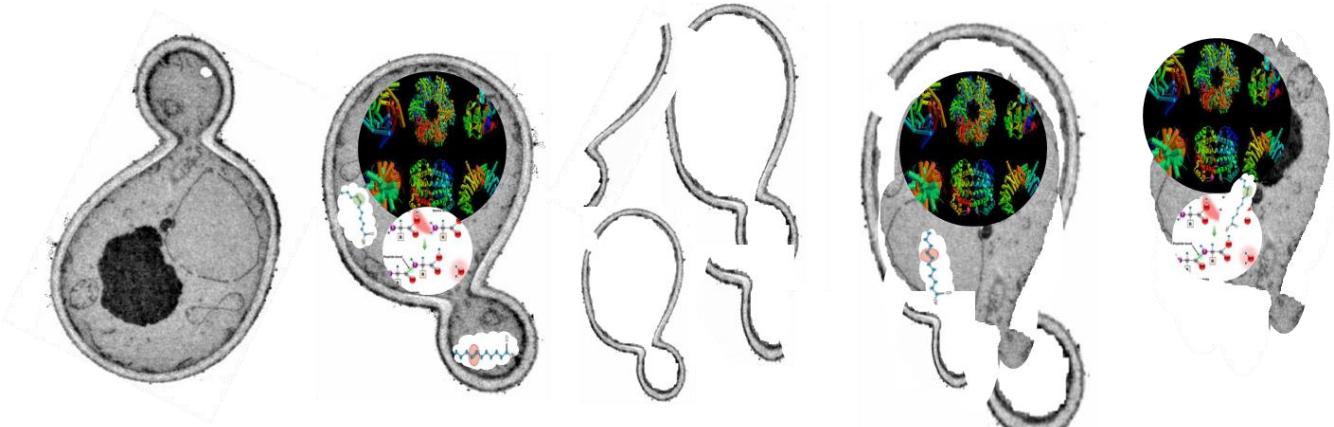
Use of Innovative Yeast Products on Aromatics and Longevity of White Wines

Dr Eveline Bartowsky
R&D Manager
Lallemand Australia

Klosterneuburg Hefetagung, Webinar, 1 July 2021

Yeast are amazing

- Fermentation – sugar to alcohol and wine aroma
- Organic nutrition for fermentation
- Lees ageing and wine protection
- … not only Specific Inactivated Yeast
- The many faces of yeast derivative products!



Active Yeast | Inactivated Yeast | Cell walls | Autolysate | Extract … Yeast Protein Extract

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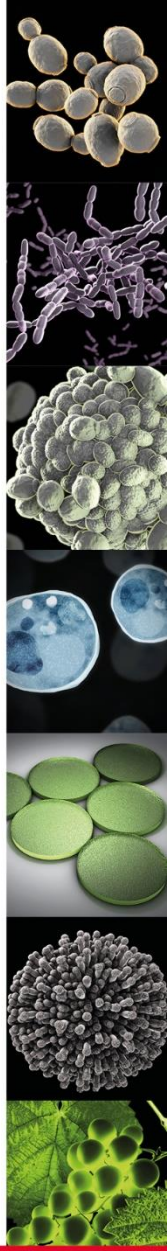
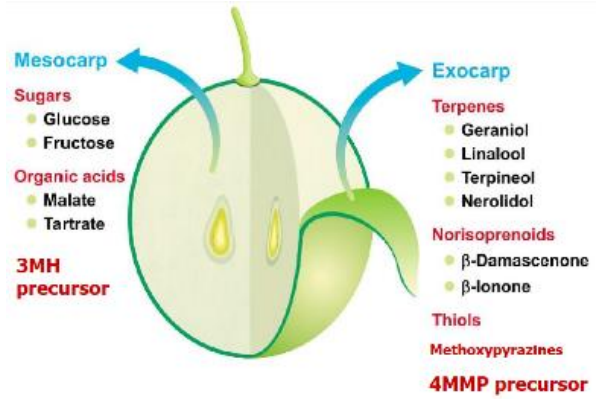
Original by culture

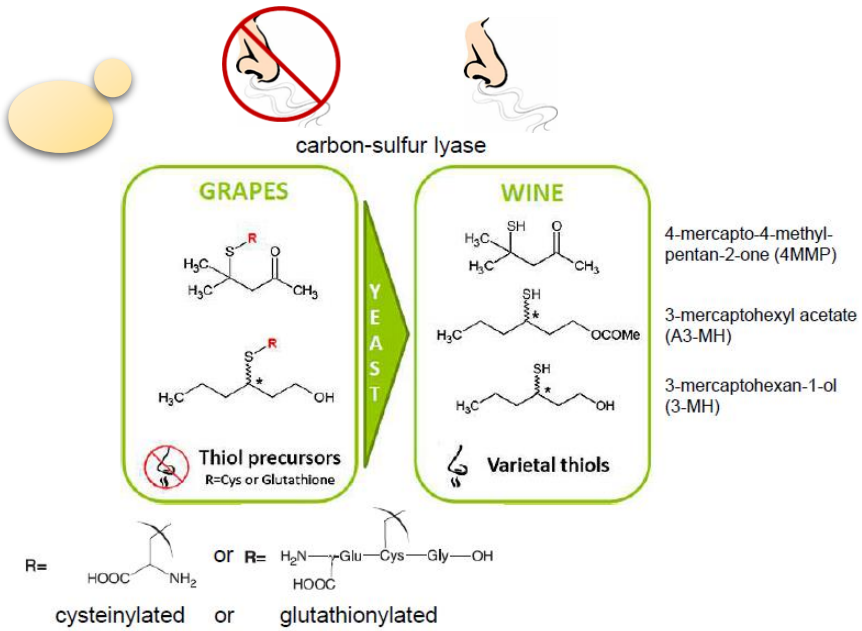
Enhancement of aroma compounds

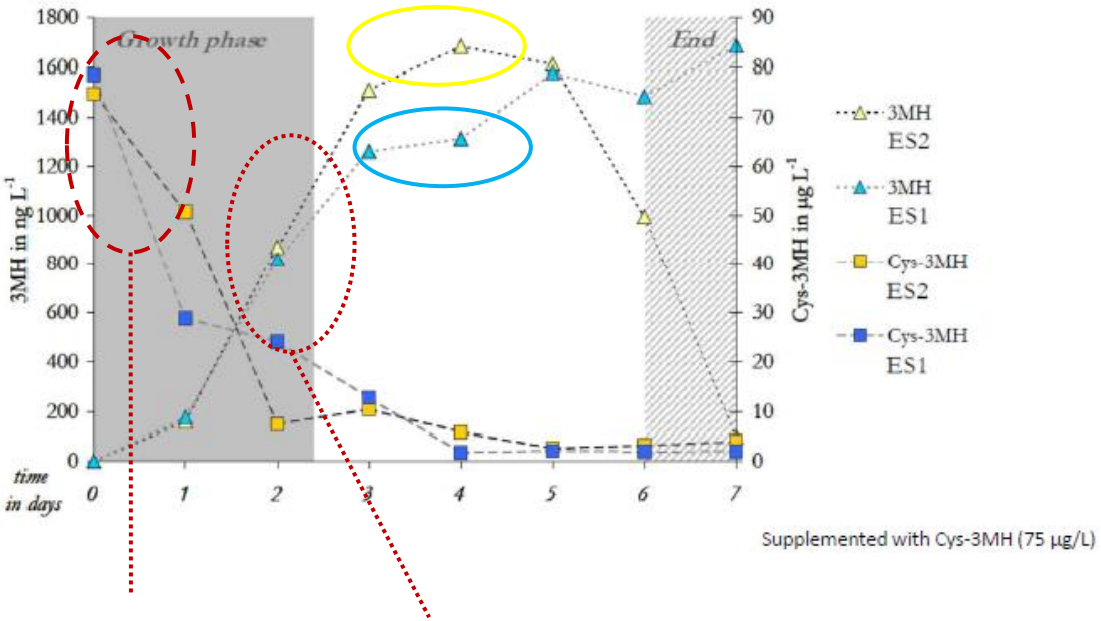
vineyard harvesting crushing fermentation pressing maturation bottling enjoyment



Thiols are taken up and enzymatically released







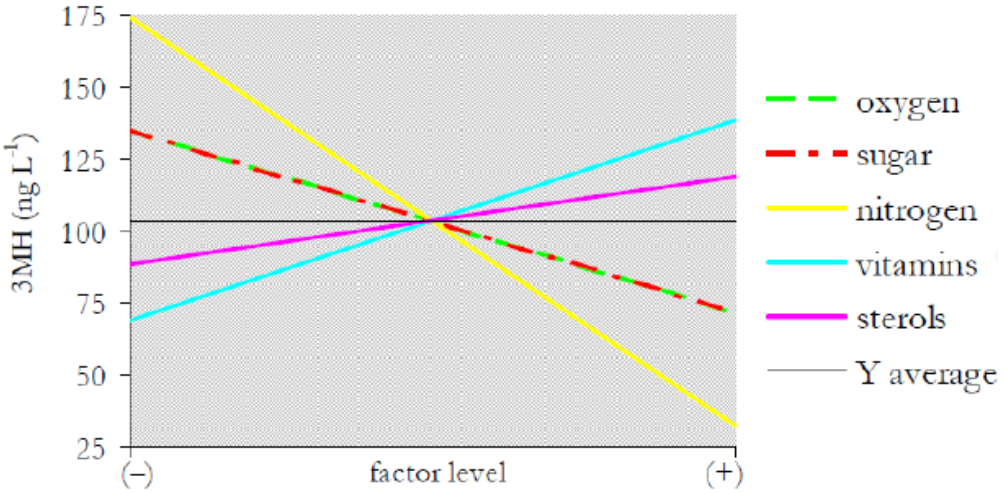
1st third of exp phase
Uptake of thiol precursors

2nd third of exp phase
Release of thiol precursors

Subileau PhD thesis 2008

- Volatile thiols are released from their precursors during the yeast growth phase
- Release of thiols efficiency is yeast strain dependent

Importance of micronutrients & nitrogen type on thiol release



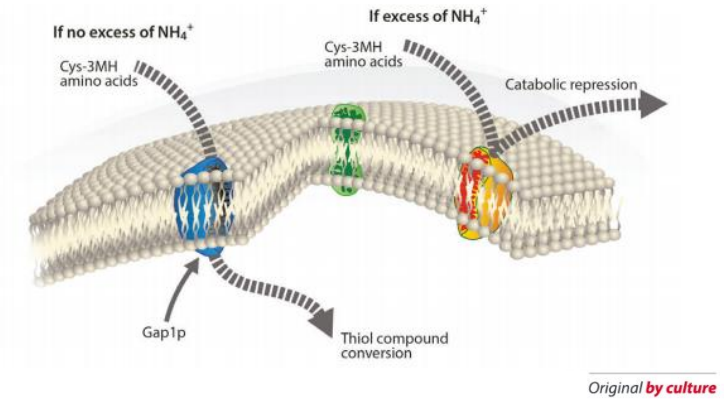
- Vitamins
  - Better effect on 3MH release ↑ 30%
- Oxygen – negative impact on thiol release
- Ergosterol – allows an increase of 3 MH: ↑ 15%
- Ammonium in excess
  - The greatest negative effect on 3MH: ↓ 68%

Release of volatile thiols is governed by **N**itrogen **C**atabolism **R**epression

In the presence of ammonium, the uptake of amino acids through Gap1 is repressed

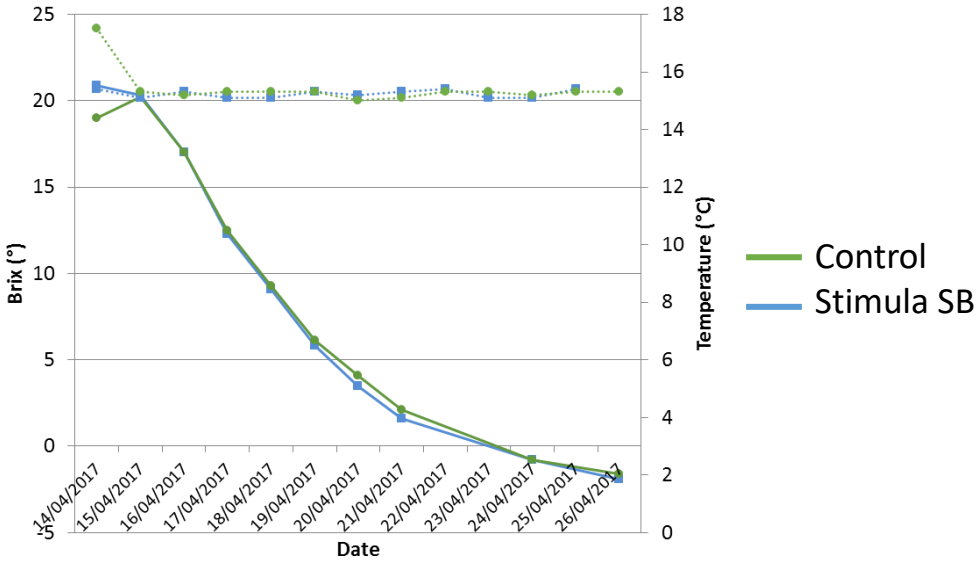
Includes Cys-3MH/Cys-4MMP

➢ Subsequently, the release of volatile thiols is reduced

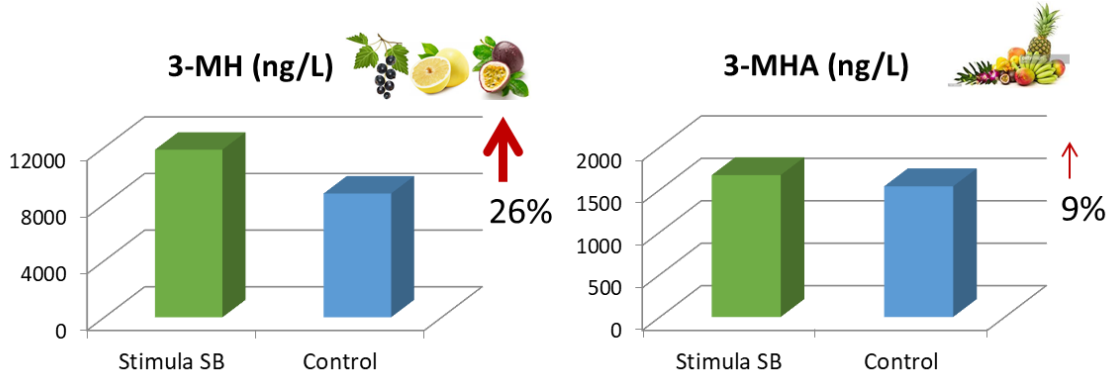


Specific organic nutrition increase thiol release

Sauv blanc (Marlborough NZ)
58 kL tanks
IOC Revelation thiols +GFPE
Stimula Sauv Blanc – 400 mg/L



	Control	Stimula SB
pH	3.35	3.36
TA (g/L)	7.29	7.55
Alc (% v/v)	12.89	12.27
Aroma	Some reduction. Notes of Hops	Notes of Hops, Sweaty thiols.
Palate	• Good mouth weight. Punchy. Medium + Thiols. Notes of Melon, apple, oyster shell. • Moderate texture. Some sporey notes	• Tropical notes, pineapple, passionfruit with good thiol punch. • Good texture and length with nice tropical finish
		This was the preferred wine



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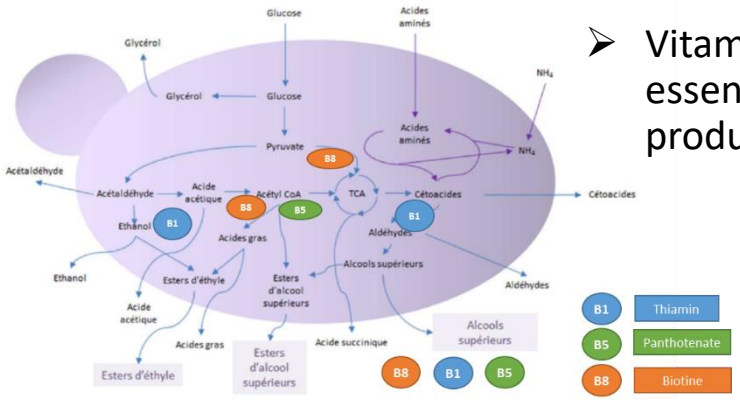
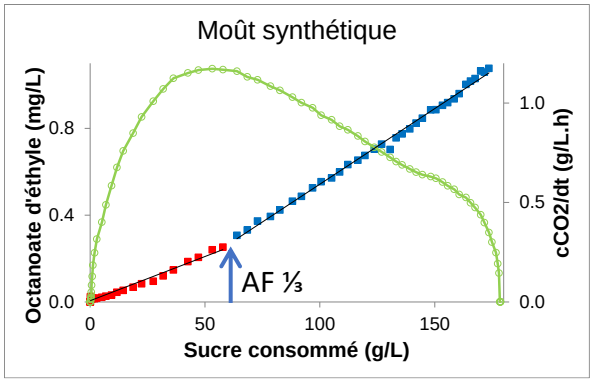
Understanding when yeast produce esters



- Vitamins are essential in the production of esters



- Esters biosynthesis speeds up at ⅓ AF

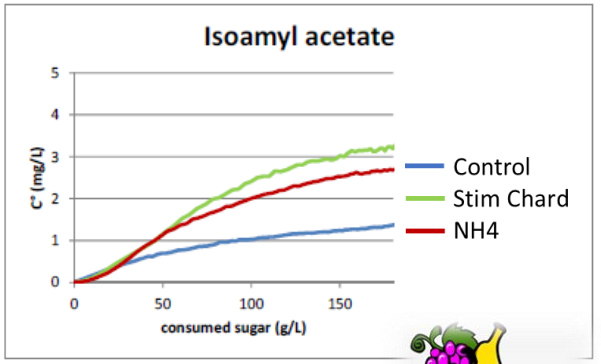
Mouret et al. (2014)
Yeast 32, 257-269

Li et al, 2010 (thiamine role); Bohlscheid et al, 2007 (biotin & panthotenate role);
Wang et al, 2003 (panthotenate)

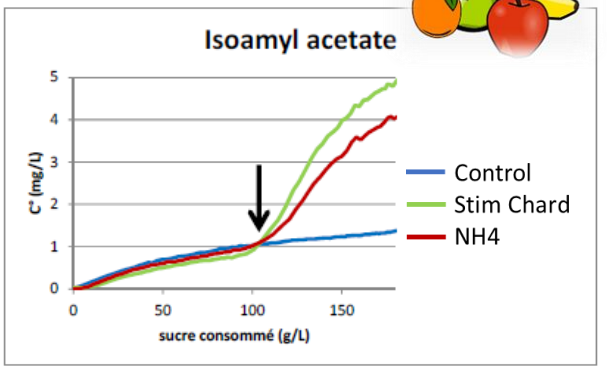
- N addition at the beginning of stationary phase
  - Significant ↑ of the production of acetate esters
  - Addition of organic N (Stimula Chardonnay) is more efficient than that of ammonium (NH4)

- Addition at the beginning of stationary phase (⅓AF) induces a higher final concentration of acetate esters compared with addition at start of AF

Initial addition

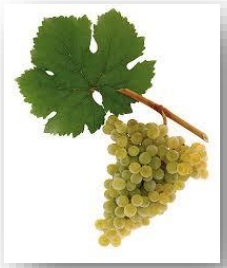


Addition at ⅓ AF



Stimula Chardonnay

Specific formulated nutrition can drive aroma compound production

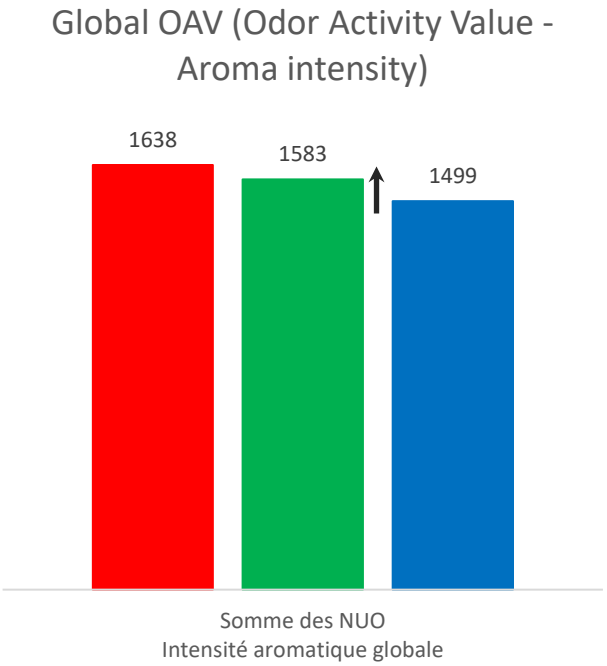


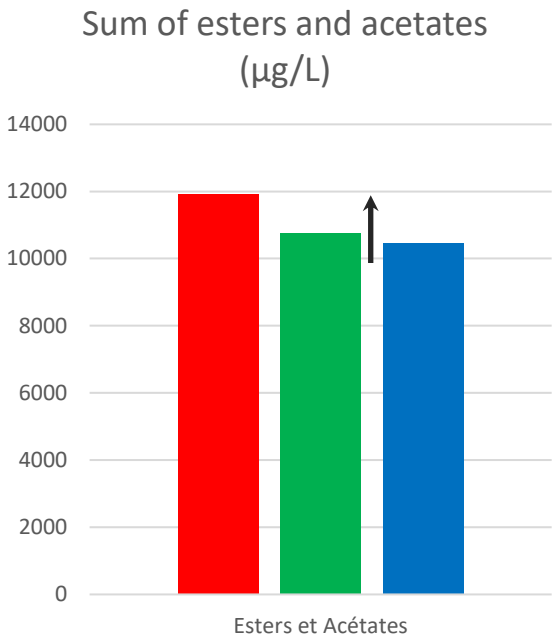
- Impact of different organic nutrition products on Grüner Veltliner aroma

Stimula Chardonnay
40 g/hL 1/3 AF

Stimula Sauvignon Blanc
40 g/hL initial addition

Control





Stimula Sauvignon blanc Stimula Chardonnay

➢ More aroma potential, higher sum of esters with organic nutrition

USA (2018)

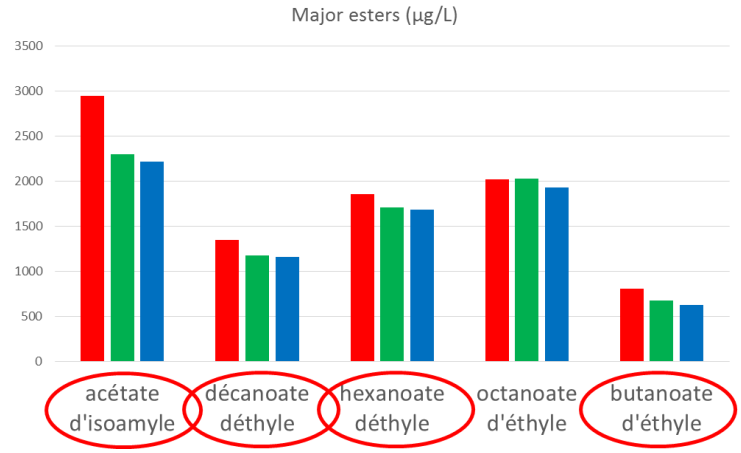
Specific formulated nutrition can drive aroma compound production

Grüner Veltliner
USA (2018)

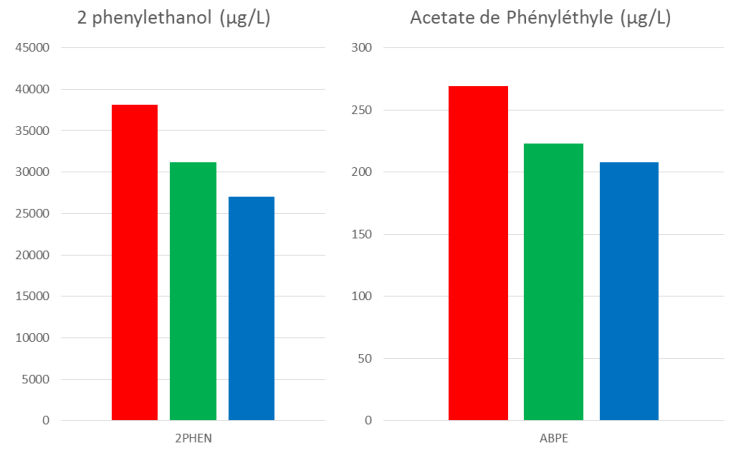
Stimula Chardonnay
40 g/hL 1/3 AF

Stimula Sauvignon Blanc
40 g/hL initial addition

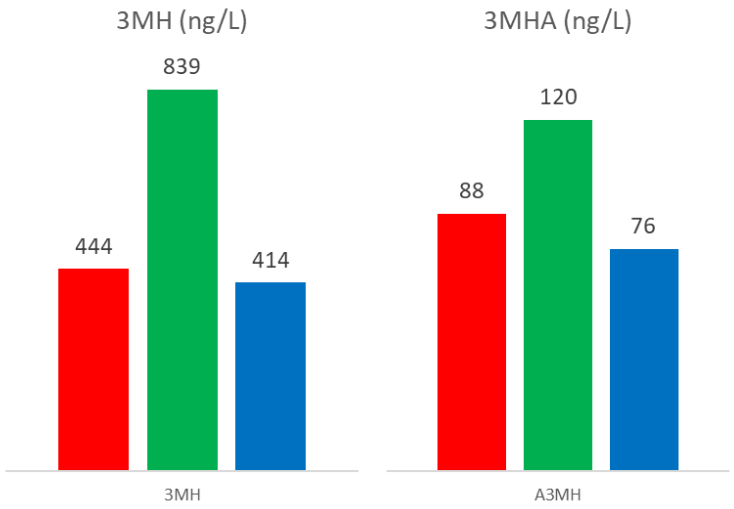
Control



More Fruity aromas compounds with STIMULA CHARDONNAY



More Floral Aromas compounds with STIMULA CHARDONNAY



More citrus and tropical aromas (thiols) with STIMULA SAUVIGNON BLANC

Stimula Sauvignon blanc Stimula Chardonnay

Enhancement of aroma compounds

- Specific organic nutrition can be used to enhance white wine aroma

Thiols or Esters

Stimula Sauvignon blanc Stimula Chardonnay

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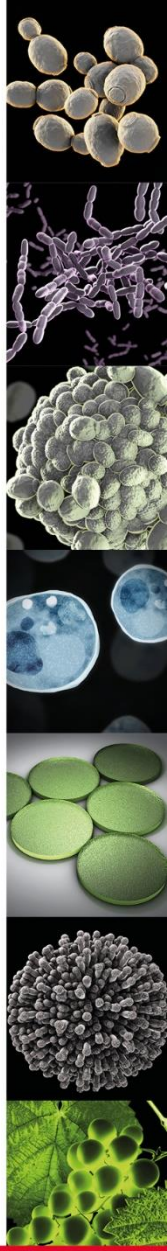
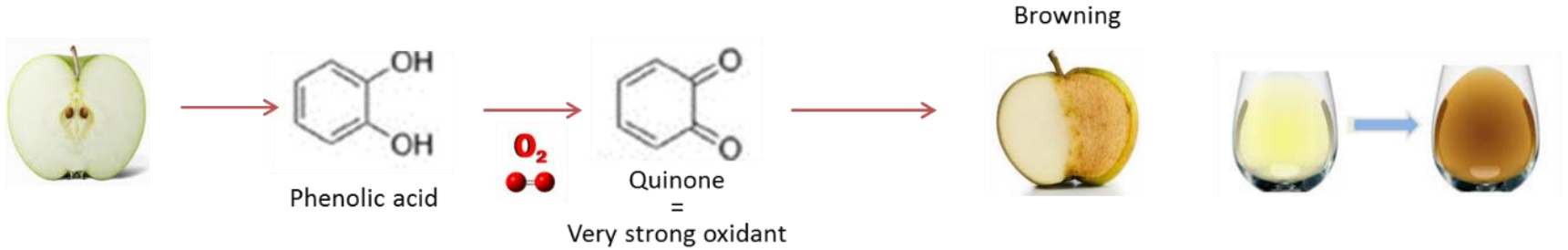
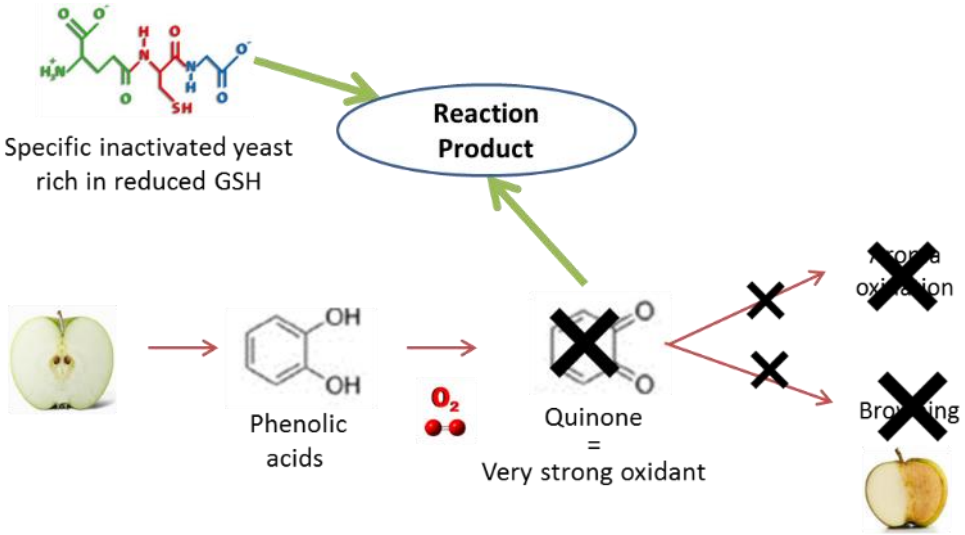
Preservation of aroma compounds



Wine oxidation





Protect precursors from oxidation

Limit / avoid browning

SYD (with GSH) compete with aroma compounds that could bind to quinone (etc)
SYD (with GSH) bind and leave the aroma compounds free

Adapted from Dubourdieu et al., 2001

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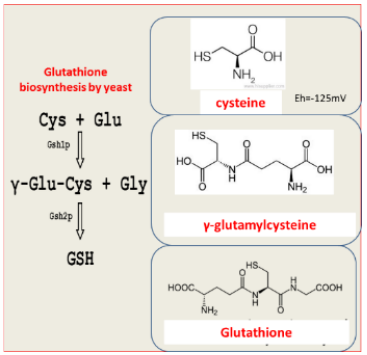
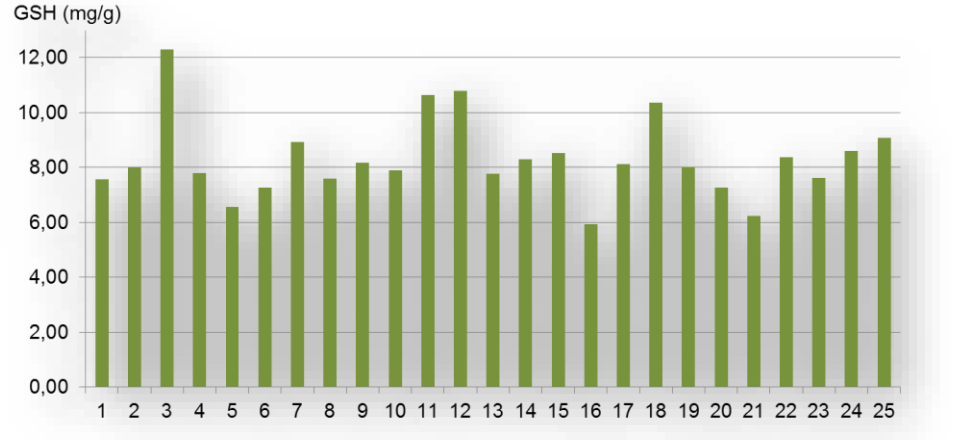
Glutathione is synthesized by yeast

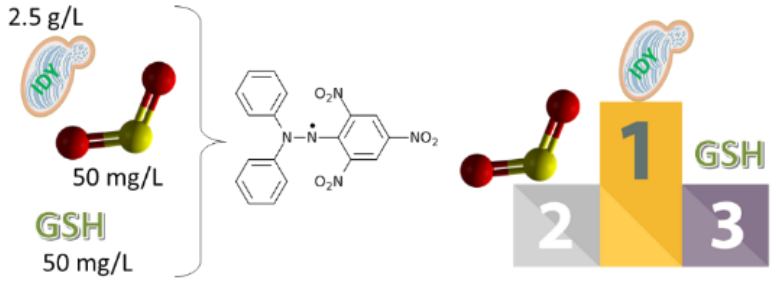
Glutathione comes from the **normal natural metabolism of *Saccharomyces cerevisiae***



GSH-inactivated yeast (IDY) is very efficient in protecting against oxidation

GSH content of 25 *Saccharomyces cerevisiae* strains from Lallemand collection grown on a standard YPD culture medium





Comuzzo et al., 2015 FdChem 168, 107-114

- GSH-IDY is more efficient than pure GSH

- Glutathione content in an inactivated yeast naturally rich in glutathione and in industrial products (range 0.6-3.5%)

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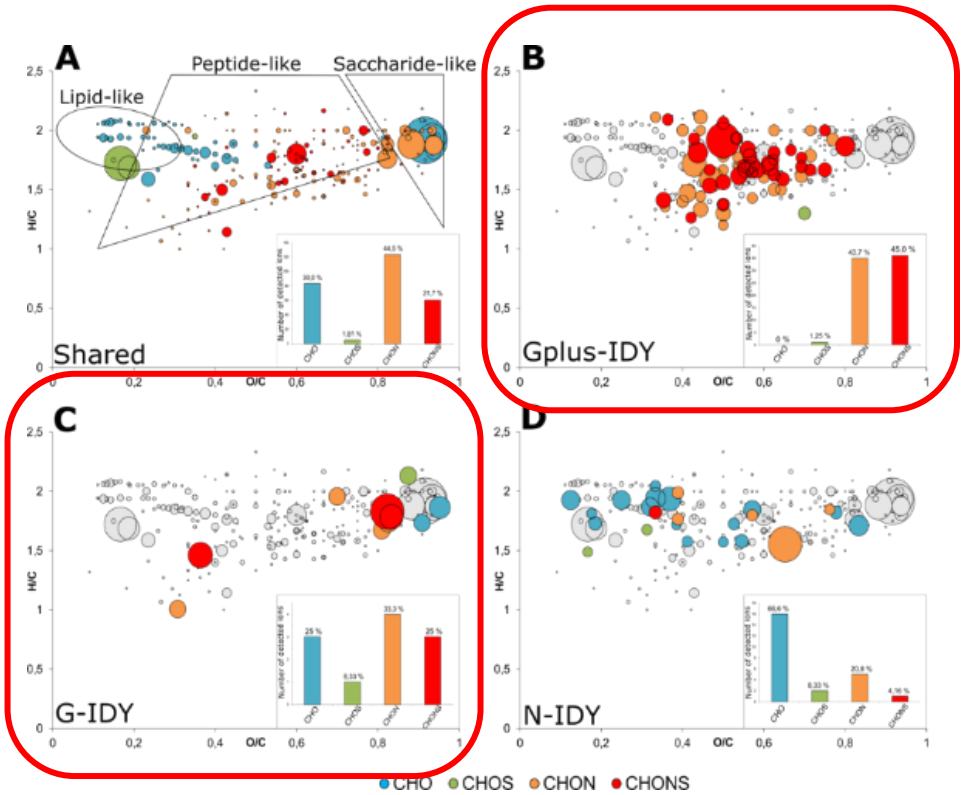
What makes GSH-SYD so special?

Metabolic Studies



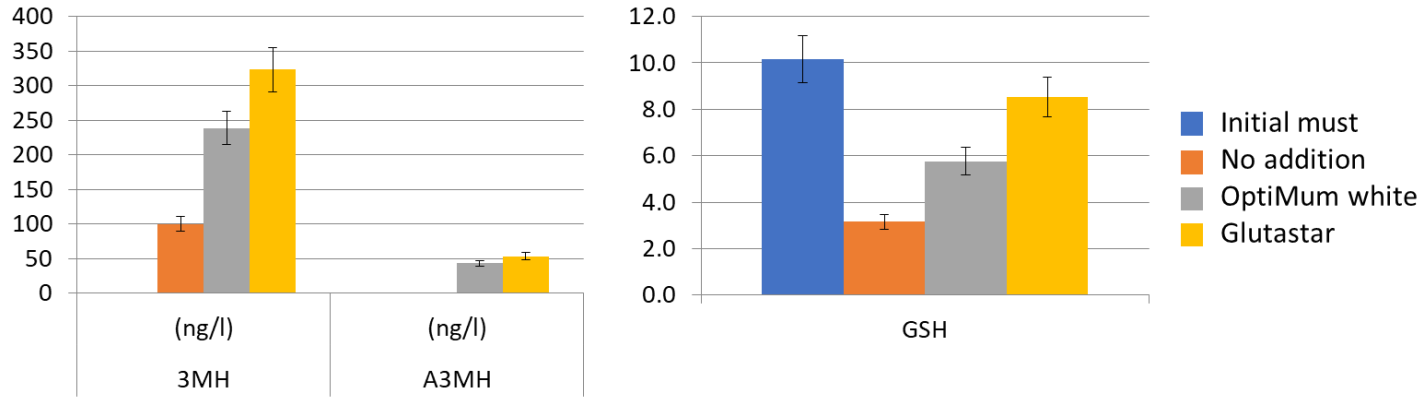
- 3 inactivated yeasts studied.
- Unique compounds released by each IDY
  - G+ releases much more CHONS compounds in the peptides-like area.
- CHONS/CHO ratio clearly indicates the process leading to GSH accumulation and the combination with the optimized strain lead to a higher accumulation of CHONS.
- These latter are interesting since free sulfuhydril is potentially active against oxidant compounds.

Bahut et al (2019) 123, 762-770

➢ GSH-IDY have high GSH and also other components that contribute to oxidation management, thus more efficient

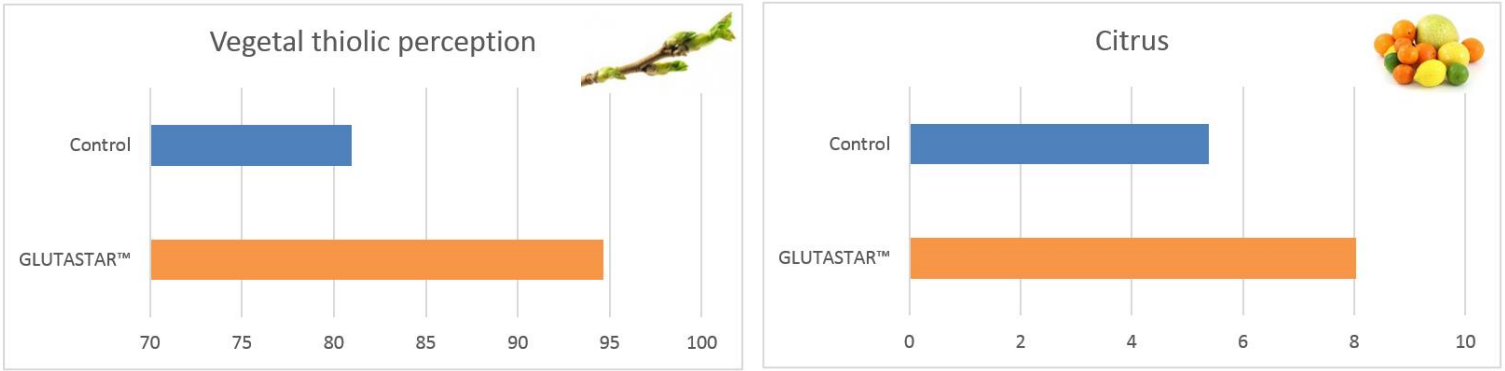
Protects thiols and wine aroma potential

Sauvignon blanc
(2017, Bordeaux, France)



➢ Big difference in GSH and thiols with GSH-IDY

Sauvignon blanc
(2019, IFV Val de Loire, France)
Addition of 30 g/hL of GLUTASTAR on the free run juice of the press



➢ Positive impact on wine aroma potential

Aromas index based on Odor Activity Value (OAV)

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Applications of SYD post fermentation

- Protection against oxidation during **storage** and **transportation**
- Protection against oxidation during **cold stabilization**
- **Pure-Lees Longevity™**

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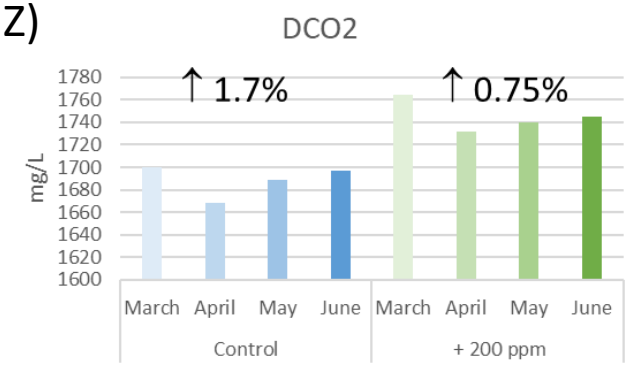
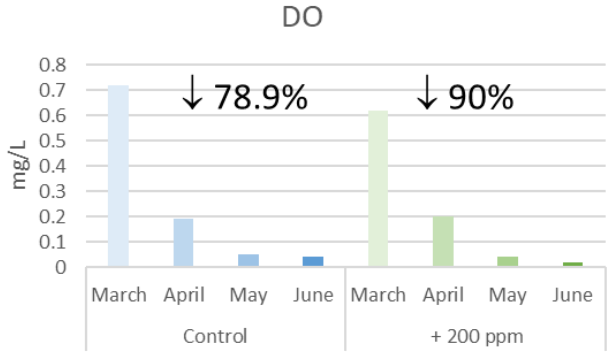
Protection of wine during ***tank storage***

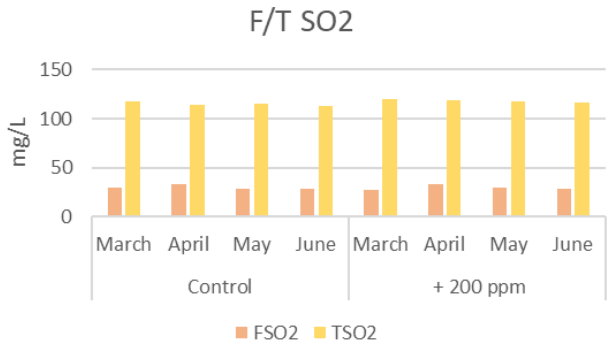
- Sauv blanc blend (2018 Gisborne, NZ)
  - FSO2 40 ppm
- 58.2 kL tanks
  - Same row
  - Under cover
  - No ullage
  - No cooling

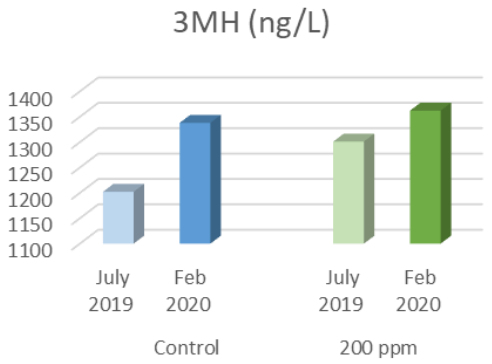
➢ Very good protection of thiols during 7-month storage

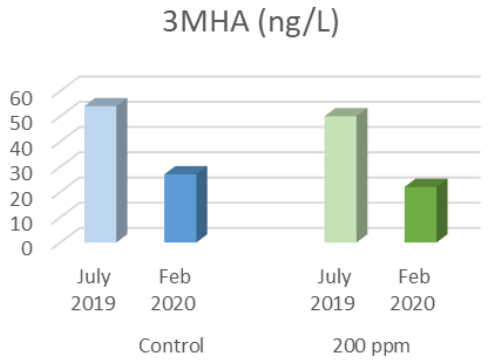
➢ *From the winemaker*:
We saw no appreciable difference in the metrics on the 2 tanks, however on tasting, ***it was very evident that the Pure Lees had helped to conserve aroma and flavour***

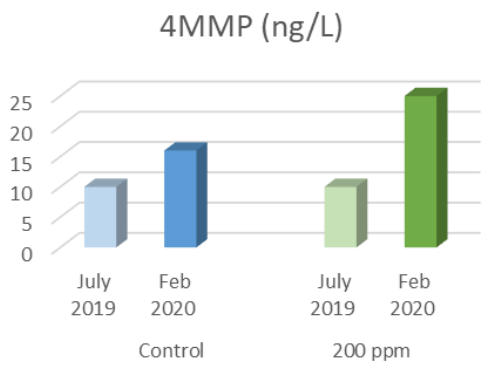




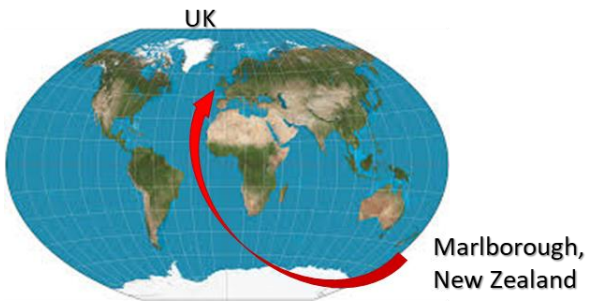


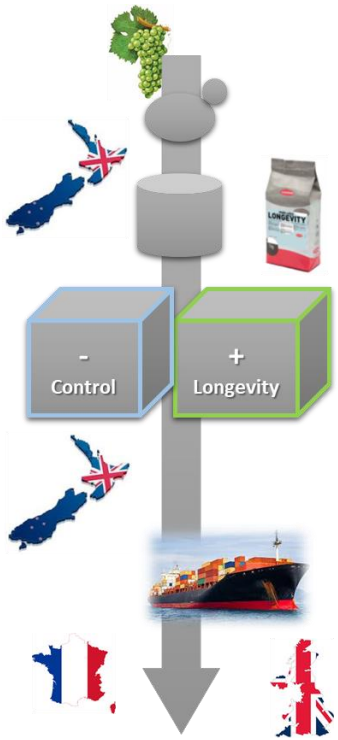




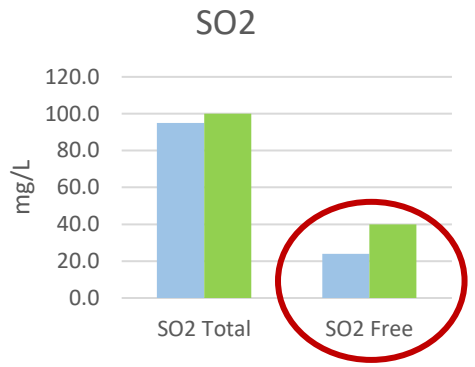


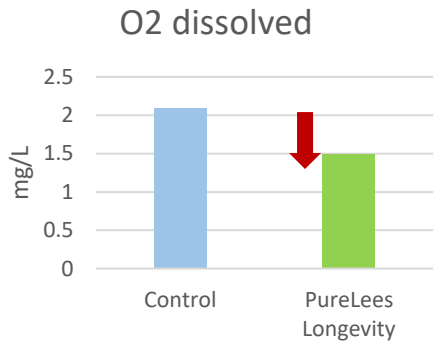
Protection against oxidation during ***transportation***

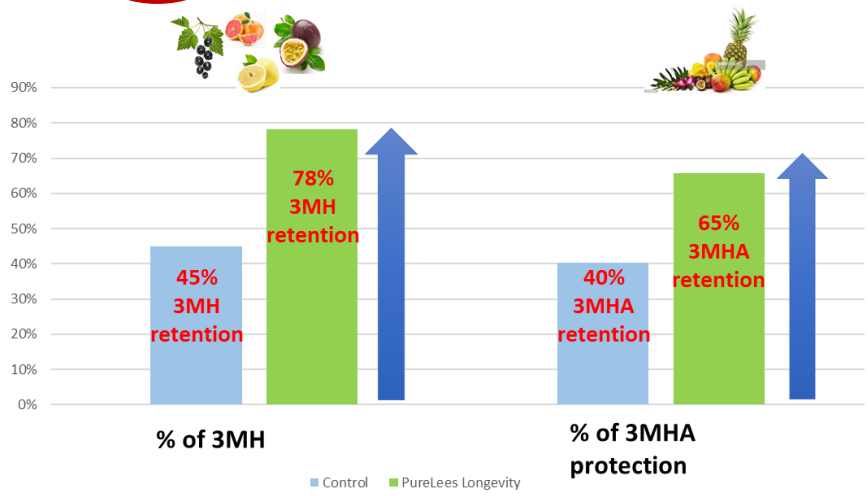




After Journey	Control	Longevity
3MH (ng/L)	2792	4708
3MHA (ng/L)	88	146
4MMP (ng/L)	18	24







- PL Longevity has preserved the wine through the journey from New Zealand to France, and onto final destination, the UK
- *Longevity will maintain SO2 content, preserve thiols, and ensure that any O2 is scavenged*

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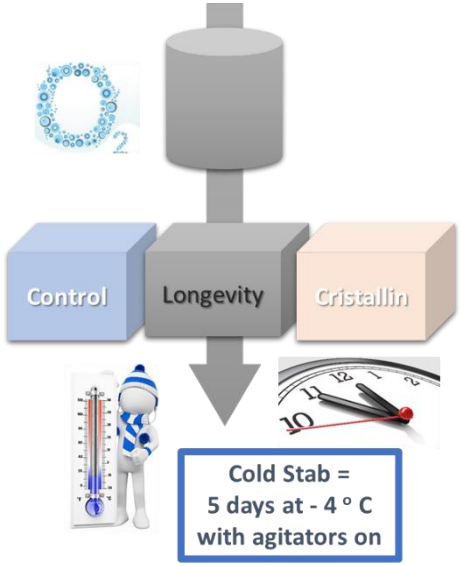
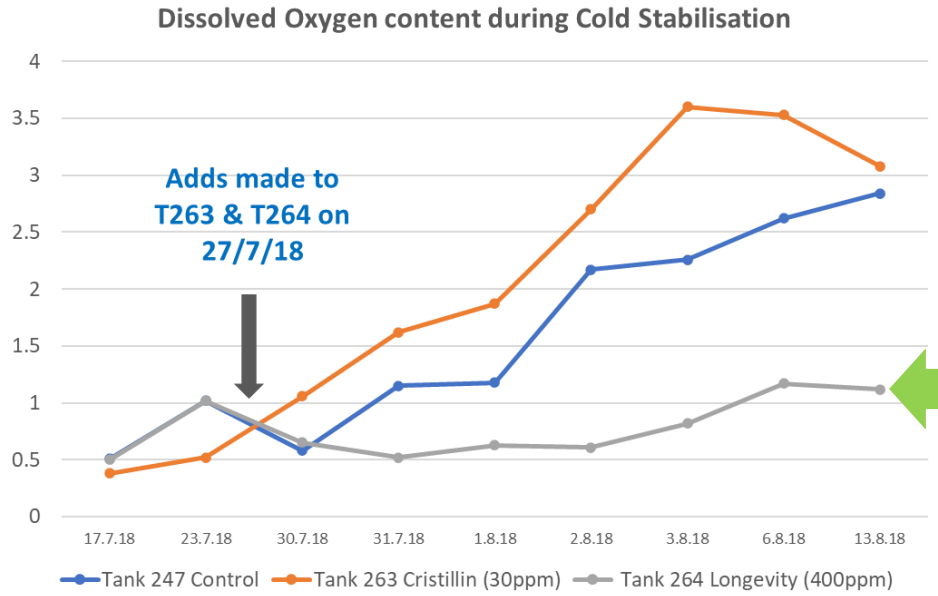
Protection against oxidation during ***cold stabilization***

Chardonnay (2018, Griffith, Australia)





PL Longevity Considerably lower DO compared to other tanks

- Starting dissolved oxygen 0.38 – 0.51 mg/L
- Winery generally **picks up 3-6mg/L** during cold stab; this can take 2 weeks to remove with sparging post cold stab to get to spec of < 0.5mg/L
- 3 x 275 kL tanks of same wine
  - Control with no adds
  - Gallic tannin added (30mg/L)
  - Longevity (400mg/L)

- Protection during the 2 week cold stabilization process
- Tank-Longevity much closer to customers DO specification
- No significant differences in F/T SO2
- *Potential way to reduce energy costs and improve process efficiency and wine quality*

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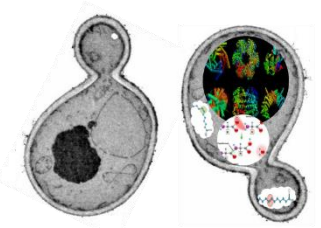
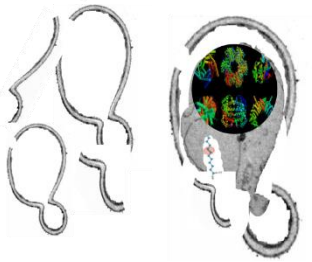
Einsatz von innovativen Hefeprodukten auf das Aromaprofil und die Langlebigkeit von Weißweinen

- Specific nutrition to **enhance** wine aroma
  - Thiols
  - Esters

Stimula Sauvignon blanc Stimula Chardonnay



- Oxidation management & aroma **preservation**
  - During fermentation
  - Post fermentation



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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.