High pH Red Winemaking

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WEBINAR OVERVIEW

- 40 min presentation
- Have a pen and paper
- Only use chat box #2 for technical difficulties
- Recording in progress!
- Attached documents

OVERVIEW

- What determines pH
- pH adjustments in musts
- Microbial impact
- Oxidative impact
- Mouthfeel aspects

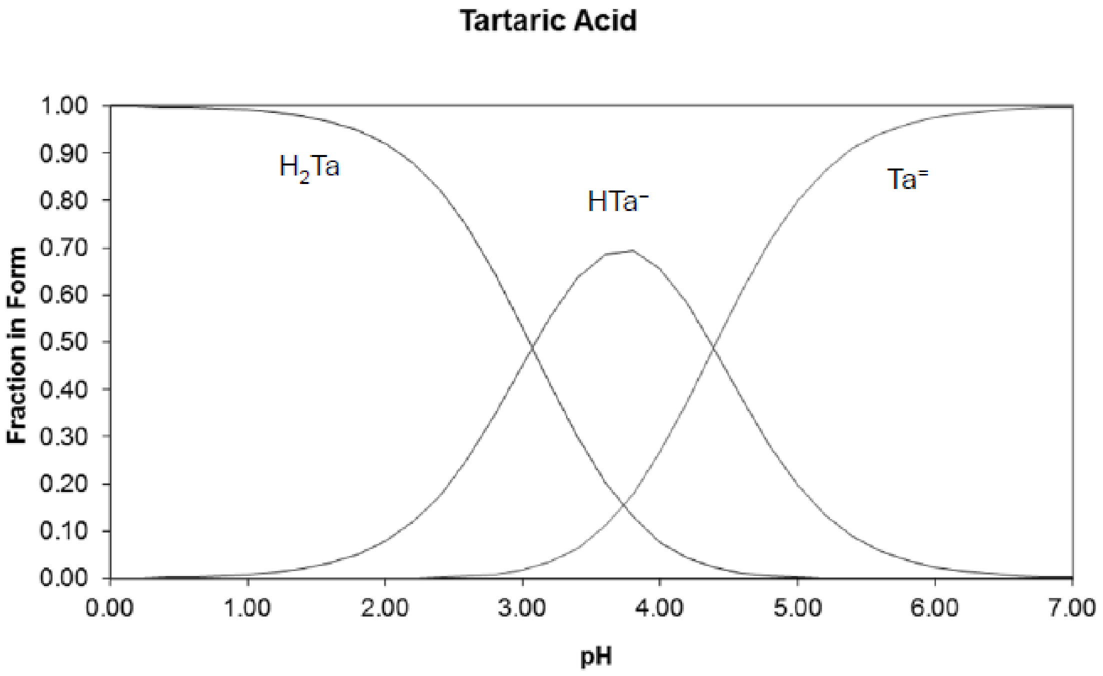
WHAT DETERMINES pH?

<u>Fruit composition</u>

- Cultivar
- Fruit maturity
- Crop level
- Soil moisture content during maturity
- Mineral composition available to the vine (aka potassium content)

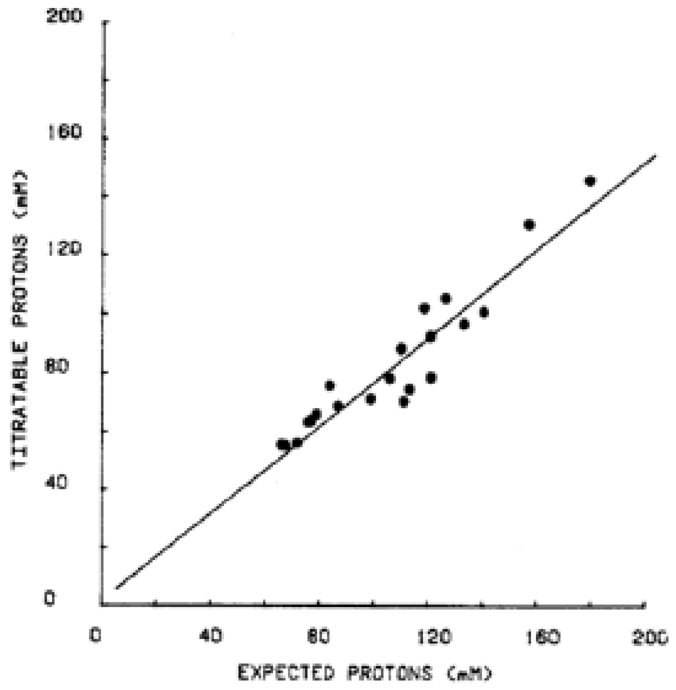
<u>Winemaking</u>

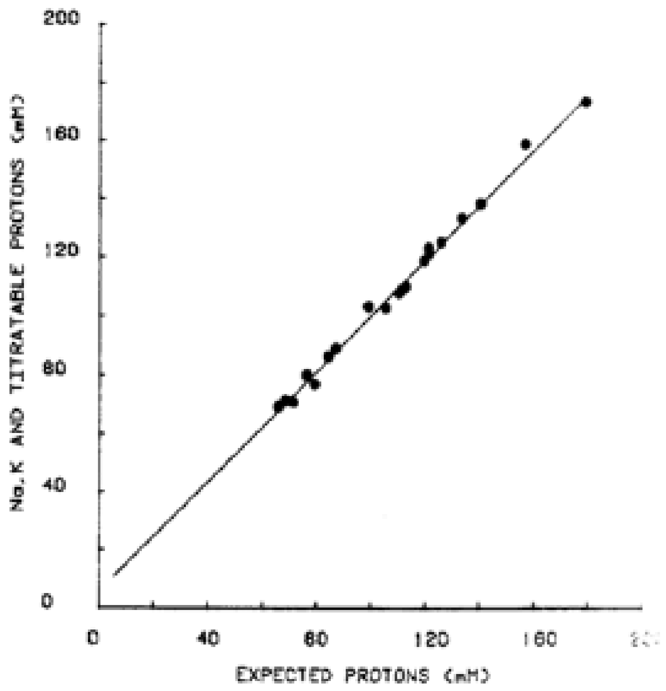
- Acid precipitation (intentional or natural)
- ➢ Starting pH >3.8 = rise in pH, < 3.8 = lowering in pH
- Acid adjustments – addition (Tartaric acid) or removal (K_2CO_3)
- Pressing – more = higher potassium
- Ethanol changes - more = less solubility KHTA
- Malolactic conversion – more = increase in pH



ACID ADJUSTMENTS

Common Challenge: Acid additions are off the mark, requiring multiple additions of tartaric acid or potassium carbonate





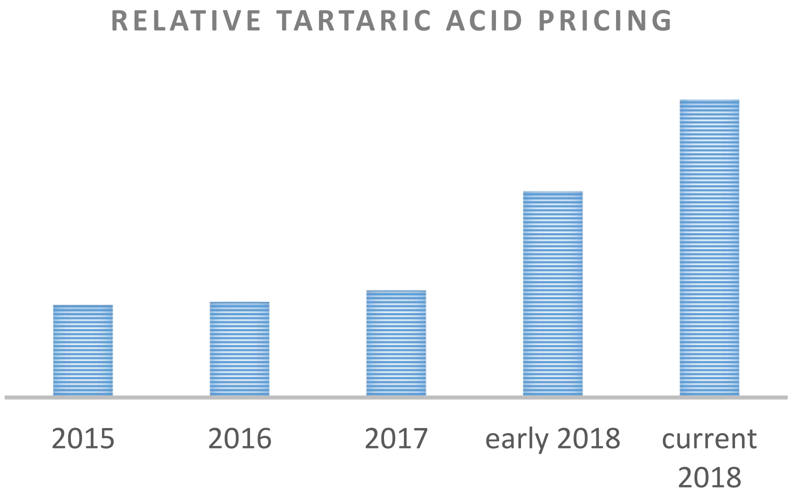
PREDICTIVE ACID MANAGEMENT

SOLUTION: pH and acid management panel!

Measurements:
pH, Brix, TA, organic acid profile, Buffer Capacity, Potassium (K+)

Software:
Predictive acidity suite

Benefits:
- Eliminate second / third additions
- Reduce cost associated with missed adds
- Maintain quality from improper adds



Sampling tips:
- After cold soak maceration (> 2 or 3 days)
- After pump-over or mixing

A DIFFICULT SITUATION

- High pH, high TA
- High potassium levels
- Wine already has TA (> 7 g/L)
- Acid additions will make the wine taste sour
- Can’t add acid
- Still have issues associated with high pH

MICROBIAL CONSIDERATIONS

Consider:

- At higher pH, microbes grow more easily

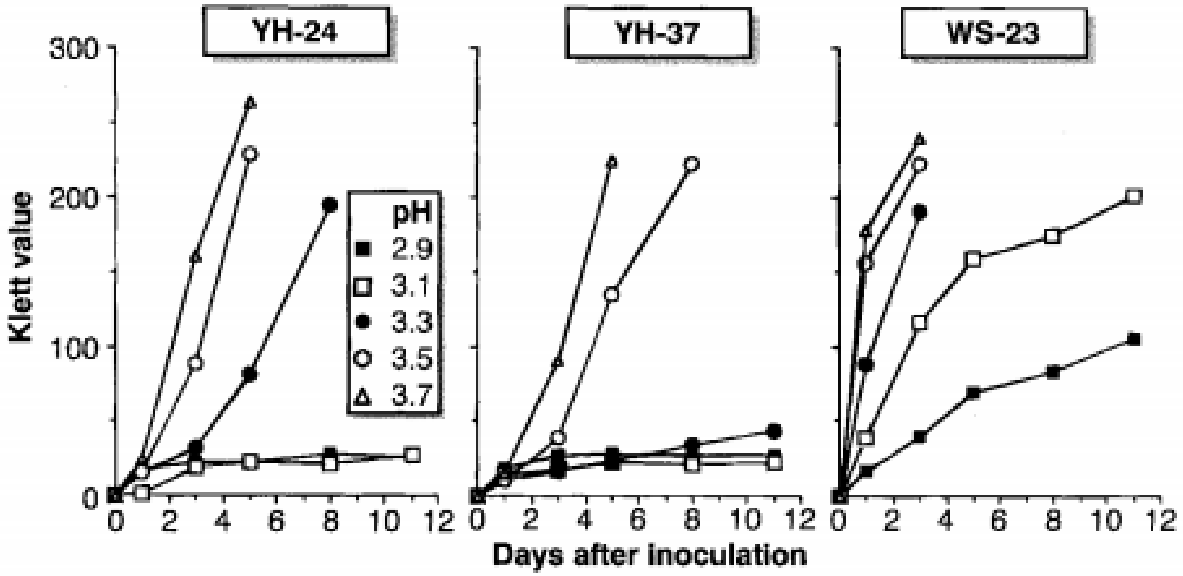


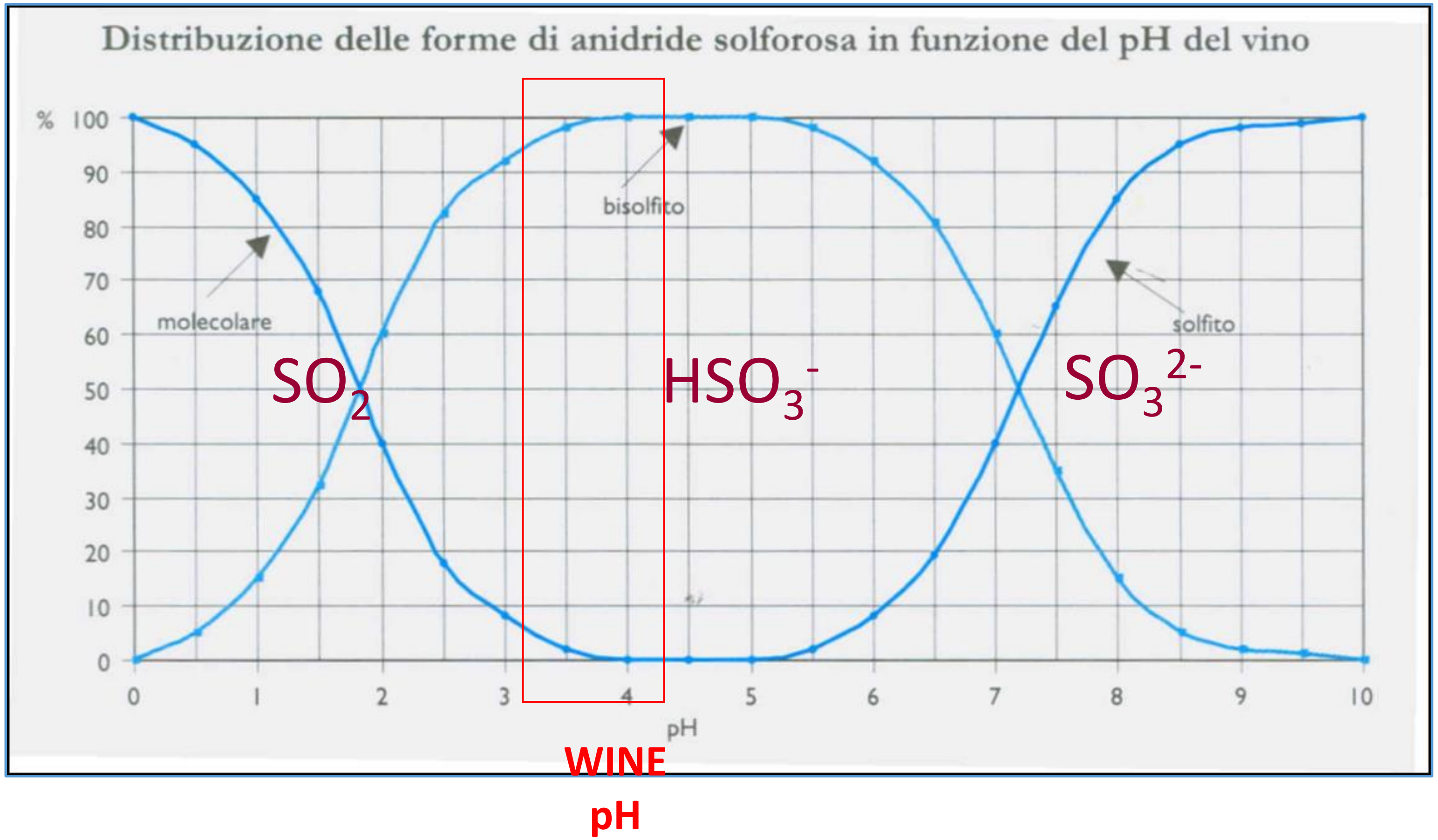
Fig. 1. Growth of *Leuconostoc oenos* strains YH-24 and YH-37 and *Lactobacillus plantarum* WS-23 in MR broth acidified to pH 2.9, 3.1, 3.3, 3.5, or 3.7.

Edwards 1998

MICROBIAL CONSIDERATIONS CONT.

Consider:

- Antimicrobial molecular SO_2 concentration drastically lowered at higher pH



STAB MICRO FOR HIGH pH

- Pre-activated Chitosan
- Antimicrobial fining agent
- Broad ranged
- Can be used at nearly any phase of winemaking
- Negligible impact on active *Saccharomyces Cerevisae*
- Vegan
- Non-allergenic
- <u>Works well at high pH</u>

enartis STAB MICRO

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Musts or turbid wines

STAB MICRO – HOW IT WORKS

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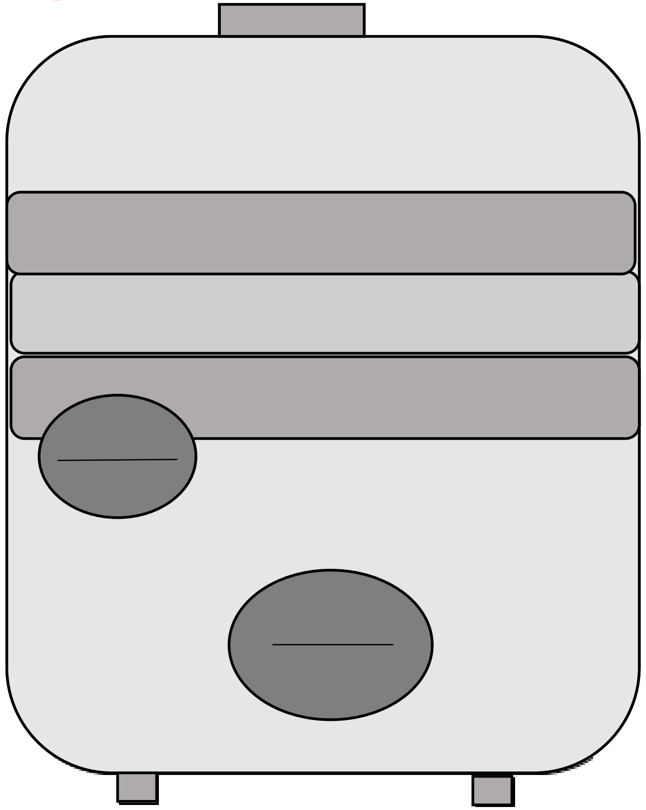
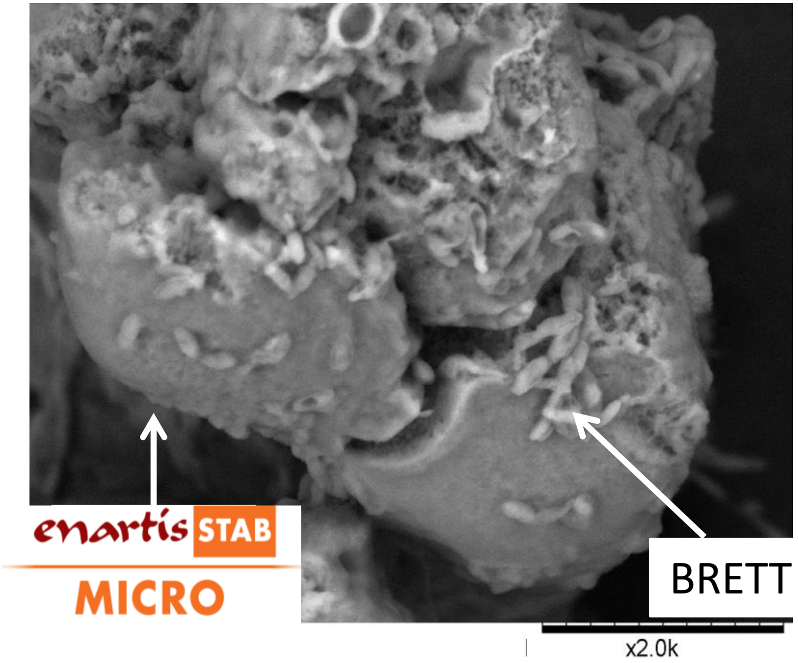
MICRO





STAB MICRO EFFECT ON WINE MICROBES

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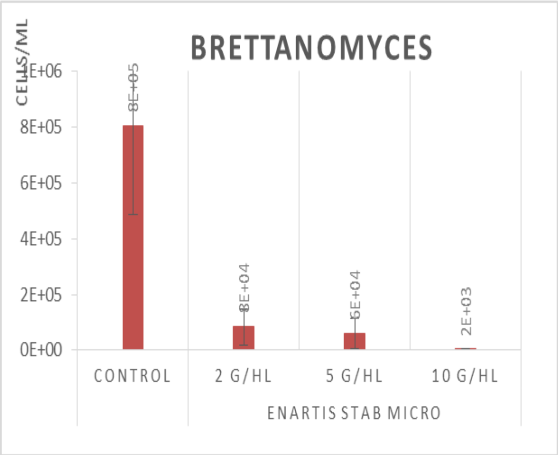
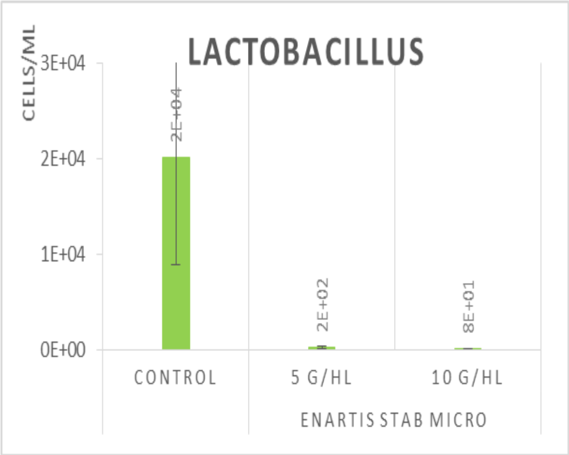
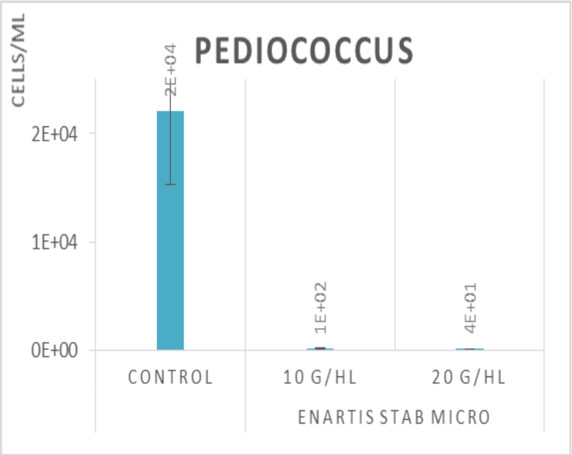
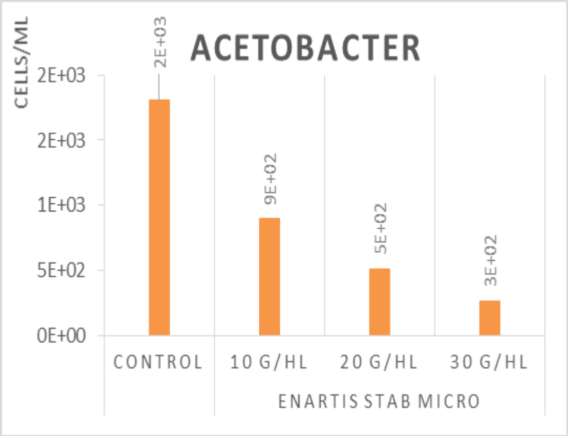
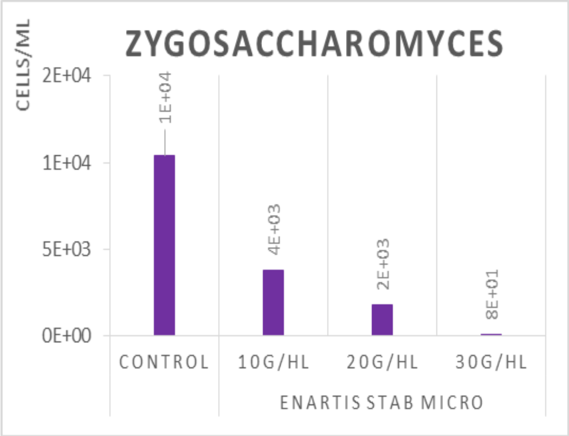
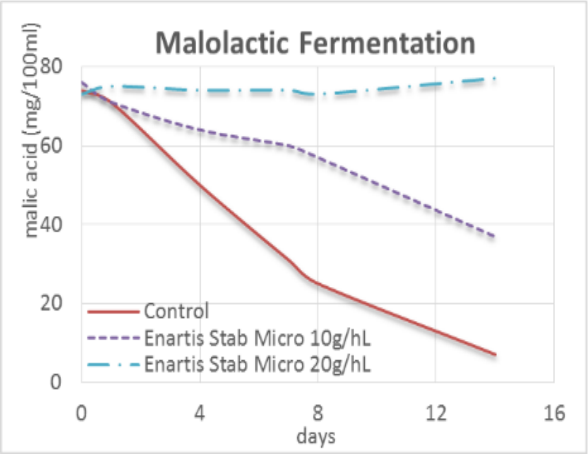






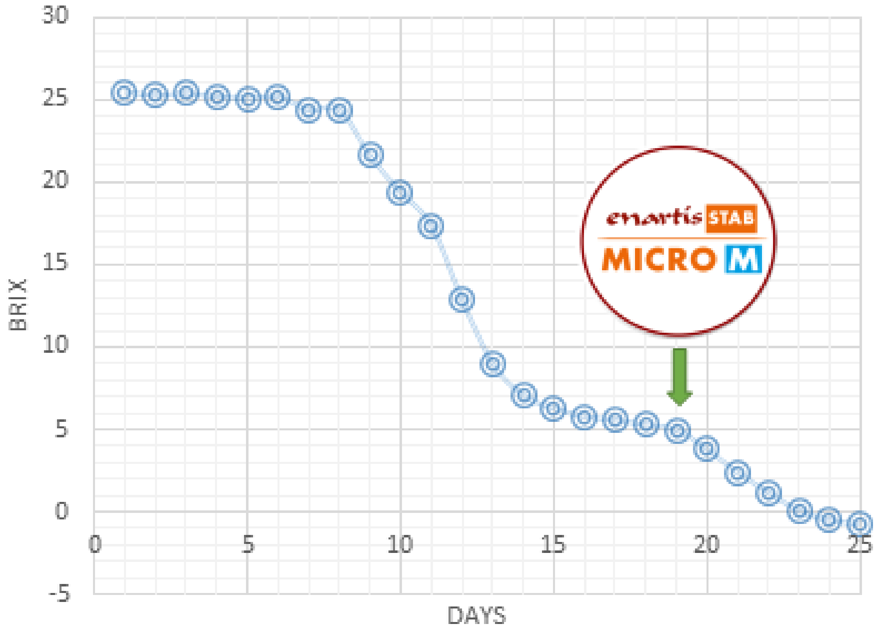


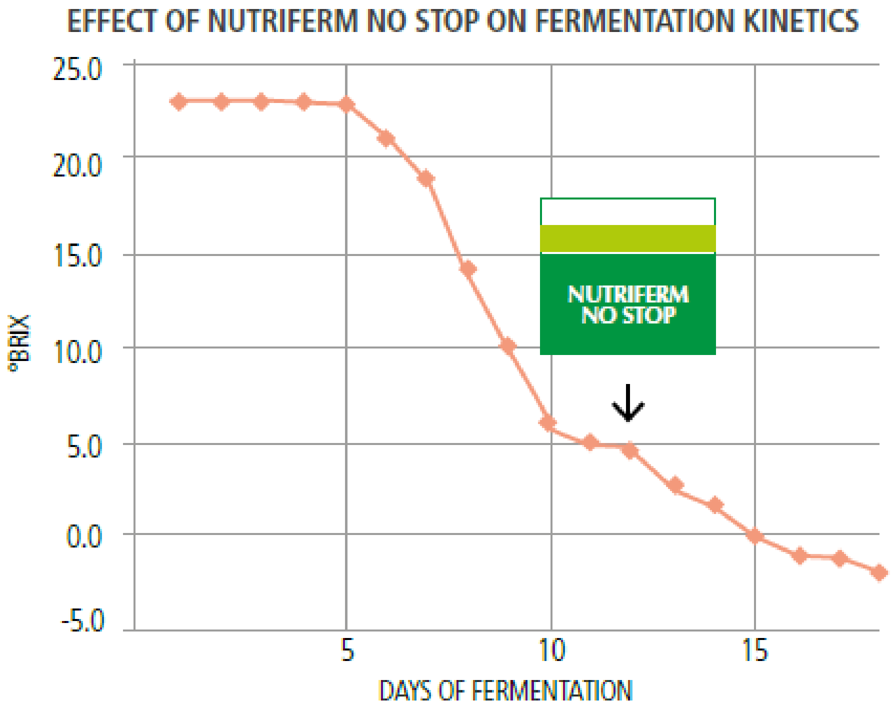




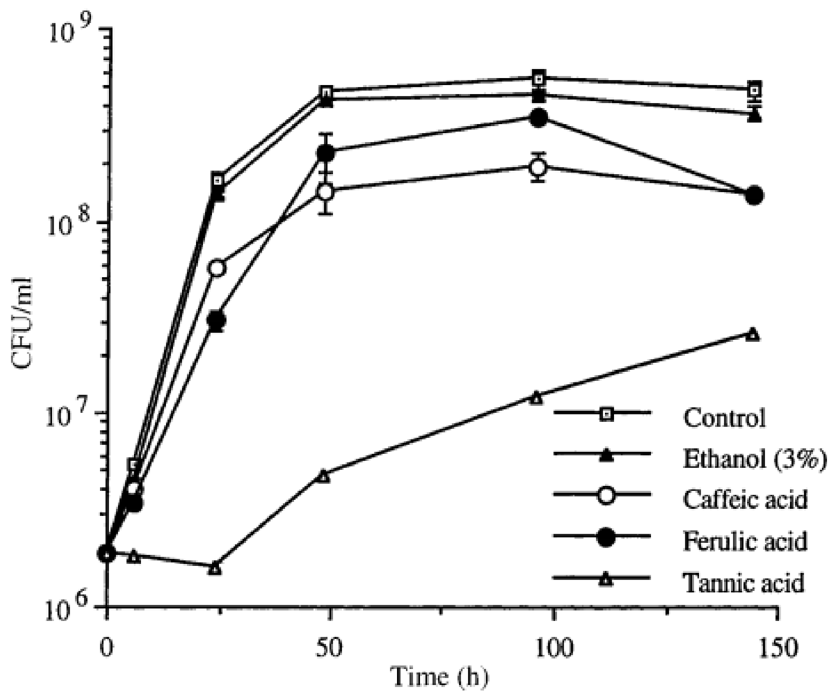
SLUGGISH FERMENTATION DUE TO COMPETITION

- High pH = more competition
- Eliminate competitors
- increase *Saccharomyces* survival factors
- Preventative or curative



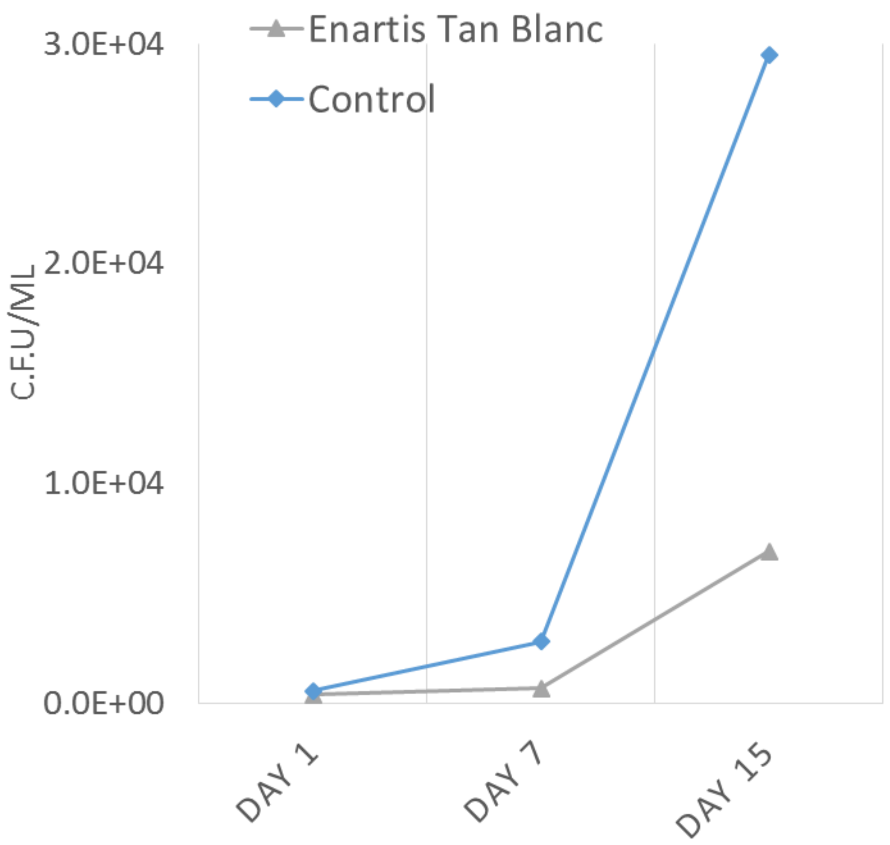


TANNIN AS AN ANTIMICROBIAL



Effect of tannic acid on Lactobacillus plantarum cells growth.

N.Rozes and C. Peres, (1998)



OXIDATION AND pH

- Wine phenols oxidize faster at high pH
- Amount of phenolate ion is 9 times higher at pH 4 compared to pH 3
- Amount of total Oxygen able to be taken up by phenolics is less at higher pH than lower pH

Table 1. Comparison of oxygen uptake under slow (acidic) conditions followed by fast (alkaline) conditions.

		Oxygen uptake				
	PhOH mg/*L*	mg/*L* (acid)	mg/*L* (alk.)	At/M. PhOH (alk.)	At/M. PhOH (acid)*	Acid/-alk.**
Chardonnay	266	0	132	5.3	—	—
Chardonnay	249	105	126	5.4	66	18
White	193	0	89	4.9	—	—
White	162	63	76	5.0	22	5
Rosé	265	0	79	3.2	—	—
Rosé	195	39	51	2.8	6	1.4
Red	676	0	158	2.5		
Red	526	63	130	2.6	4.4	2

* Atoms of oxygen per mole of gallic acid equivalent phenol lost during the reaction with oxygen under the wine's natural acid condition.

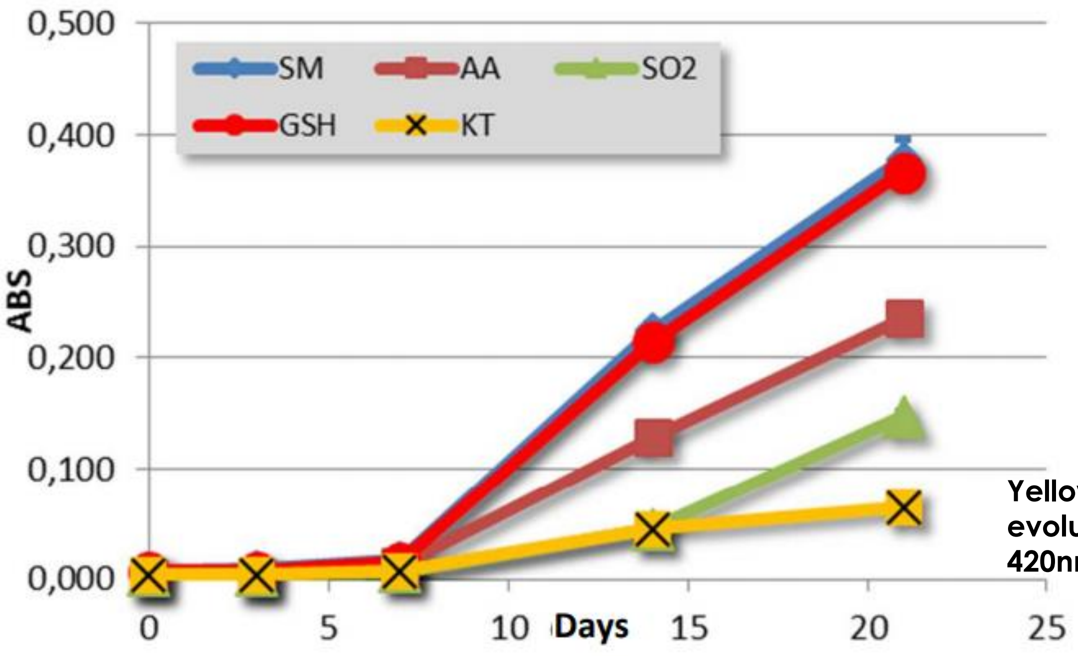
** Mg of oxygen absorbed under acidic conditions per mg of oxygen decreased alkaline absorption resulting from acidic exposure.

Singleton .1987

CHITOSAN ANTIOXIDANT ACTIVITY

Trial made using wine-like solutions with high content of catechins in order to test the effects of:

- AA (100 ppm ascorbic acid)
- GSH (30 ppm glutathione)
- KT.- 100 ppm chitosan
- SO_2 – 80 ppm
- SM is the control



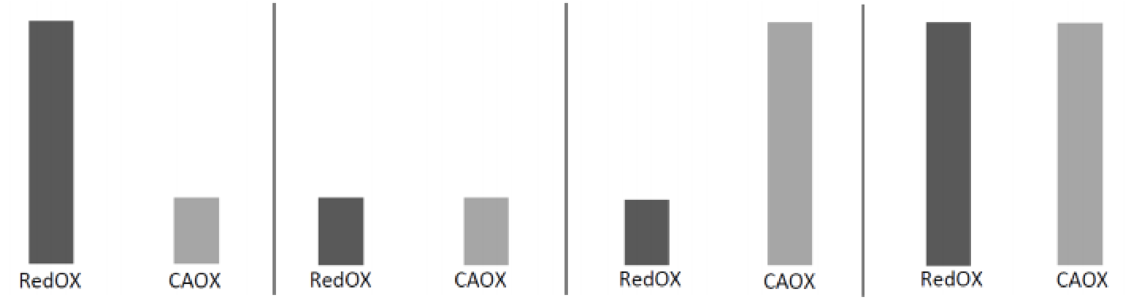
Yellow hint evolution(Oxidation) 420nm

Oxidative browning in the various treatments during the study (absorbance at 444nm)

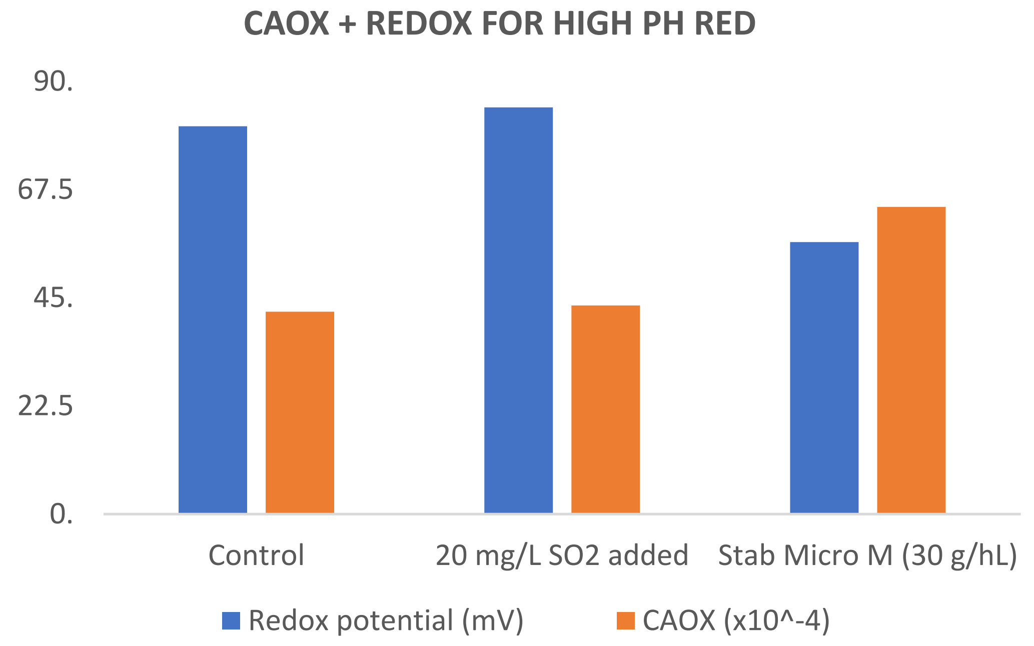
2014. Chinnici e Riponi. Control of the oxidation of (+) catechins with chitosane.

BALANCING REDOX WITH STAB MICRO

CAOX®



AT RISK	NOT STABLE	STABLE	READY TO DRINK
The wine is in an oxidative state and shows low resistance to oxidation.	The wine is in a protective state, but shows low resistance to oxidation. The antioxidant capacity can be improved with adequate ageing.	The wine is in a protective state and shows high resistance to oxidation. Ideal scenario at the beginning of the ageing process.	The wine is "open" and has high resistance to oxidation. This is the ideal case of a bottled wine that is ready to drink.



CHÊNE SERVICES

OTHER ENARTIS SOLUTIONS FOR OXIDATION

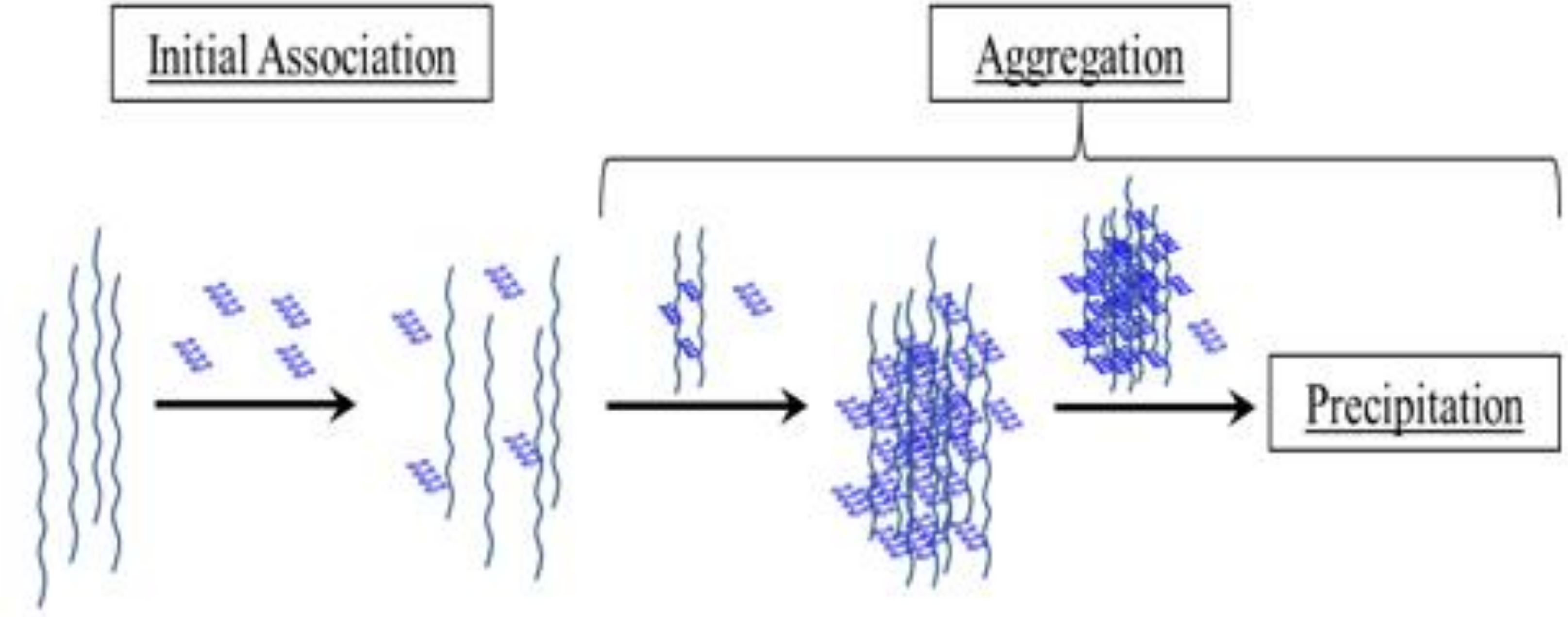
- Increase extraction of phenolics
- Limit oxidation during aging with clean oxygen scavenging lees, add midpalate

enartis ZYM
COLOR PLUS

Surlì
one

pH IMPACT ON ASTRINGENCY

- Lowering pH increases perception of astringency *Fontoin 2008*
- Lowering pH increases reactions between protein and tannin *Kallithraka et al 1997*



CONCLUSIONS

- Dealing with high pH wines requires a very different mindset from typical pH wines
- Microbial influence is higher in high pH situations, which may require extra care and sanitation, or use of Chitosan to supplement aging.
- Tannins can benefit high pH wines as antimicrobials (gallic) and antioxidants (condensed skin or seed)
- Oxidation occurs more readily in high pH wines, increasing phenolic levels and utilizing yeast lees may help to combat those conditions

THANK YOU FOR YOUR PARTICIPATION!

- Thank you for your participation!
- Please fill out our survey!
- Useful downloads
- *More useful info and webinar videos @ http://www.enartis.com/us/focus-on*
- Now, 20 minute Q&A!

- To reach the Enartis team:
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