



‘THE EARLY BIRD GETS THE WORM’

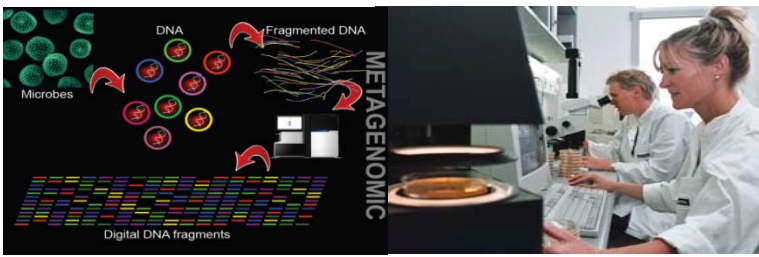
Now the wine research & innovation team at Chr. Hansen delivers proof that this adage also applies to the winemaking process and the management of the fermentation in particular:

- ✓ Early colonization of must/wine with selected Viniflora® pre-fermentation yeasts inhibits the growth of undesired bacteria and yeast species
- ✓ Viniflora™ pre-fermentation yeasts are also well known for their effect on flavor and mouthfeel
- ✓ Oenologically, “non-saccharomyces” yeast has now been recognized by OIV in the new resolution OIV-OENO 576B

In wine, spoilage can originate from many kinds of micro-organisms. The nutrient rich nature of the grape juice and absence of pasteurization can lead to a danger of undesirable micro-organisms. Sulfites are not the ideal answer, but early colonization might just be the solution.

CHR HANSEN

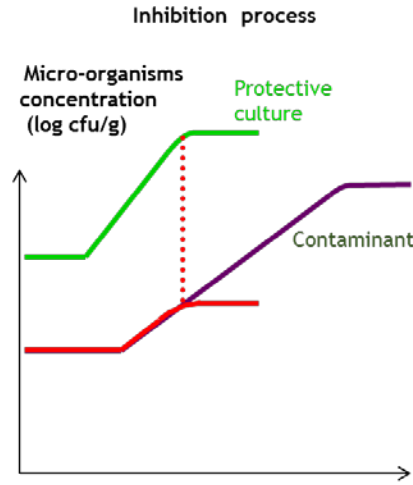
Improving food & health



Pre-fermentation yeast & Bio-protection

Several mechanisms can explain bio-protection

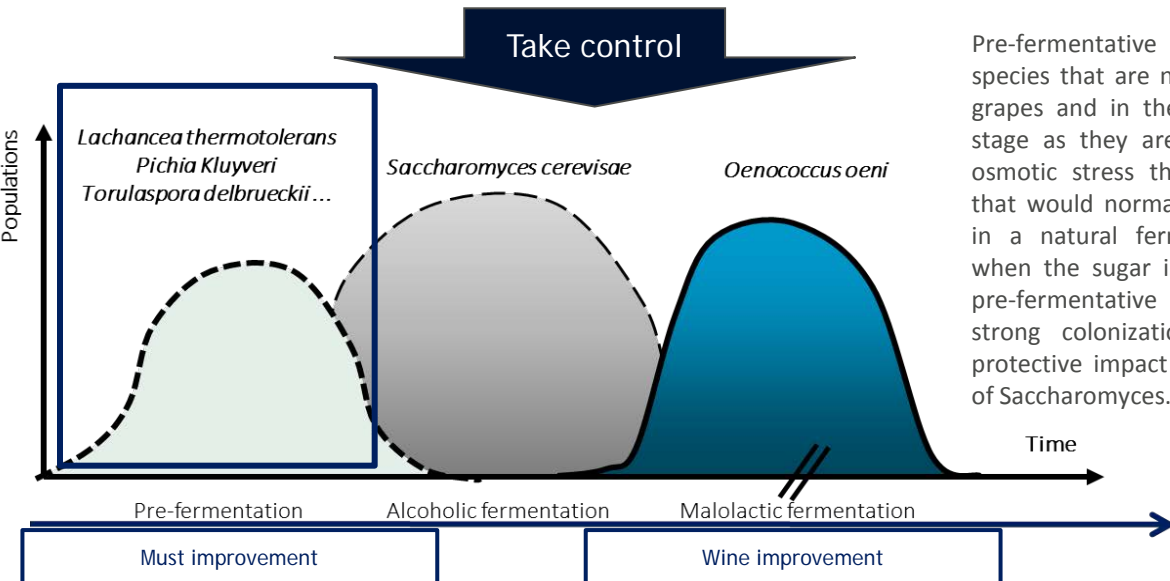
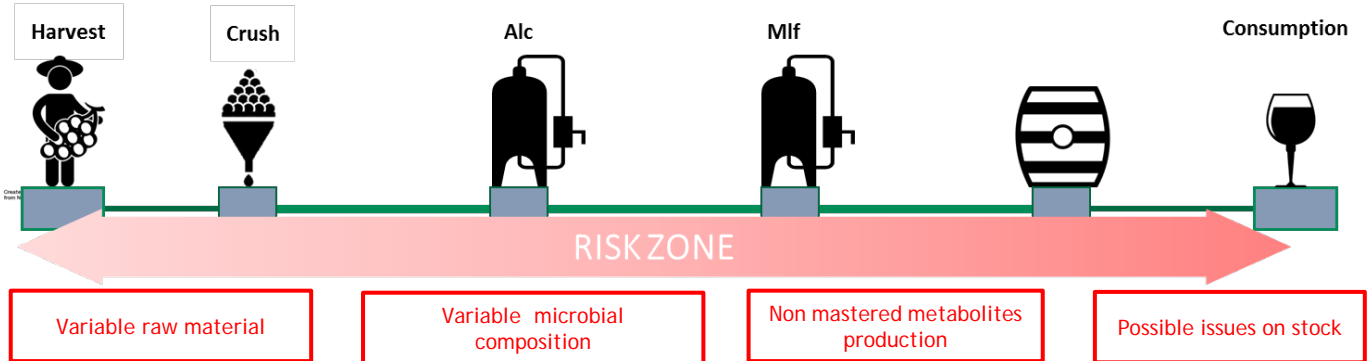
The inhibition can be due to a **competition for nutrients** uptake or to better adaptation to the medium conditions. It can also be caused by the **formation of antagonistic substances** by the protective strain that limits the development of other microorganisms. Moreover, inhibition can be due to competition for space. Indeed, space in the suspension can be limited and fastest duplicating strain could get a survival advantage. Lastly it could be **Cell signal (communication)** by the protective strain that limits the development of other microorganisms



Effect of high active protective culture in time

“The R&D team has worked on the results from metagenomic analysis of many must and wine samples.”, said Hentie Swiegers, head of wine application team. “These studies enable us to get a broad view on the wine microbiome and we are starting to understand the symbiosis and antagonisms between various microorganisms during the winemaking fermentation sequences.”

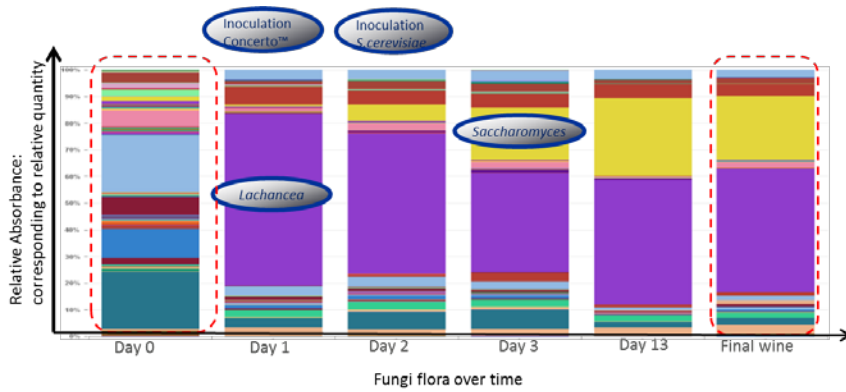
Early colonization prevents spoilage



Pre-fermentative yeast belong to species that are normally present on grapes and in the must at an early stage as they are more tolerant to osmotic stress than Saccharomyces, that would normally only occur later in a natural fermentation process, when the sugar is lower. Therefore, pre-fermentative yeast can have a strong colonization and high bio-protective impact before the growth of Saccharomyces.

Early colonization cultures give control over variable microbial activity
And reduces the risk zone for production of : VA, Biogenic Amines, non mastered metabolites

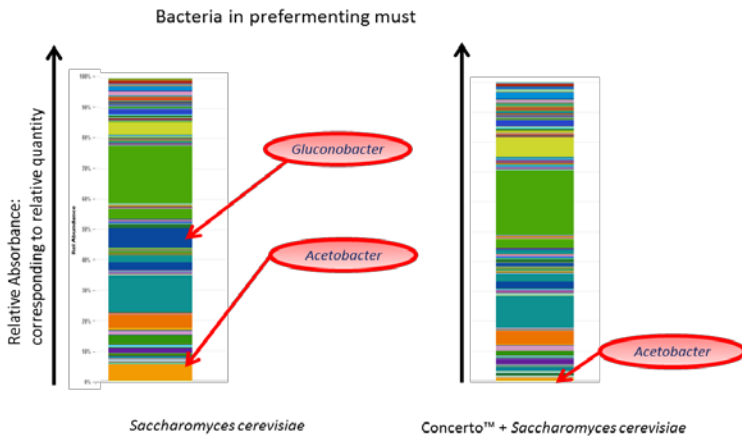
Viniflora® CONCERTO™ takes control of the Fungi eco-system



As soon as inoculated, the species *Lachanea thermotolerans* can be visualized by a wide strip on the species mapping, corresponding to a high abundance of its DNA. One can also note the presence of inoculated *Saccharomyces* at a later stage.

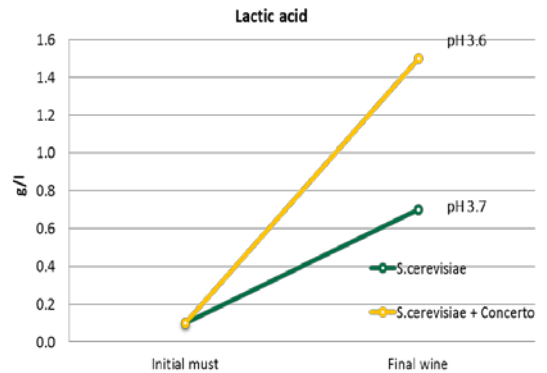
Besides their bioprotective features, pre-fermentation yeast also play a role in the wine aroma: Concerto™, is appreciated for its freshness, it adds a light acidity to wine, enhancing the fruit expression. Frootzen™, is an in-situ thiol and ester factory. Bringing out the full aroma potential of the grapes

Viniflora® CONCERTO™ enables to reduce acetic acid bacteria



On the graph above, *Lachanea thermotolerans* is showing a decreasing effect on the relative abundance of *Gluconobacter* and *Acetobacter*.

Viniflora® CONCERTO™ produces lactic acid

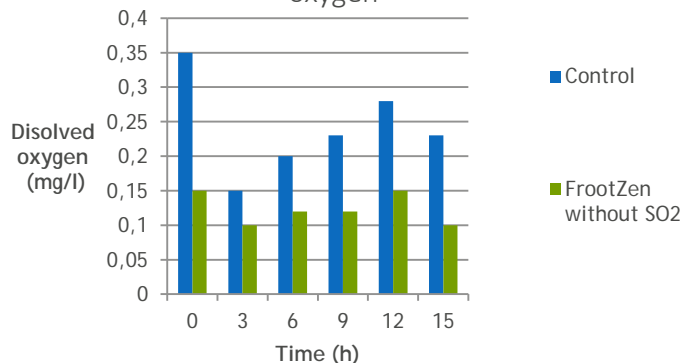


As shown above, in addition to its significant implantation from the inoculation time, CONCERTO™ also increases lactic acid and decreases the pH. Not only does that protect against unwanted flora it also adds a freshness to the wine.

Lachanea thermotolerans (CONCERTO™), *Pichia Kluyveri* (FrootZen™) and *Torulaspora delbrueckii* (PRELUDE™) are pre-fermentative yeast with the following abilities:

- Colonize the on must at a very early stage
- Protect the wine against non-wanted microorganisms
- Show a good symbiosis with *Saccharomyces cerevisiae* and *Oenococcus oeni*
- Also provide interesting flavors and /or pleasant mouthfeel

Viniflora® FrootZen™: Effect on dissolved oxygen



FrootZen™ reduces dissolved oxygen concentration in the grape juice during fermentation (here above: Sauvignon Blanc at cold settling): Decreasing oxidation and enabling reduction of SO₂ at the early winemaking stage.