CHR HANSEN

Improving food & health

non-*Saccharomyces* wine yeast

Annicka Bunte 16 June 2009

History of yeast starters

- First starter culture: Müller-Thurgau 1890
- First commercial wine yeast starter: California 1964-65
- Today: 90% starter fermentations in California
  [Mortimer(2000) ***Genome Res.*** 10 (4): 403-409]
- Process consistency gained
  at the expense of some positive wine qualities

Lost qualities associated with ‘‘wild’’ yeast

FRUIT.

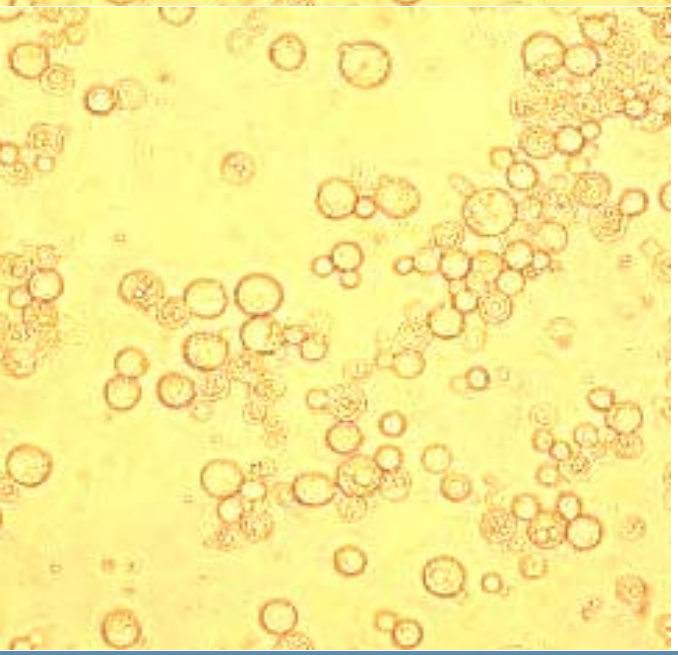
COMPLEXITY.

MOUTHFEEL.

Reintroducing the good “wild” characters

- Aiming to reintroduce fruit, complexity and mouthfeel like spontaneous fermentations
- Keeping process control
- Screening of non-*Saccharomyces* isolates
- Laboratory and field trials ensuring good vinification
- Safety aspects tested (low urea/ethyl carbamate)
- Sensoric impact evaluated in field trials

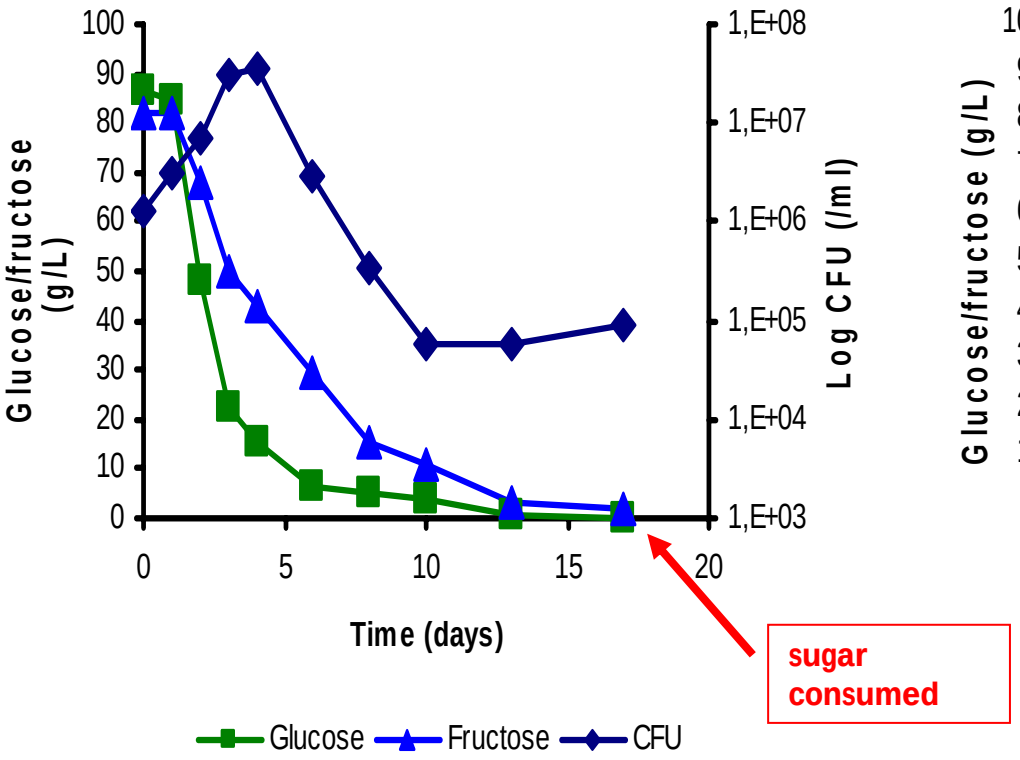
Chr Hansen screening of wine related ‘‘wild’’ yeasts started in the 1990’s



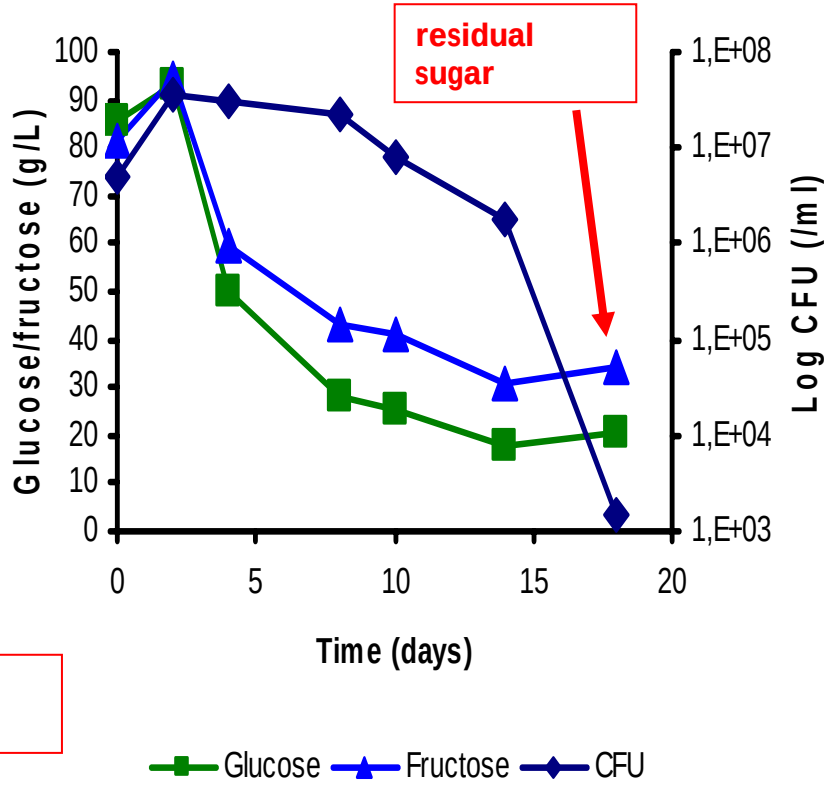
- *Brettanomyces* / Anamorph *Dekkera*
- *Candida*
- *Cryptococcus*
- *Debaromyces*
- *Hanseniaspora* / Anamorph *Kloeckera*
- *Hansenula*
- *Kluyveromyces*
- *Torulaspora*
- *Metschnikowia*
- *Pichia*
- *Rhodotorula*
- *Saccharomyces*
- *Saccharomycodes*
- *Schizosaccharomyces*
- *Zygosaccharomyces*

Saccharomyces drives the alcoholic fermentation

S. cerevisiae



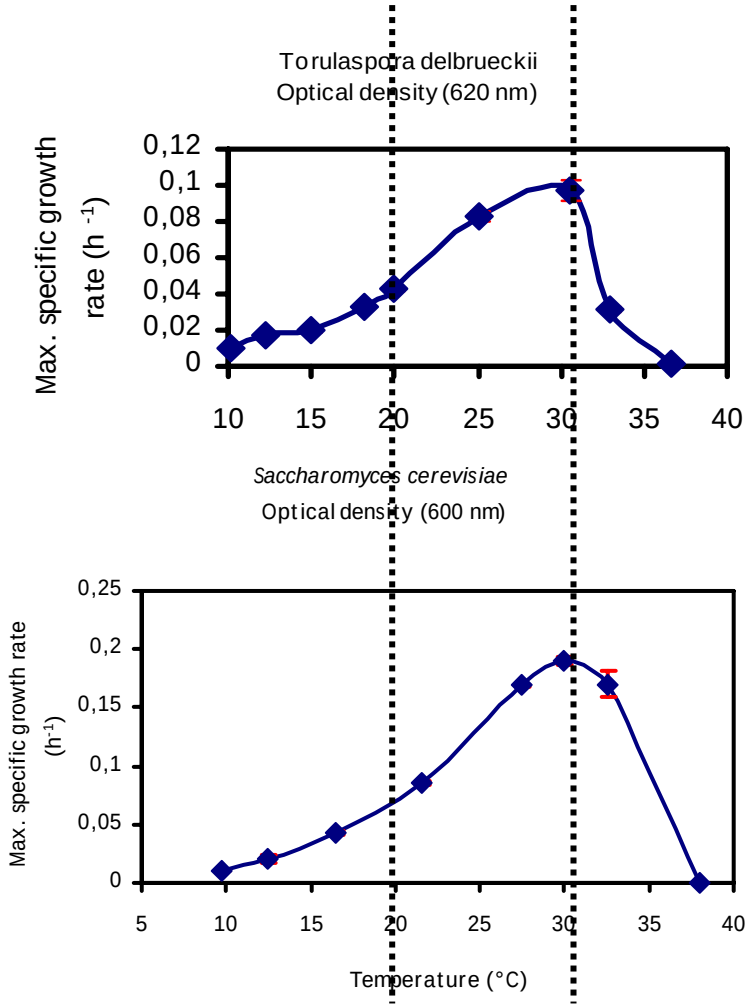
T. delbrueckii



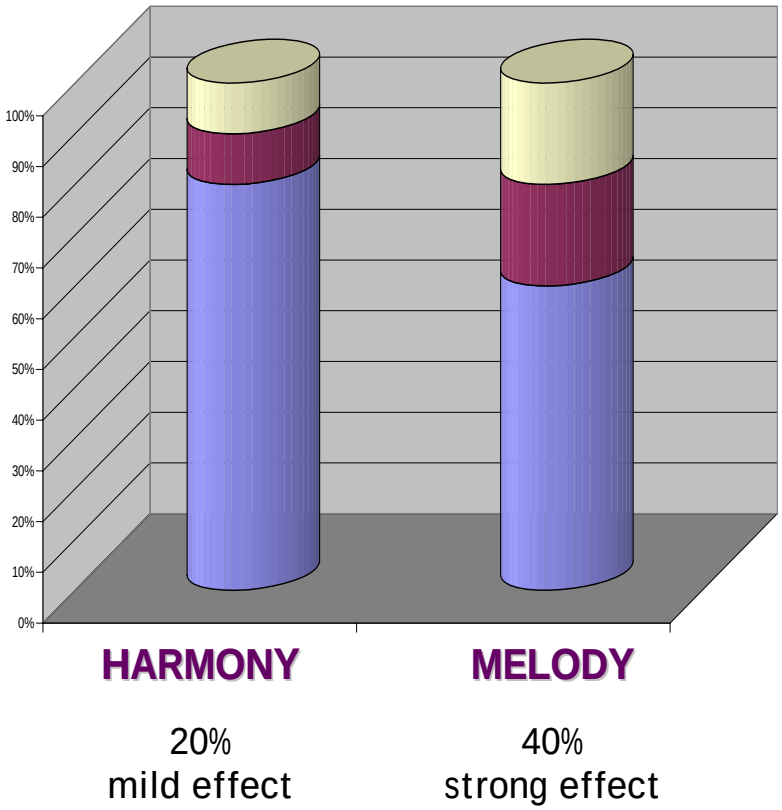
non-*Saccharomyces mixed* starters

- *Saccharomyces* yeast needed to finish fermentation
- non-*Saccharomyces* yeasts and *Saccharomyces* yeast should ferment under similar conditions
- 2003 big scale field trials
- 2004 first non-*Saccharomyces* containing starter cultures introduced by Chr Hansen

Temperature optimum similar, temperature tolerance differs slightly.



HARMONY.nsac & MELODY.nsac



20%
mild effect

40%
strong effect

- 2 Blends of:
  - *Torulaspora delbrueckii (Td)*
  - *Kluyveromyces thermotolerans (Kt)*
  - *Saccharomyces cerevisiae (Sc)*

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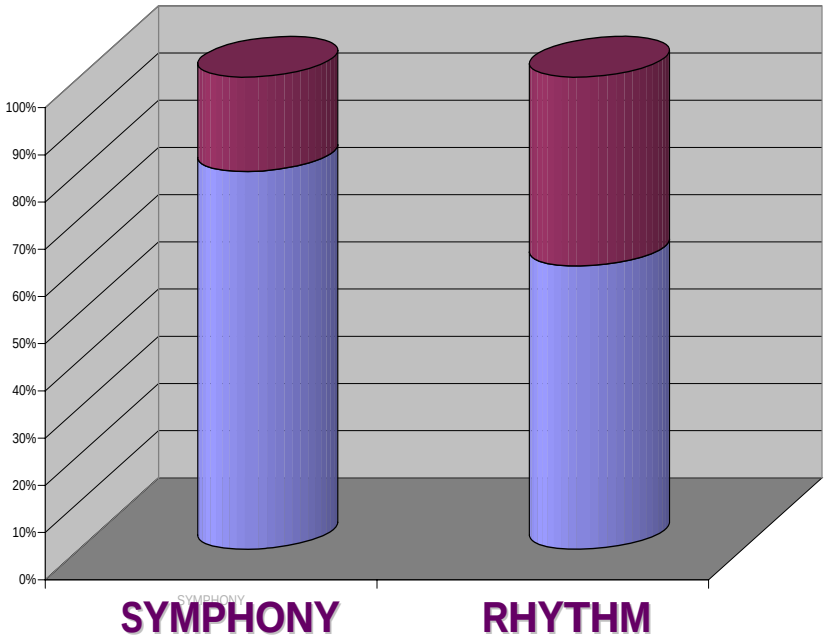
SYMPHONY.nsac & RHYTHM.nsac



20%
mild effect

40%
strong effect

- 2 Blends of:
  - *Kluyveromyces thermotolerans (Kt)*
  - *Saccharomyces cerevisiae (Sc)*

Example fermentation Cabernet sauvignon, HARMONY.nsac

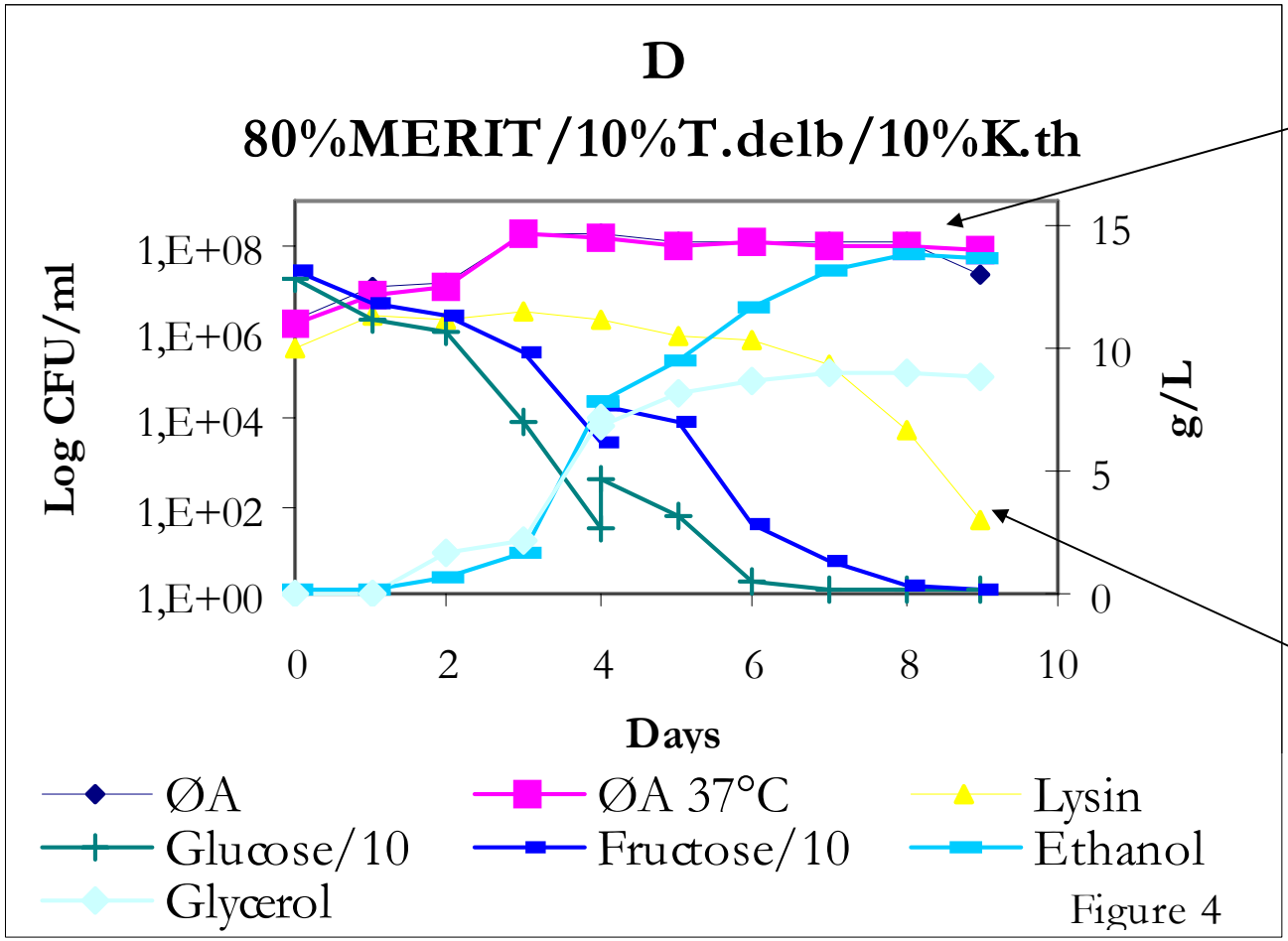
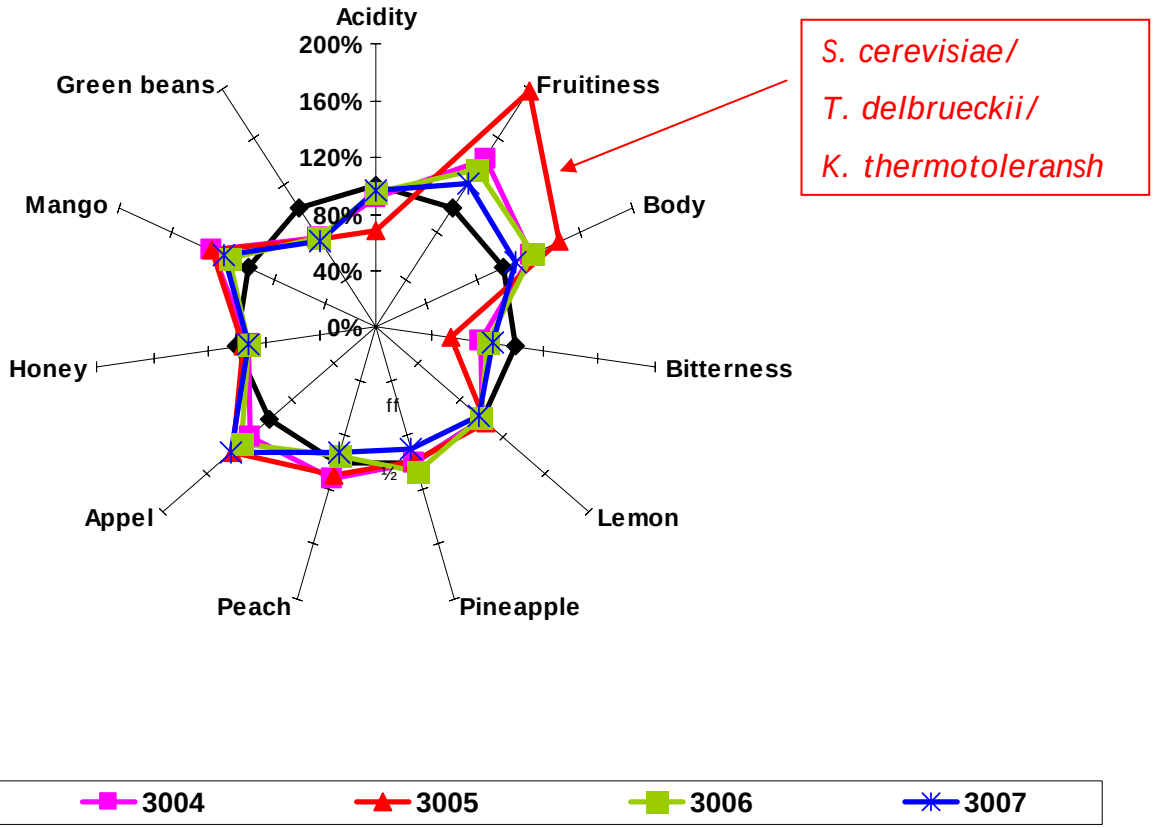


Figure 4

Saccharomyces drives the fermentation

non-*Saccharomyces* numbers decline over time, like in spontaneous fermentation

Mixed starters vs pure *Saccharomyces* cultures



Data kindly provided by University of Neustadt, Germany and E: Begerow GmbH & Co, Germany

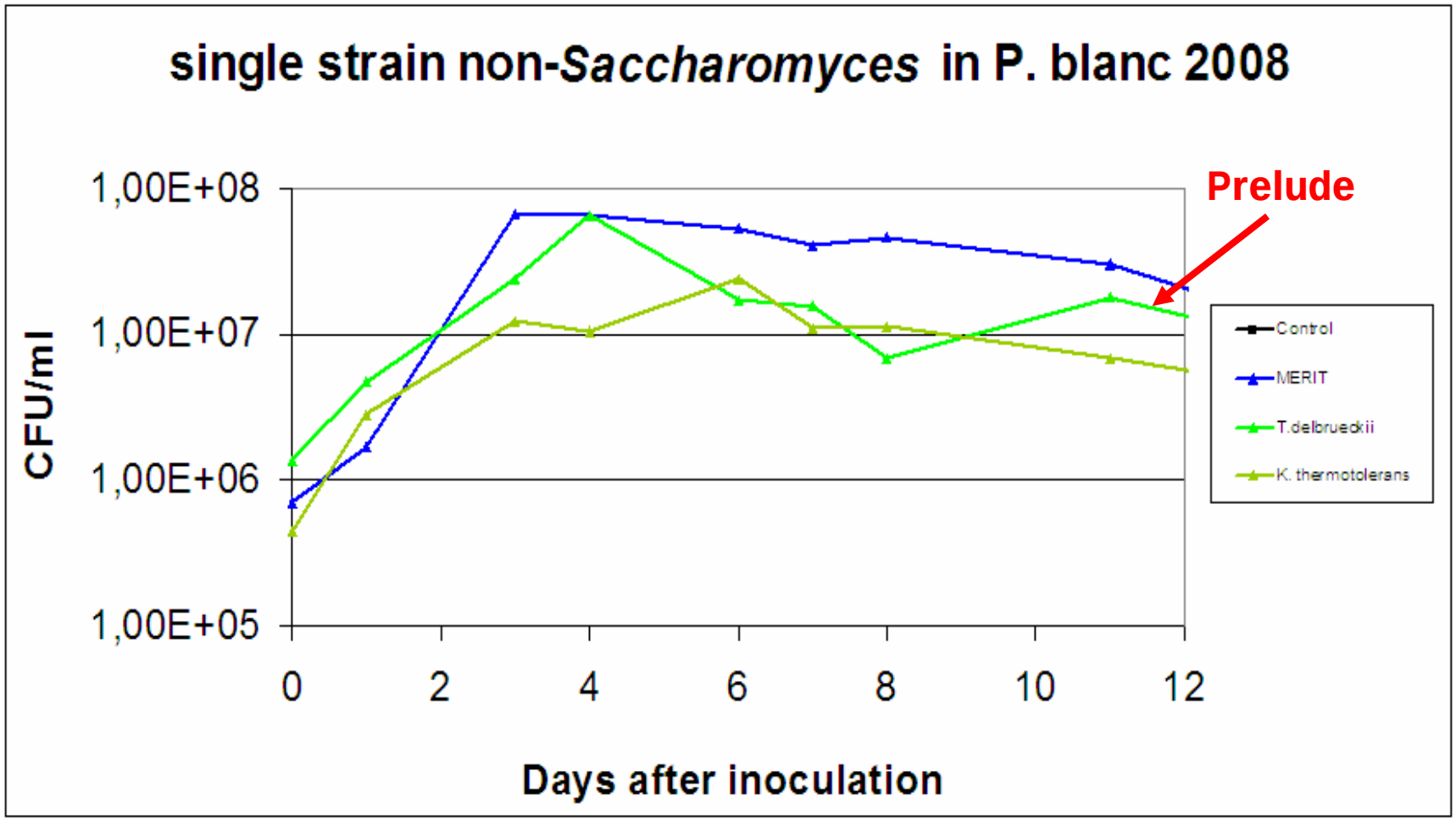
Experience with starters

- Improves mouthfeel and smoothness / roundness of wines
- Increases longevity of flavours and aromas

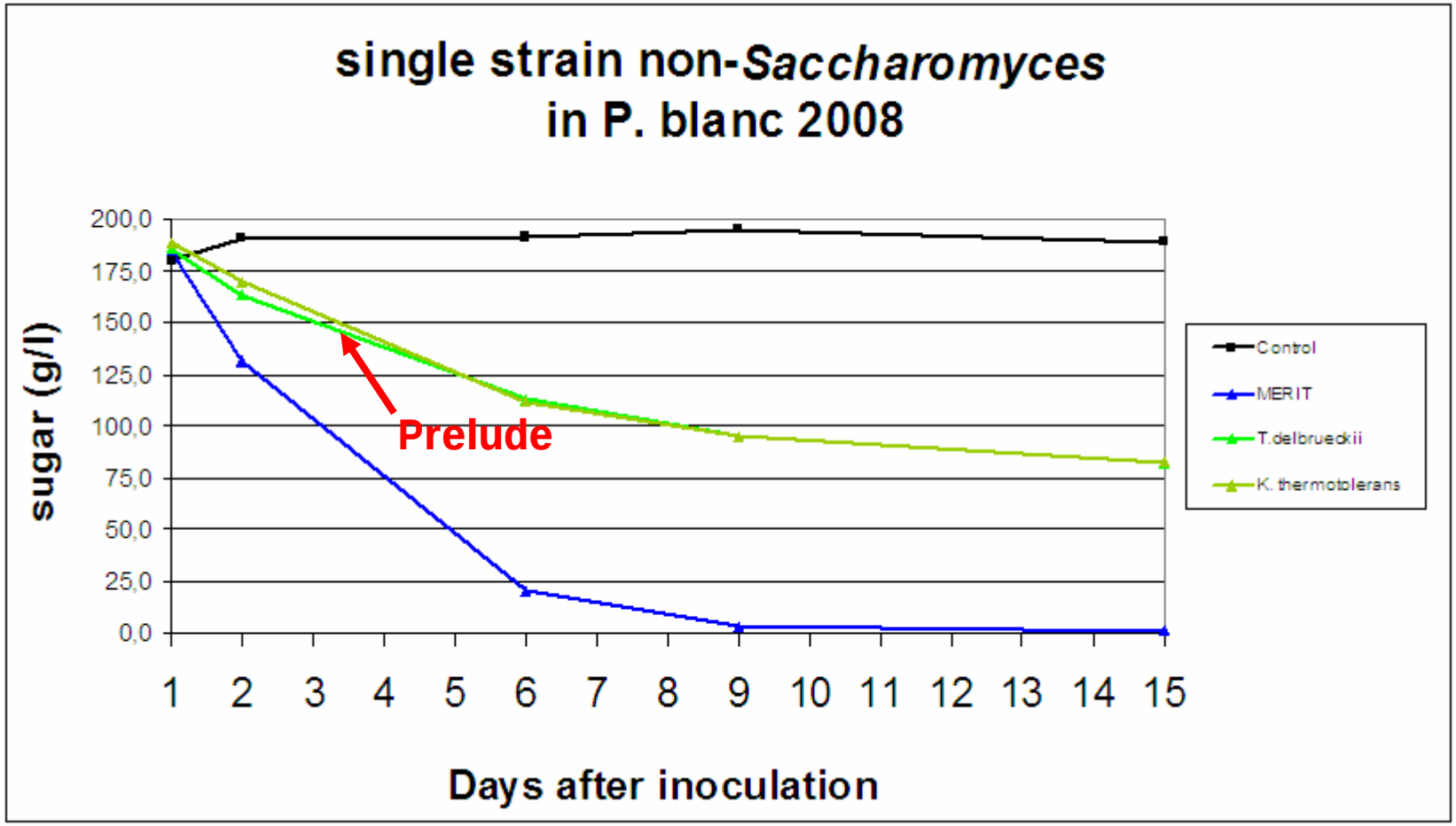
- Wineries interested in experimenting with own ratios, inoculation schemes and favourite *Saccharomyces cerevisiae* commercial strains

- PRELUDE.nsac single strain *Torulaspora delbrueckii*

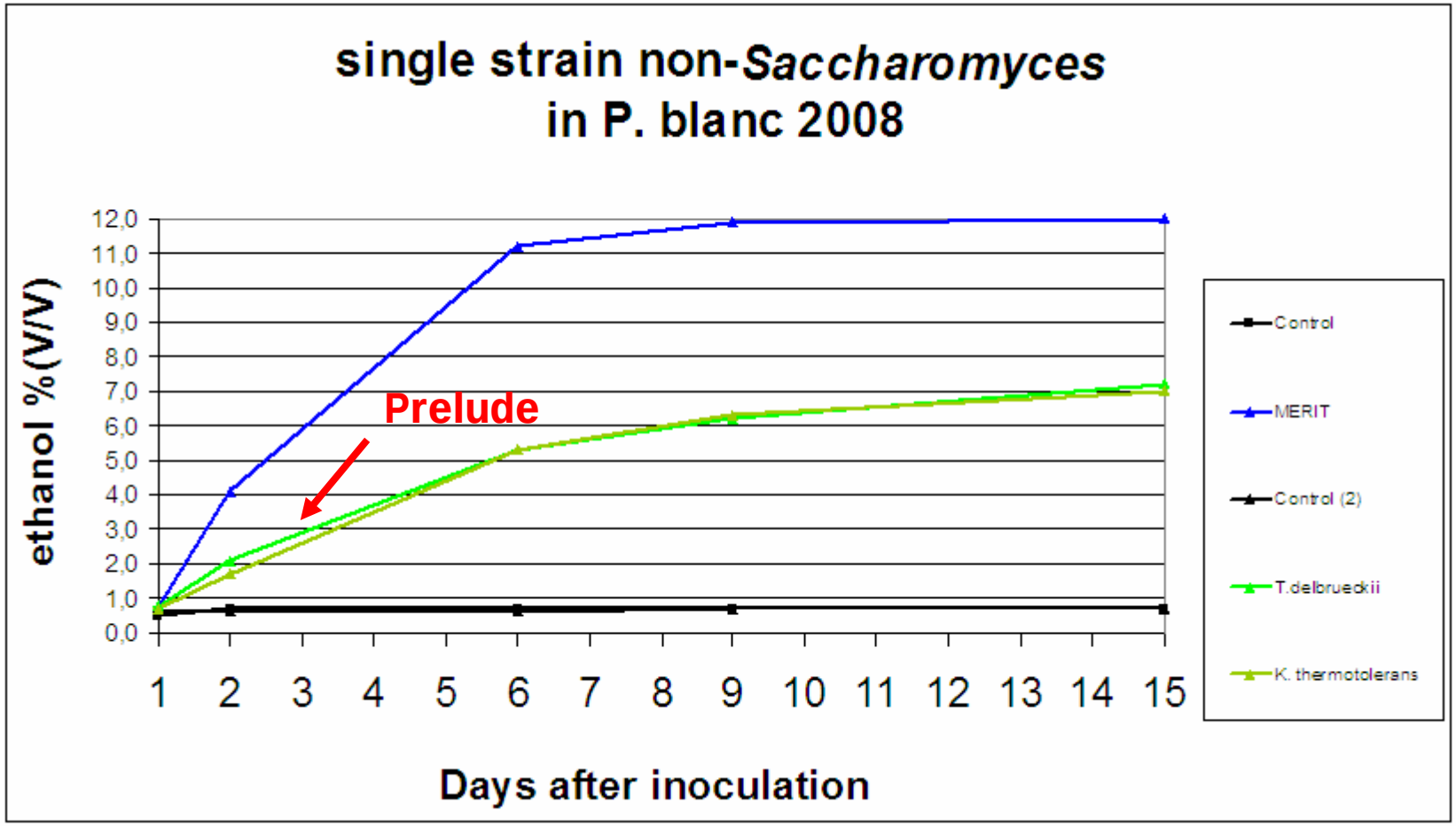
Saccharomyces drives alcoholic fermentation: growth



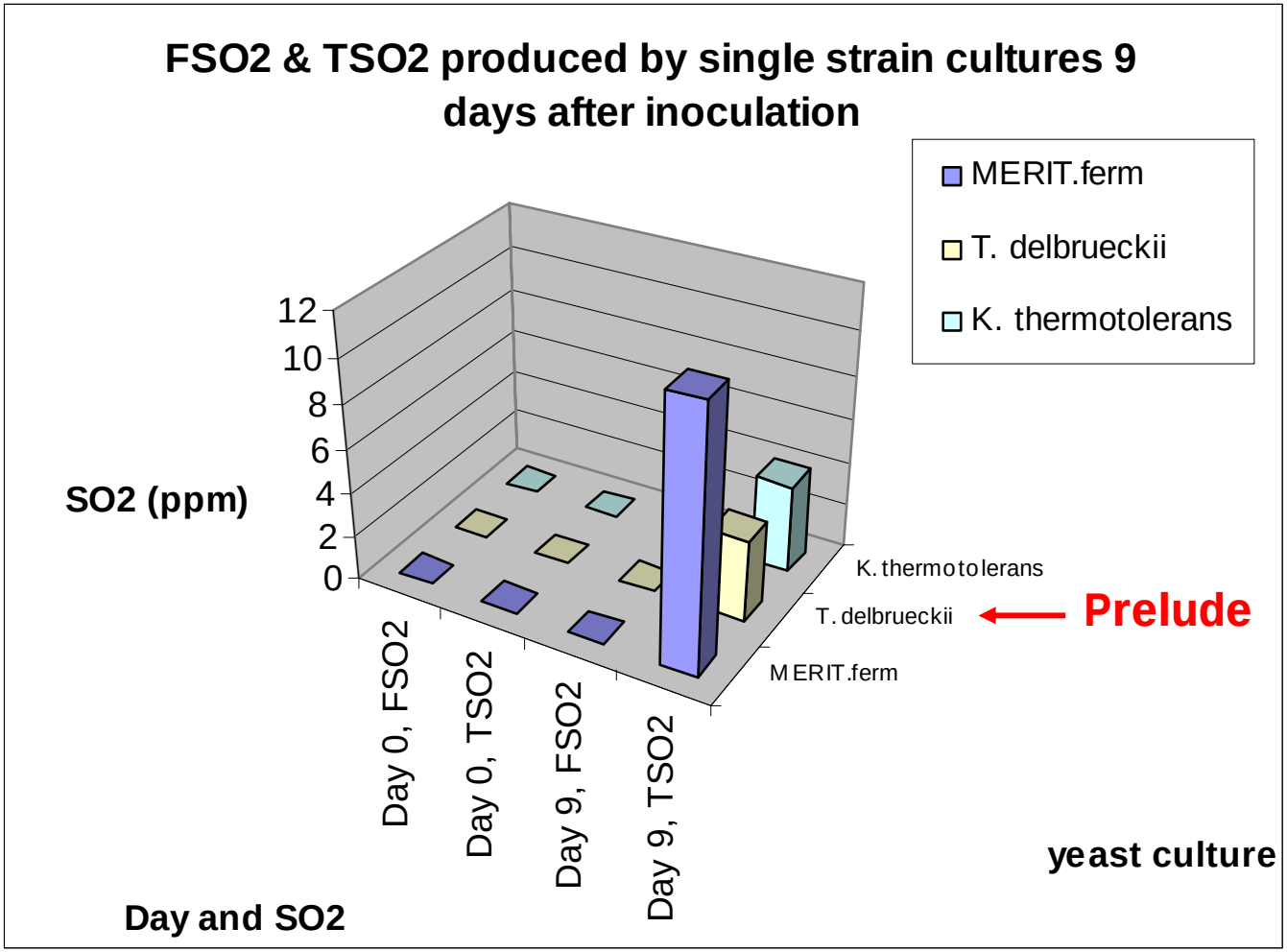
Saccharomyces drives alcoholic fermentation: sugar



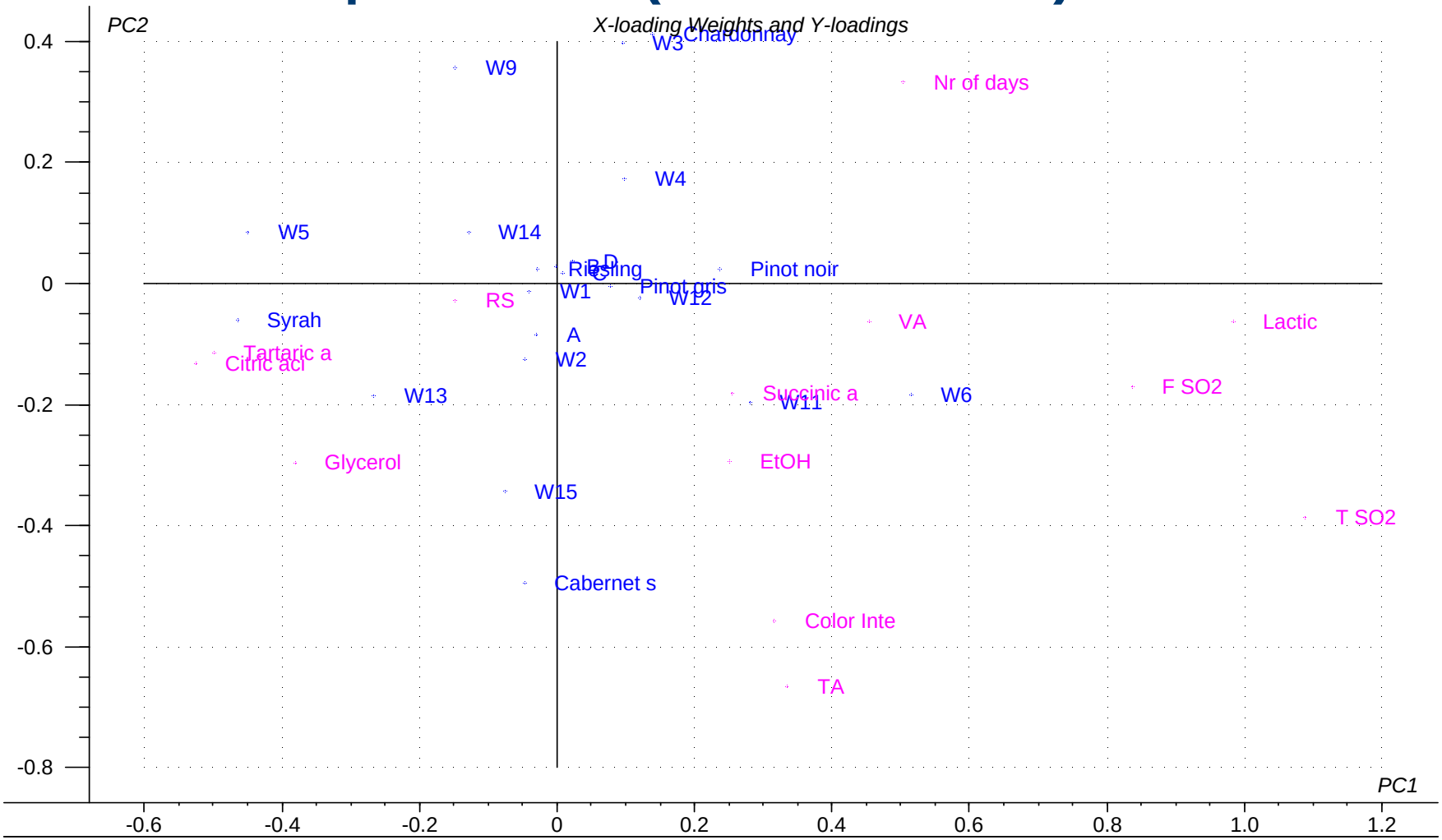
Saccharomyces drives alcoholic fermentation: ethanol



non-*Saccharomyces* contribute little to SO2



non-*Saccharomyces* made little difference on standard fermentation parametres (field trials 2003)



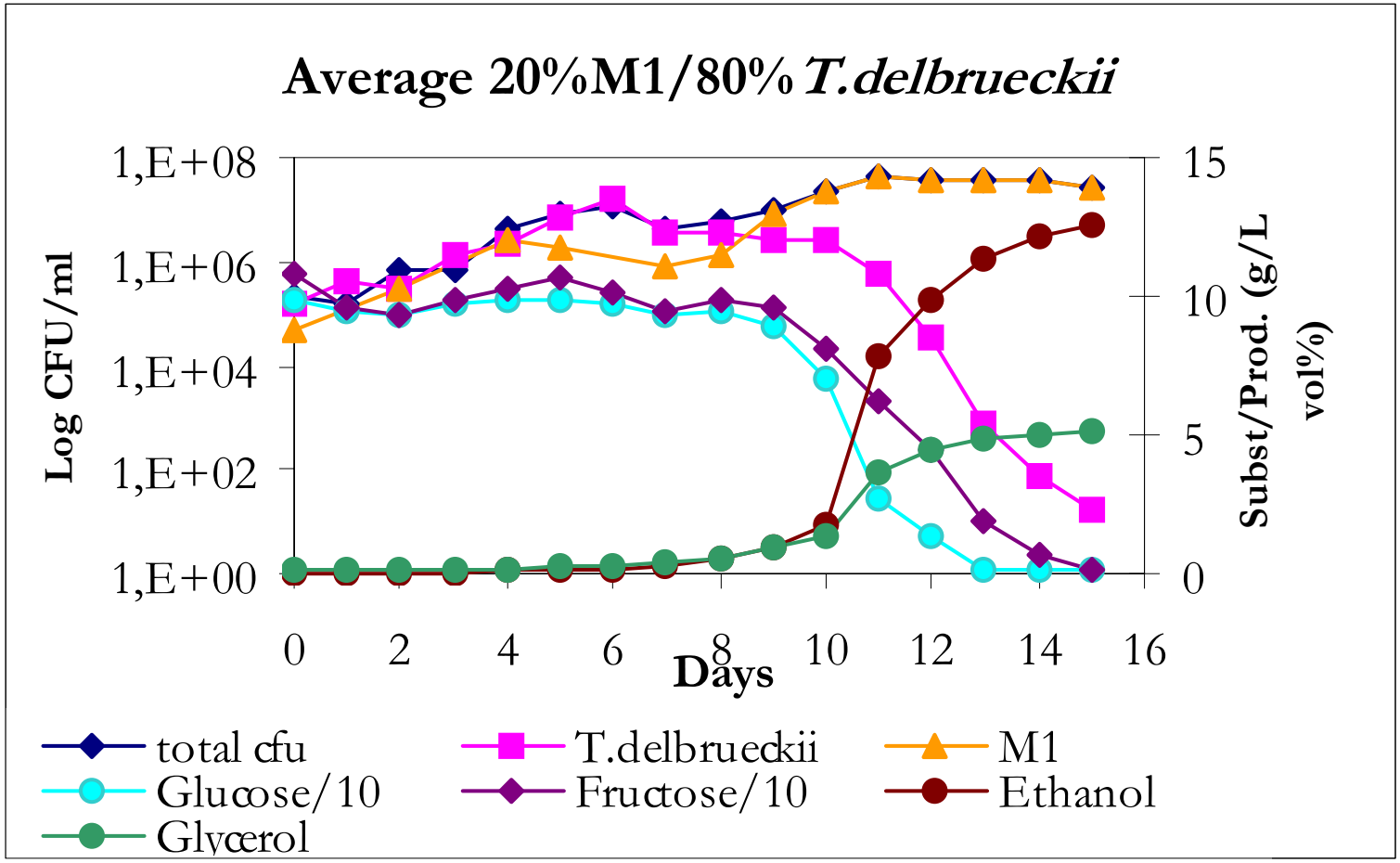
RESULT1, X-expl: 8%,8% Y-expl: 37%,14%

S. cerevisiae drives the alcoholic fermentation: field trials 2003

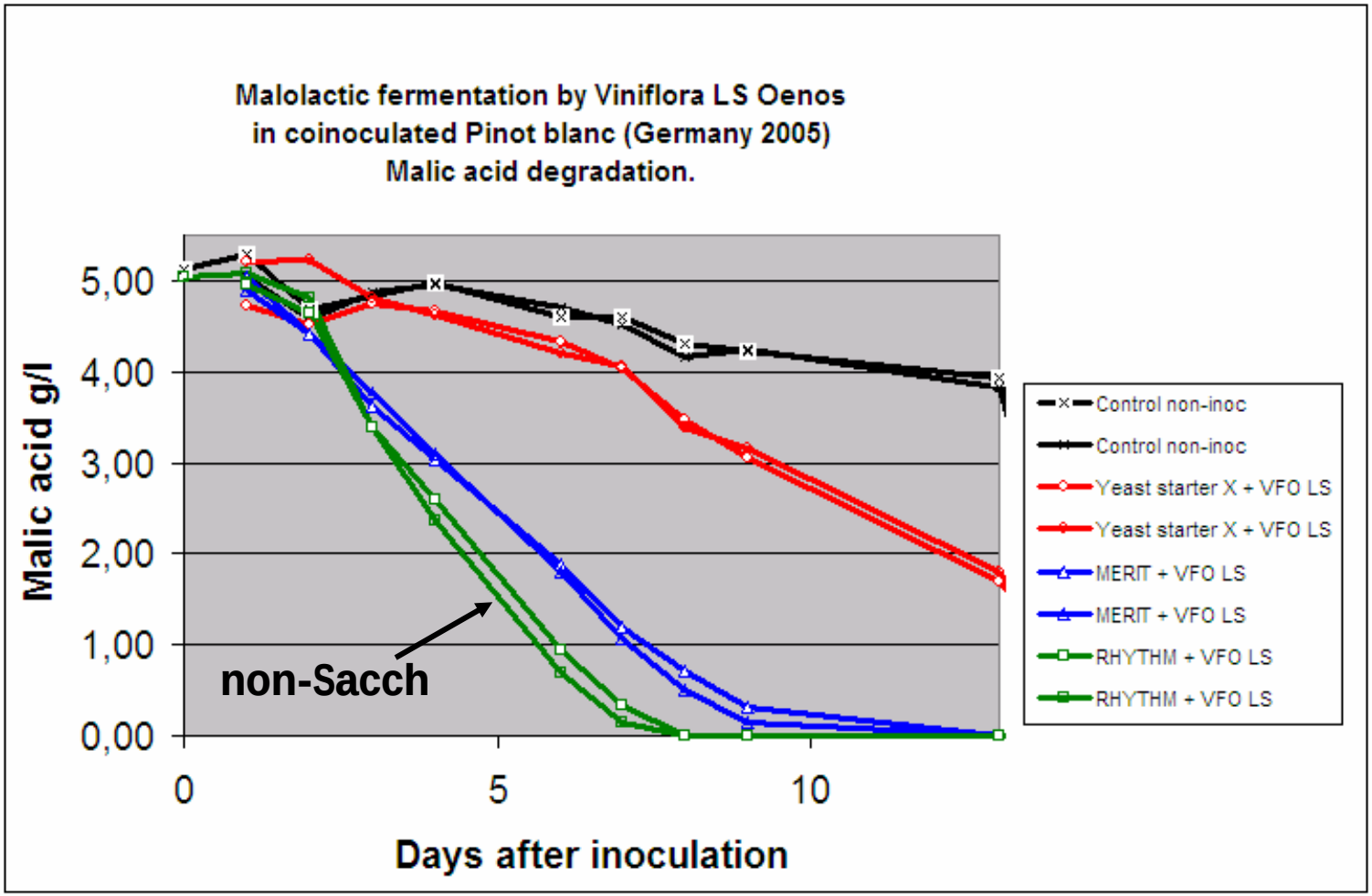
	Finished first	Finished last	Total No. reported trials
S. cerevisiae	4	1	16
80% NS	0	6	16
”PRELUDE”	0	1	15
”SYMPHONY”	3	1	14

Always use single strain *Torulaspora delbrueckii* **(PRELUDE) with a commercial** *Saccharomyces cerevisiae***!**

Torulaspora delbrueckii (PRELUDE) in Pinot blanc

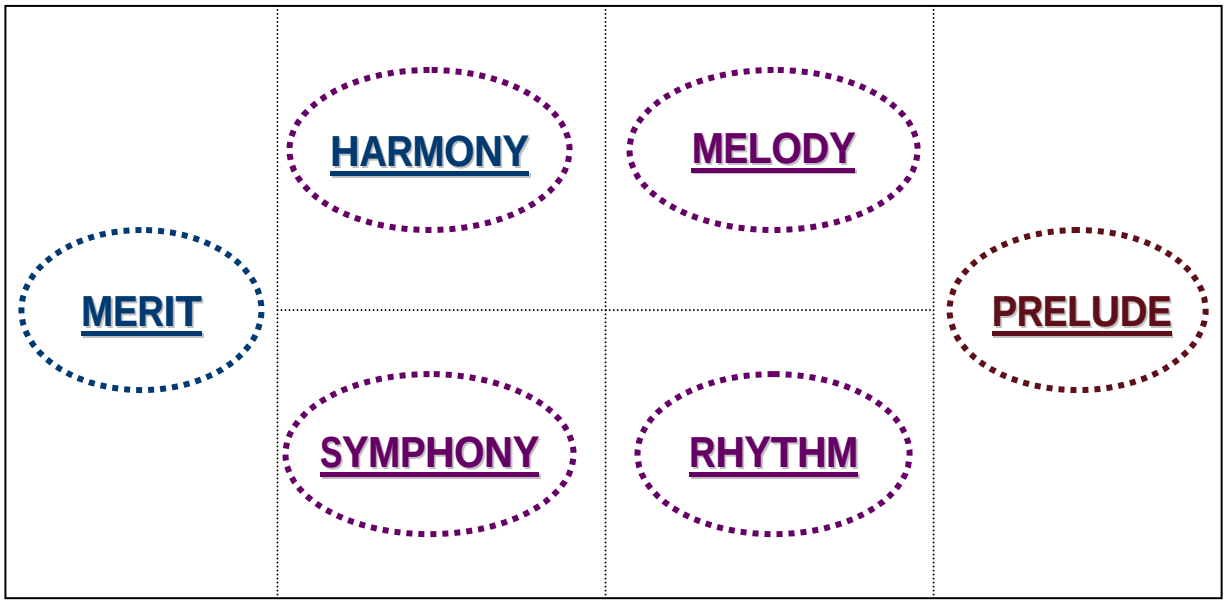


Fast MLF with non-*Saccharomyces*



Select your yeast product

	0%	20%	40%	100%	Non-Saccharomyces species
Saccharomyces cerevisiae	100%	80%	60%	0%	
	High sugar content	mild 'wild effect'	strong 'wild effect'	Palate weight strong effect	



NEW!

PRELUDE.nsac

- 100% *Torulaspora delbrueckii*
- To be used with your favorite *Saccharomyces cerevisiae*
- Gives rounder, smoother mouthfeel
- Extend palate weight and flavors
- Used in white/ rosé and premium red wines to get additional complexity
- ALWAYS use your favorite *Saccharomyces cerevisiæ* in addition to PRELUDE.nsac

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Experience with PRELUDE.nsac
South African field trials 2009

- Chardonnay: Inoculation of PRELUDE.nsac 5 days prior to *Saccharomyces cerevisiae* (commercial strain)
  - "Remarkable" increased mouthfeel, palate weight and creaminess.
  - Impact on red wines predicted to be very beneficial
  - Effect similar to addition of mannoproteins

- Sauvignon blanc: Inoculation of PRELUDE.nsac 2 days prior to *Saccharomyces cerevisiae* (commercial strain)
  - Preferred the PRELUDE.nsac treatment
  - Improved mouthfeel and lenght of flavours in the palate
  - Reduced VA notes
  - Maintain Sauvignon blanc aromas produced by Saccharomyces

Experience with PRELUDE.nsac
South African field trials 2009

- Chardonnay and Sauvignon blanc: PRELUDE.nsac pre- and co-inoculated with *S. cerevisiae* (commercial strain)
  - PRELUDE.nsac wines increased mouthfeel and roundness
  - Allows *Saccharomyces cerevisiae* to express flavour and fermentation characteristics
  - Co-inoculation preferred by most

- Shiraz trials with non-*Saccharomyces* single strain
  - Enhanced varietal character, enhanced colour and great mouthfeel, full bodied
  - Effect similar to addition of mannoproteins