



Fermentis
by Lesaffre

M A S H

MIAMI AREA SOCIETY OF HOME BREWERS



HOMEBREW CLUB EDUCATIONAL SESSION

JOIN NOW

The influence of fermentation parameters on aromas expression for three strains:
W-34/70, BE-256 and BE-134

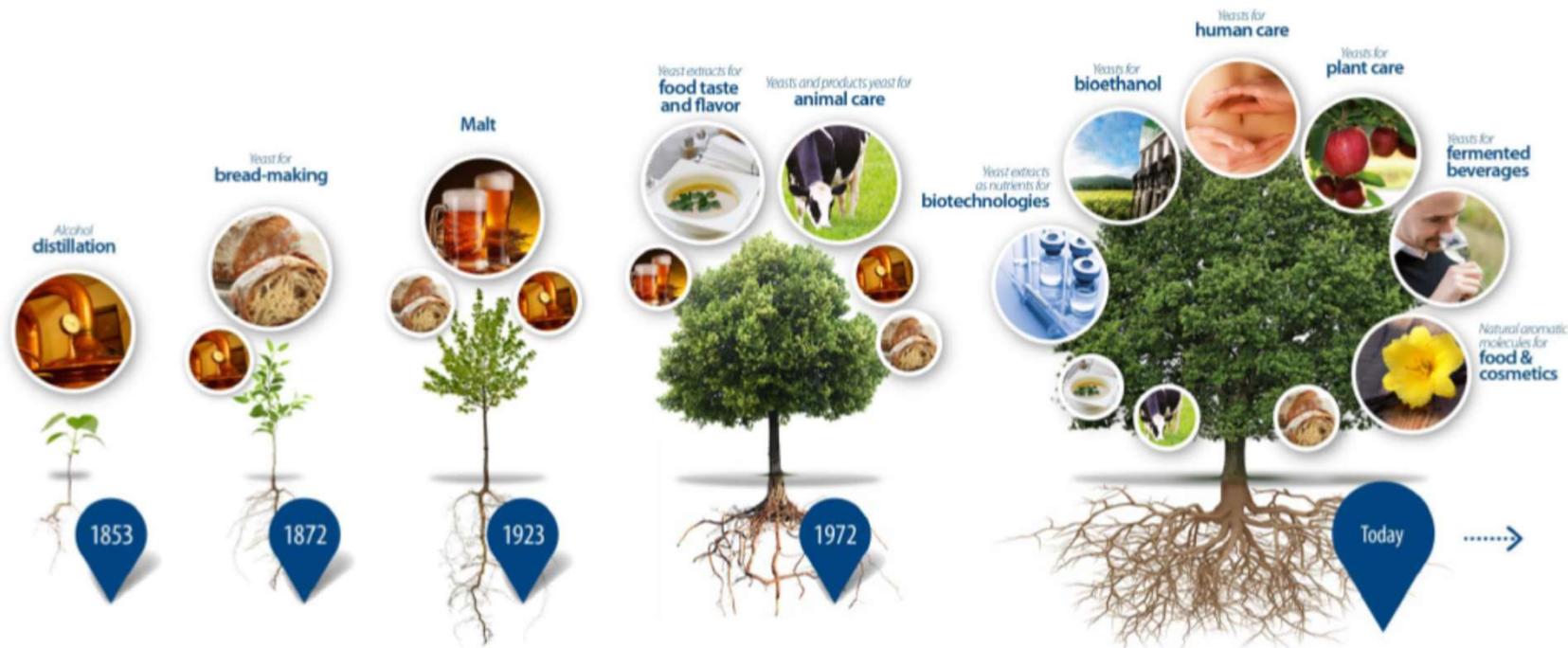
MAY | 28th | 2020

From 7:30PM to 8:40PM EST

With **José Pizarro**,
Regional Sales Manager
- North America - East

OUR GROUP

ACTIVITIES OF LESAFFRE



OUR GROUP

LESAFFRE ACTIVITIES



FERMENTIS

WE WORK FOR THIS WORLD



FERMENTED BEVERAGES

Our Vision:

THE OBVIOUS CHOICE FOR BEVERAGE FERMENTATION!



ADY ADVANTAGES



Facilitate Brewing Practices

Multiple Strains -> Contract Brew, Global Multi-Site Production, Seasonal Beers

Multiple Package Sizes -> All types of Brewers



Reliable, Consistent

(Genetics, Quality/Purity, Shelf-Life)



Easy to Source



Easy to Store



Easy to Use





Now... Make it easy;
with



E2U™ active dry yeast...

You can pitch it directly.
No need to rehydrate and oxygenate
the wort.



THE 3D FERMENTATION MODEL

FERMENTATION – A 3D WORLD



Fermentis Baseline

A PICTURE OF ALL FERMENTIS YEASTS IN
STANDARD CONDITIONS



THE OBVIOUS CHOICE FOR BEVERAGE FERMENTATION





WHAT IS THE BASELINE?

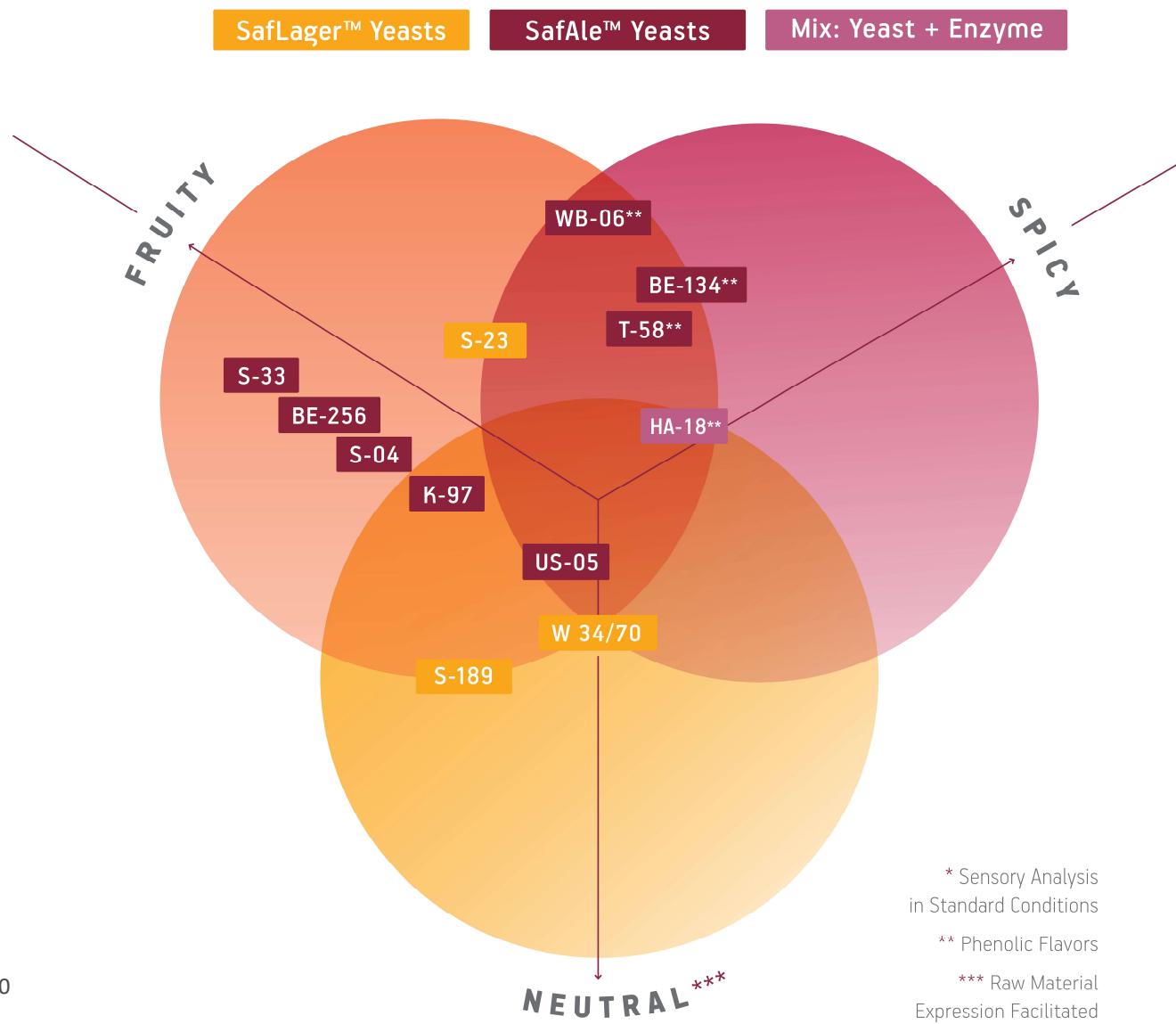
Flavour diversity?

The Baseline

- 15 °P wort (100% spring 2rows, 3EBC)
- Bitterness: 25 EBU (iso-alpha extract)
- Pitching: 50g/hl
- Temperature : 23 °C
- Atmospheric pressure

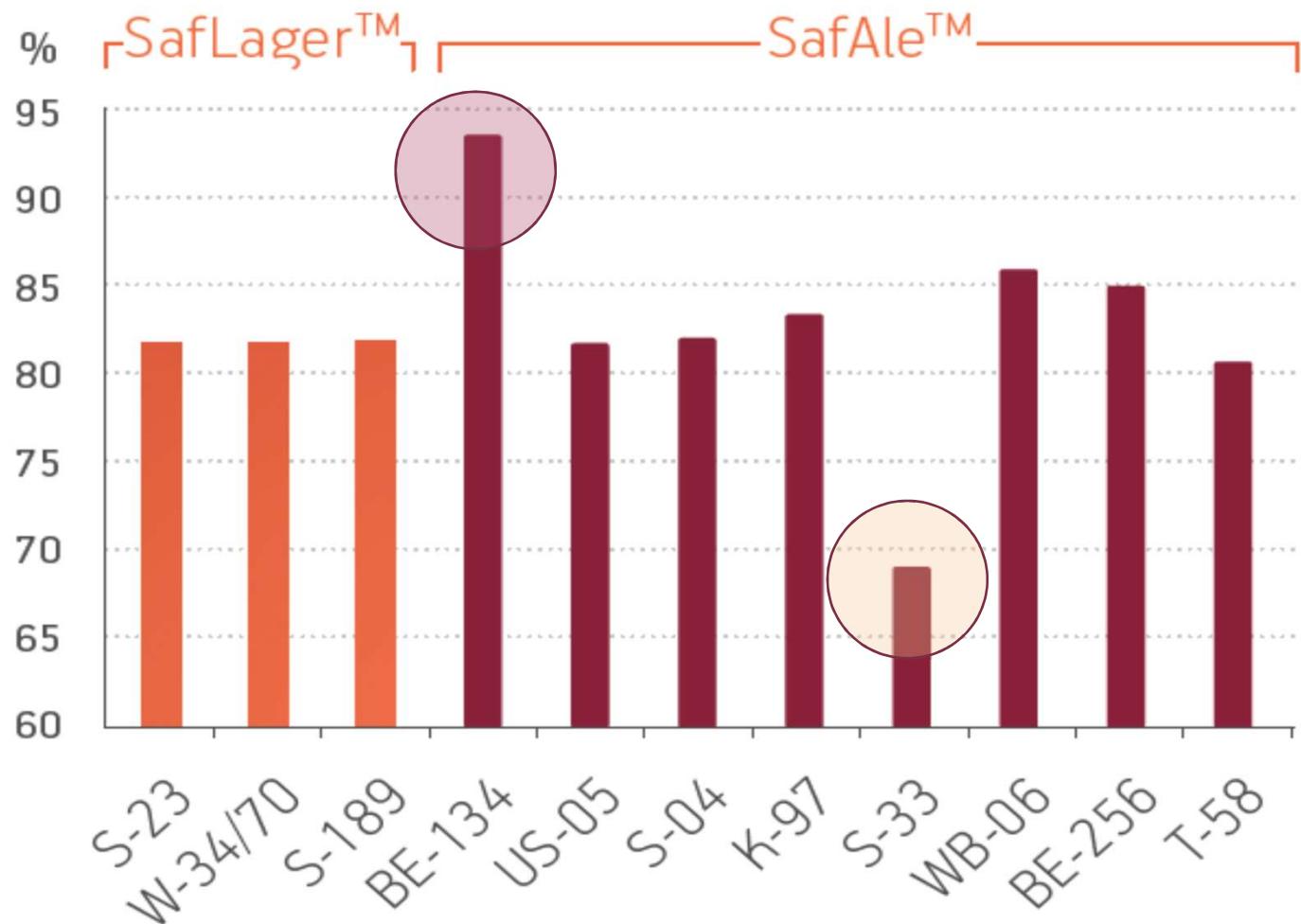


Baseline; flavour diversity ?



SUGARS UTILIZATION

APPARENT ATTENUATION



The influence of fermentation parameters on yeast aromas expression

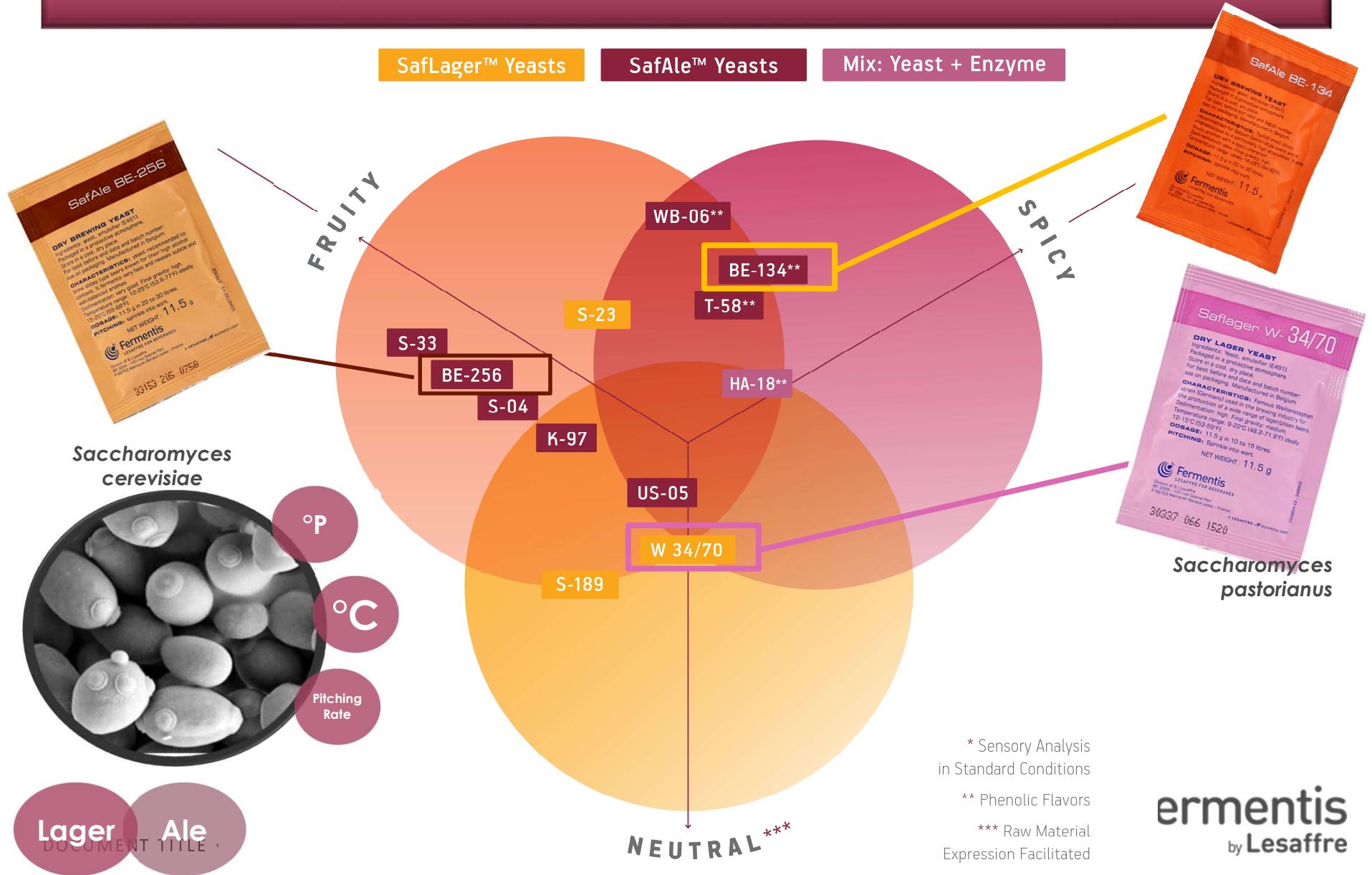
- SafLager™ W-34/70
- SafAle™ BE-256
- SafAle™ BE-134



THE OBVIOUS CHOICE FOR BEVERAGE FERMENTATION



What would happen if we change conditions?



Lager Ale

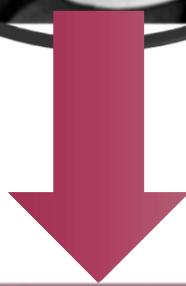
DOCUMENT TITLE

ermentis
by Lesaffre

W34/70 (1)

BE256 (2)

BE134 (3)



Fermentation Performance

Volatiles Profile

Sensory Analysis

12⁰P

16⁰P

20⁰P

12⁰C / ~54⁰F

16⁰C / ~61⁰F

20⁰C / ~68⁰F

24⁰C / ~75⁰F

28⁰C / ~82⁰F

°P
Pitching Rate

25G/HL

50G/HL

100G/HL

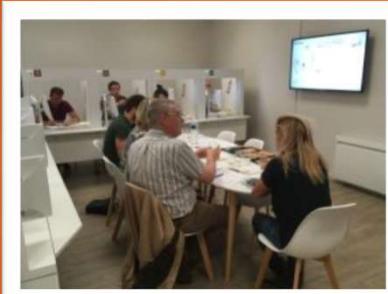
200G/HL (1)

CONDITIONS STUDIED (14,14,17)



- Wort 100% malt (pils)
- 28 EBU
- Direct inoculation
- Atmospheric pressure
- Pilot trials: 50L





Random,
blind,
repetitions,
statistics
tests!

Fermentis Beer Panel

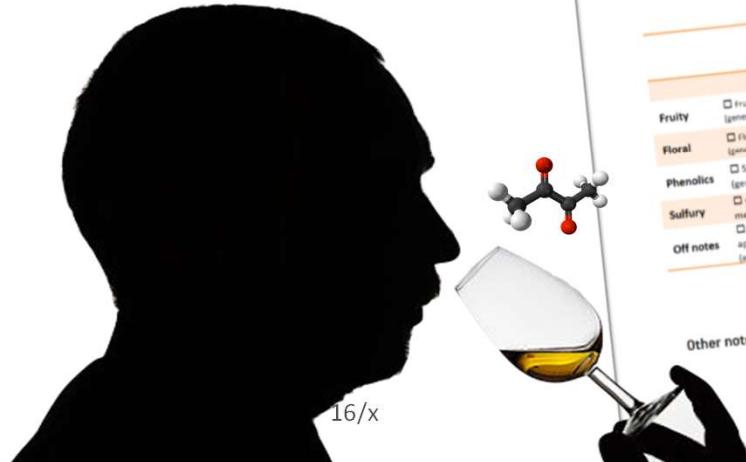
Weekly
Sessions

40 panelists



Evaluation of fermentation flavor expression

Blind taste - coded random samples (Average of 22 trained tasters per sample – pilot), 3 repetitions



Name: _____ Date: _____ Sample: _____

Fermentis
LESAFFRE FOR BEVERAGES

Main Aromas and Flavours

Fluity Phenolic Alcohols Floral Sulfury notes Other OFF NOTES

Main Taste / Mouthfeel notes

Sweet Acidity Body Bitter Warmth (alcohol) Carbonation

Odour / Aroma/Flavour
Ticked when its perceived:

Attributes

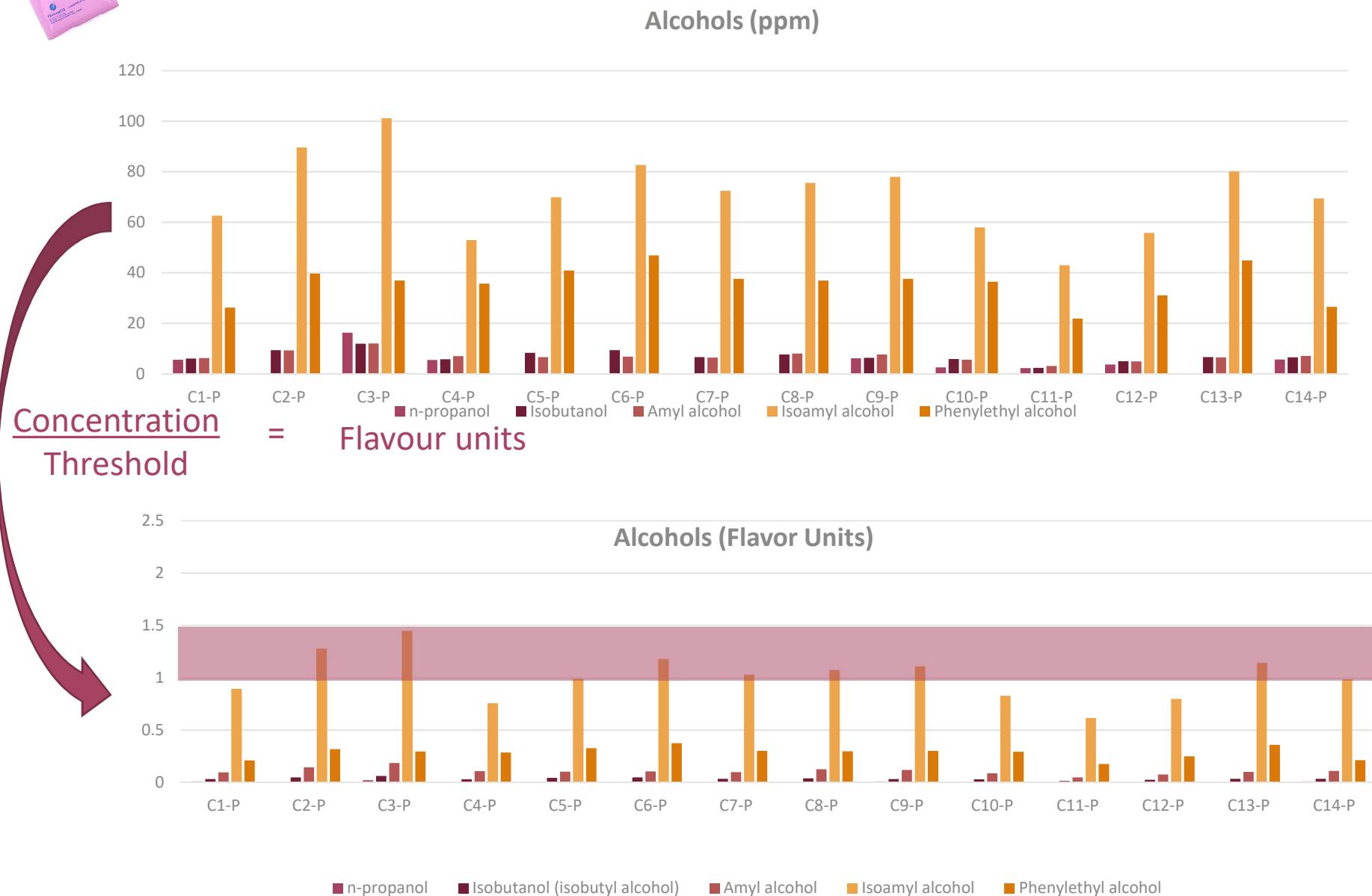
Fruity	<input type="checkbox"/> Fruity (general)	<input type="checkbox"/> apple	<input type="checkbox"/> banana, pear	<input type="checkbox"/> tropical
Floral	<input type="checkbox"/> floral (general)	<input type="checkbox"/> Rose like	<input type="checkbox"/> clove-like	<input type="checkbox"/> medicinal
Phenolics	<input type="checkbox"/> Spicy (general)	<input type="checkbox"/> plastics	<input type="checkbox"/> H2S, Rot, Rotten Egg	<input type="checkbox"/> mercaptans
Sulfury	<input type="checkbox"/> yeasty, meaty	<input type="checkbox"/> OMS, Cooked Veg.	<input type="checkbox"/> Solvent	<input type="checkbox"/> Diacetyl (butter)
Off notes	<input type="checkbox"/> Green apples (acetalddehyde)	<input type="checkbox"/> Solvent	<input type="checkbox"/> Oxidation (metallic, papery, etc)	<input type="checkbox"/> Others

Other notes:





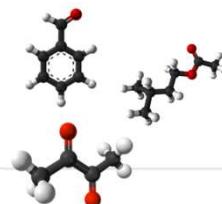
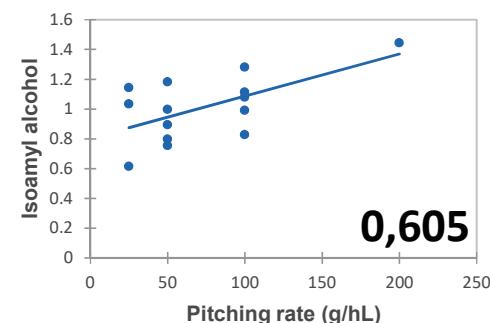
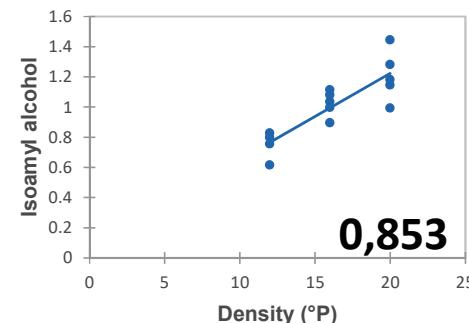
VOLATILES – ALCOHOLS in W3470



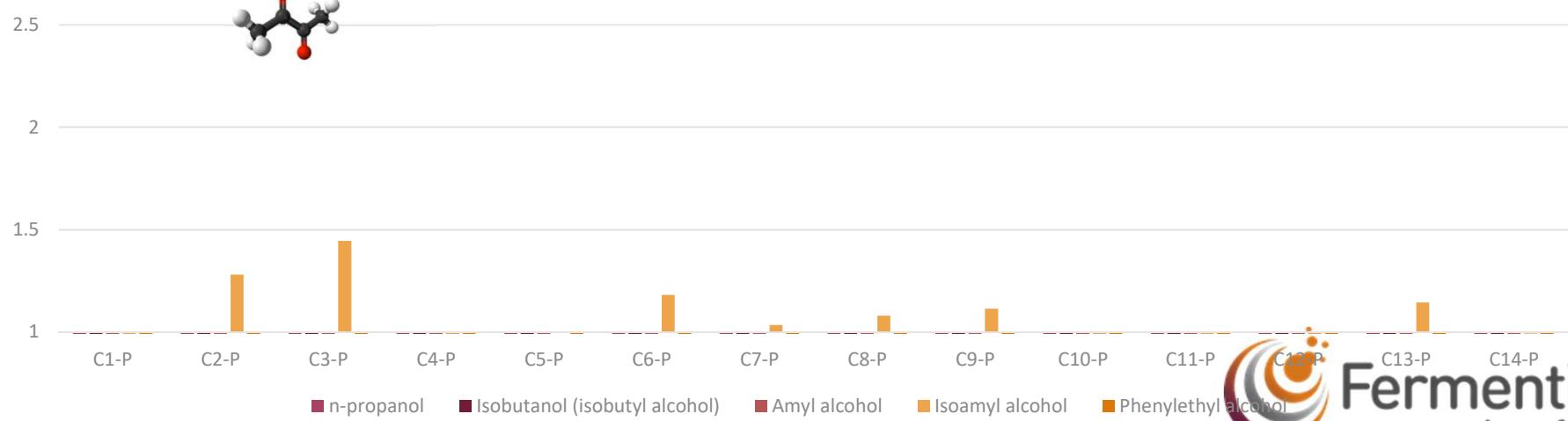


VOLATILES – ALCOHOLS in W3470

- ✓ ISOAMYL ALCOHOL is the most important alcohol produced
- ✓ It correlates positively with the density and the pitching rate



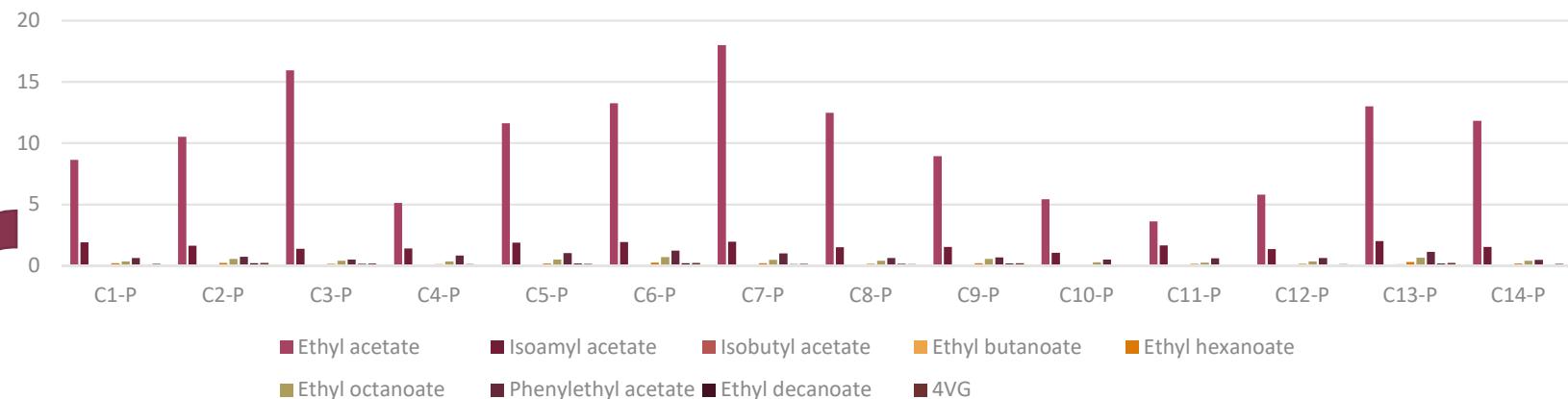
Alcohols (Flavor Units)





VOLATILES – ESTERS W3470

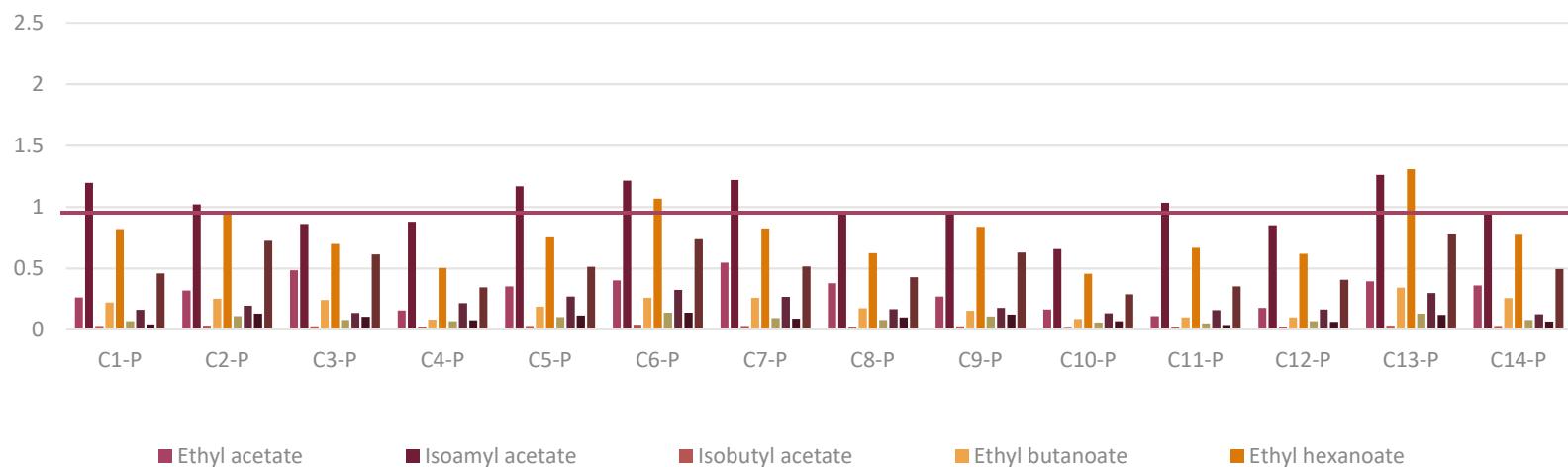
Esters and 4VG (ppm)



Concentration = Flavour units

Threshold

Esters and 4VG (Flavor Units)





VOLATILES – ESTERS W3470

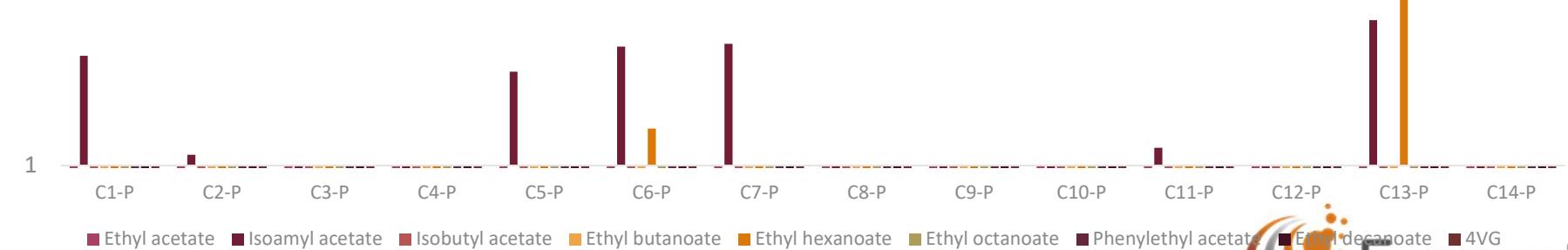
- ✓ Ethyl hexanoate and Isoamyl Acetate the most important esters produced by W3470 – but in all conditions, at a minor impact on flavor expression

Esters and 4VG (Odor Units)

2

Conditions	Density (°P)	Temperature (°C)	Pitching rate (g/hL)
C1-P	16	12	50
C2-P	20	16	100
C3-P	20	16	200
C4-P	12	20	50
C5-P	16	20	50
C6-P	20	20	50
C7-P	16	20	25
C8-P	16	20	100
C9-P	16	16	100
C10-P	12	20	100
C11-P	12	12	25
C12-P	12	16	50
C13-P	20	16	25
C14-P	20	12	100

1.5

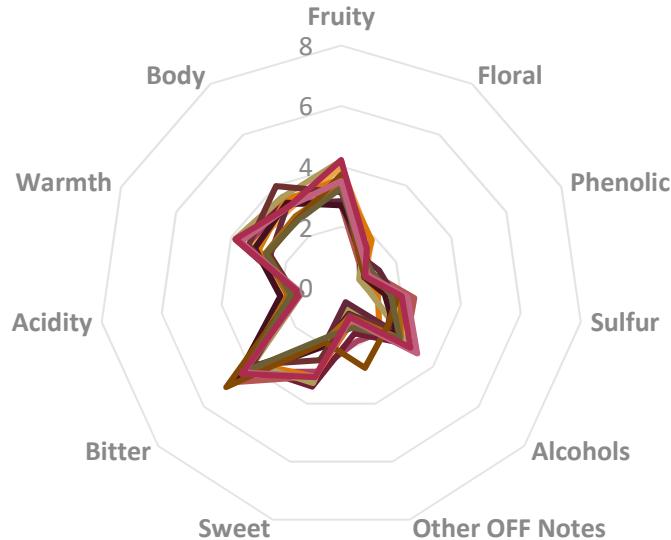




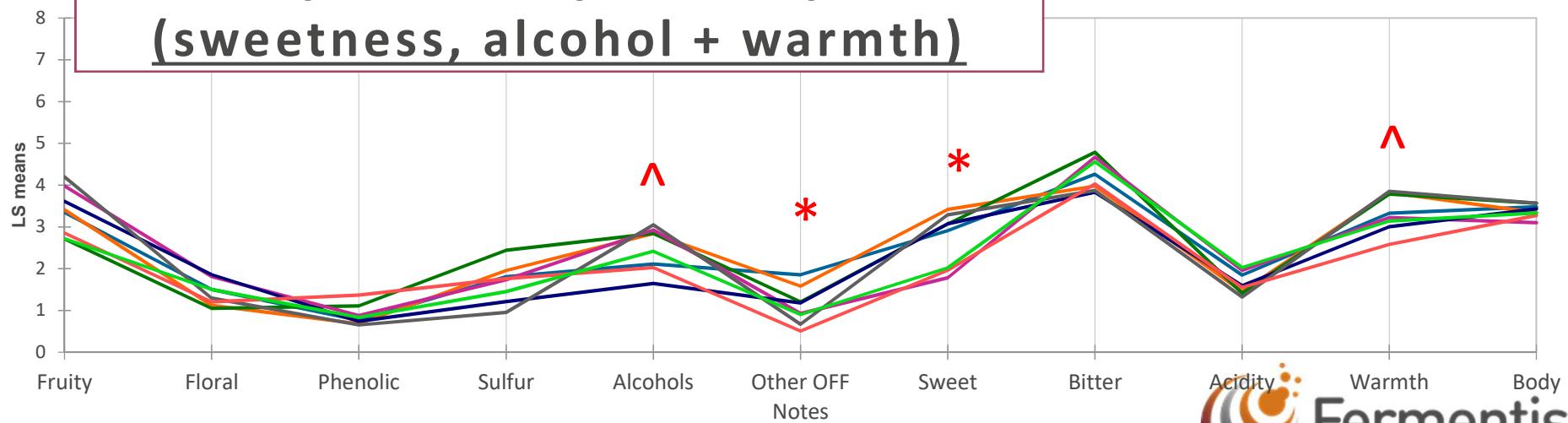
SENSORY ANALYSIS - PILOT TRIALS



Conditions	Density (°P)	Temperature (°C)	Pitching rate (g/hL)
C1-P	16	12	50
C2-P	20	16	100
C3-P	20	16	200
C4-P	12	20	50
C5-P	16	20	50
C6-P	20	20	50
C7-P	16	20	25
C8-P	16	20	100
C9-P	16	16	100
C10-P	12	20	100
C11-P	12	12	25
C12-P	12	16	50
C13-P	20	16	25
C14-P	20	12	100

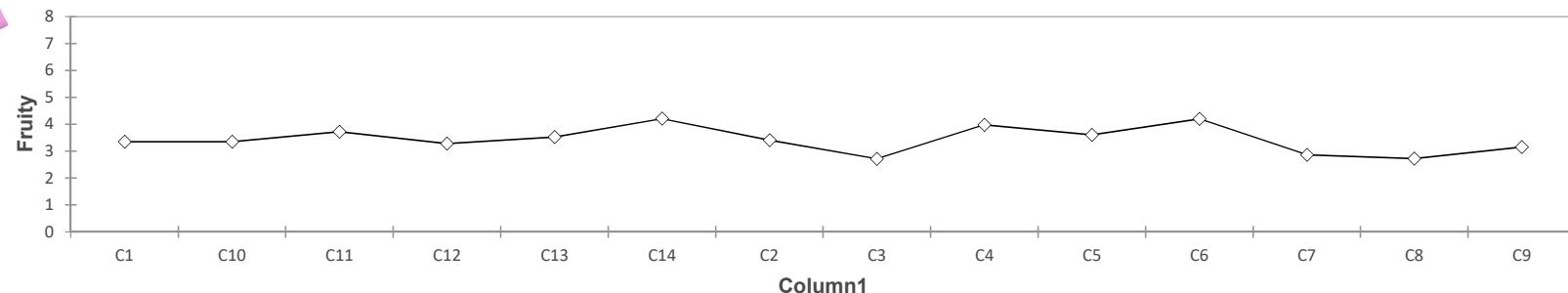


**Statically relevancy: density related
(sweetness, alcohol + warmth)**

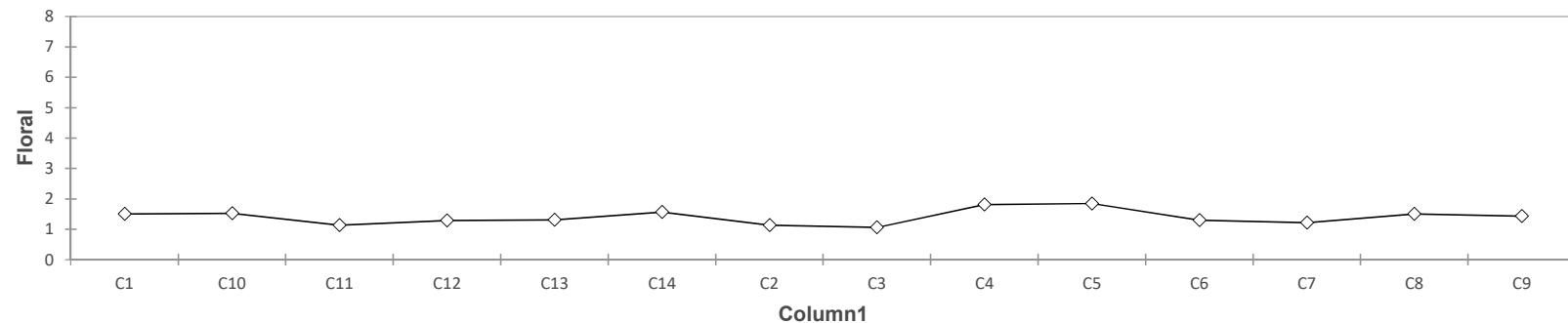




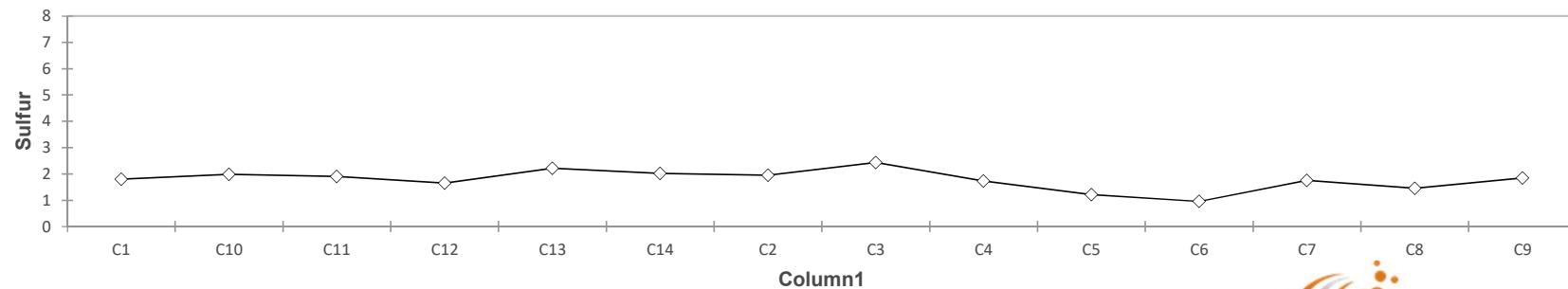
Frutal



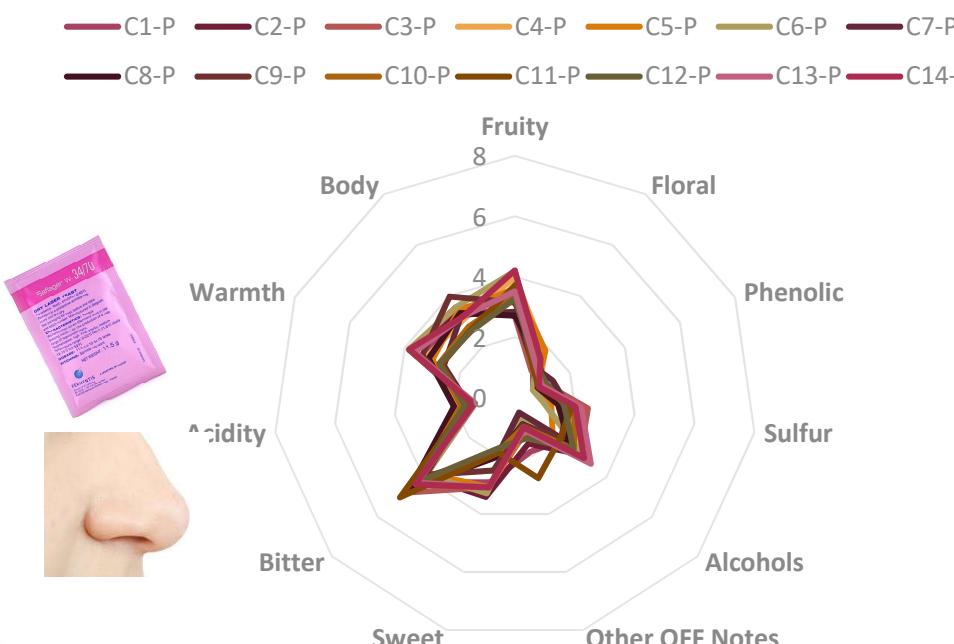
Floral



Sulfury

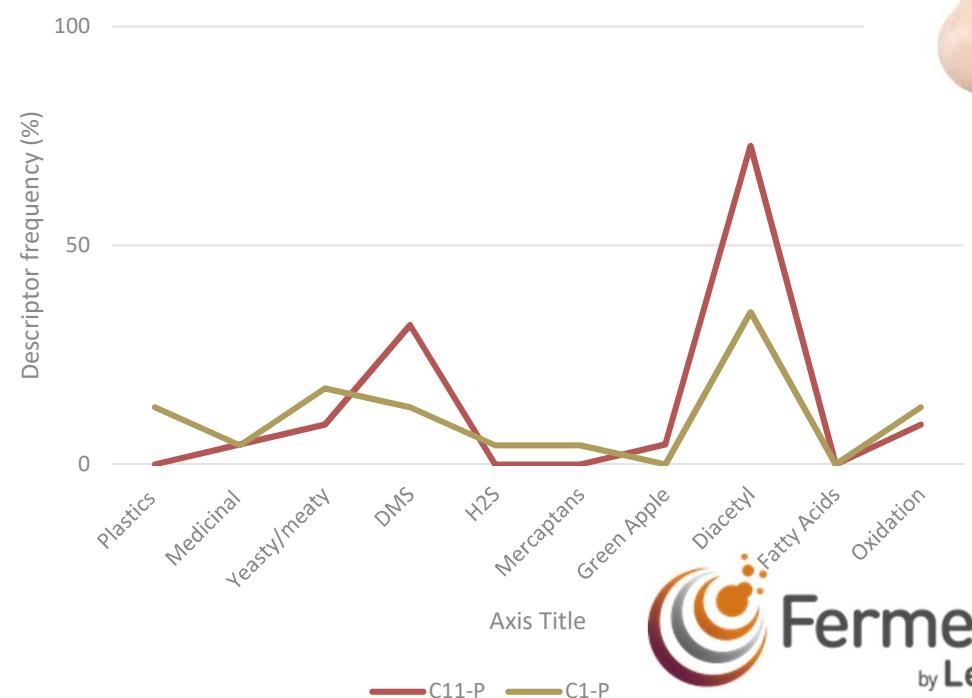


PILOT TRIALS

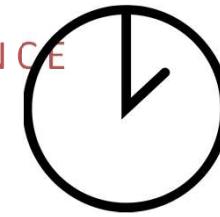


Conditions	Density (°P)	Temperature (°C)	Pitching rate (g/hL)
C1-P	16	12	50
C2-P	20	16	100
C3-P	20	16	200
C4-P	12	20	50
C5-P	16	20	50
C6-P	20	20	50
C7-P	16	20	25
C8-P	16	20	100
C9-P	16	16	100
C10-P	12	20	100
C11-P	12	12	25
C12-P	12	16	50
C13-P	20	16	25
C14-P	20	12	100

Off notes:
perceived at
LOWER
Fermentation
temperature and
lower PR



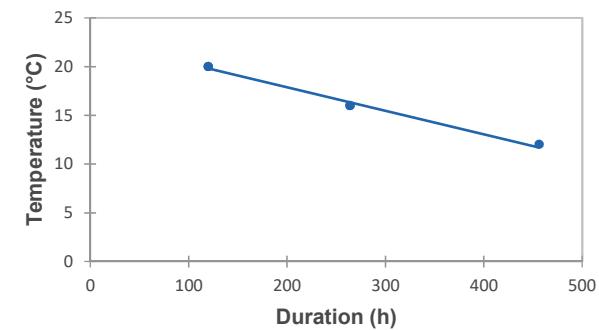
CONCLUSION PART 1:



THE HIGHER THE
DENSITIES, THE HIGHER
FERMENTATION TIME



AT 100 G/HL THE HIGHER THE
TEMPERATURE OF
FERMENTATION, THE LOWER
FERMENTATION TIME WITHOUT
DAMAGE TO BEER QUALITY

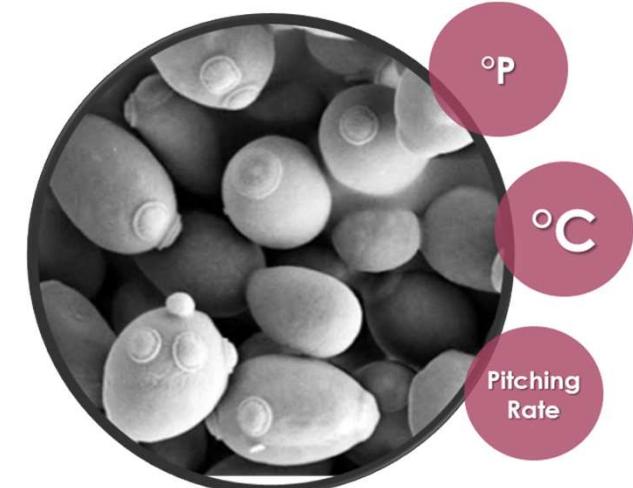


CONCLUSIONS PART 2:

SAFLAGER™ W-34/70 FERMENTATION PERFORMANCE

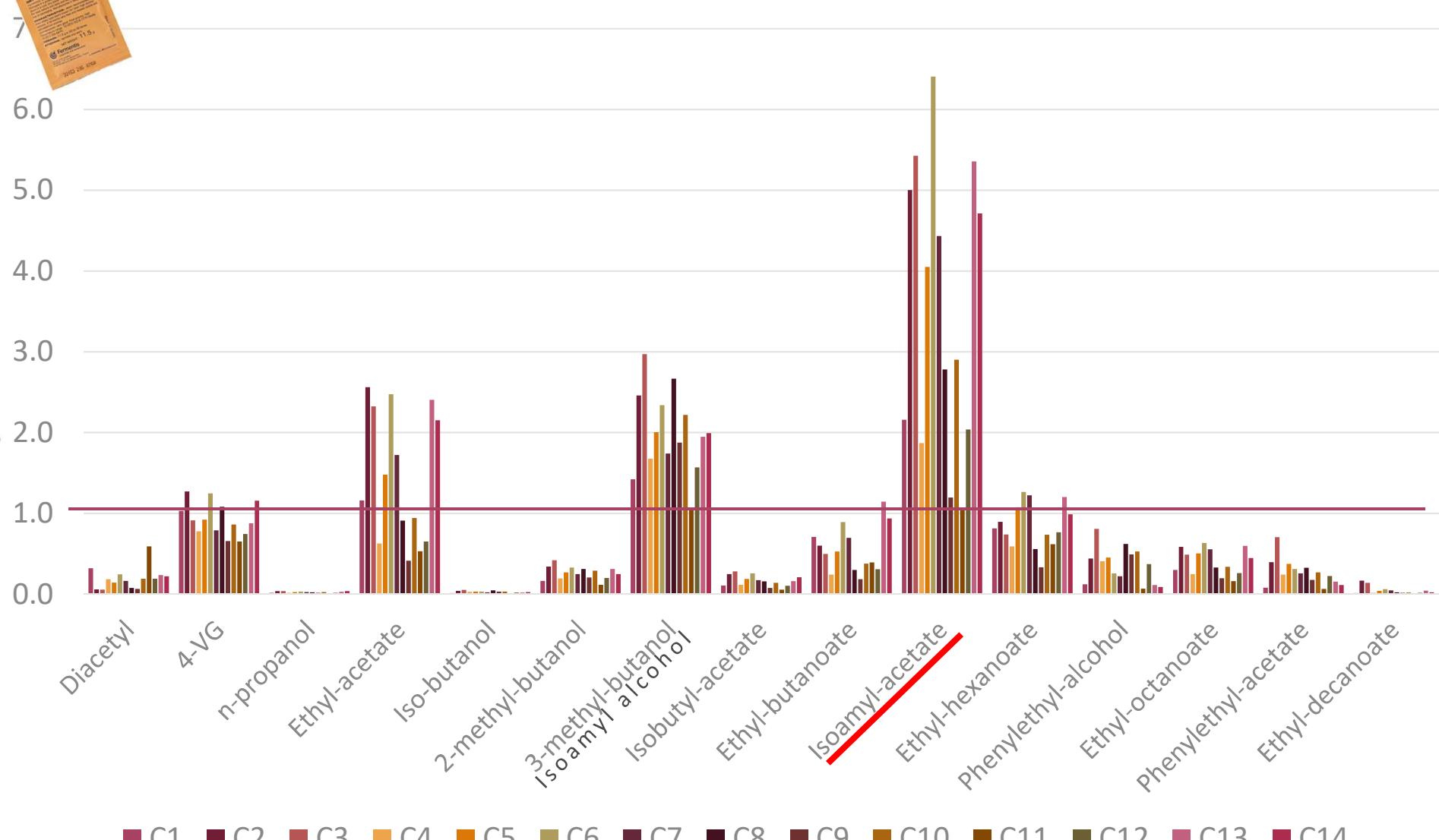
↑
THE HIGHER THE DENSITIES, THE
HIGHER VOLATILES PRODUCTION –
BUT NO RELEVANT SENSORY IMPACT

↓
THE LOWER THE FERMENTATION
TEMPERATURES, THE HIGHER THE RISK OF
SLOW FERMENTATION AND OFF NOTES





Volatiles / Flavor units



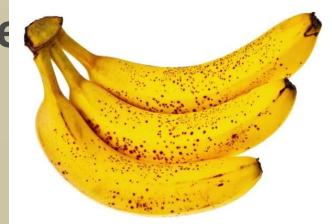
Threshold
concentration = Flavor units



The most important volatiles in BE256 are:

The esters:
Positive correlation with gravity

Isoamyl Acetate



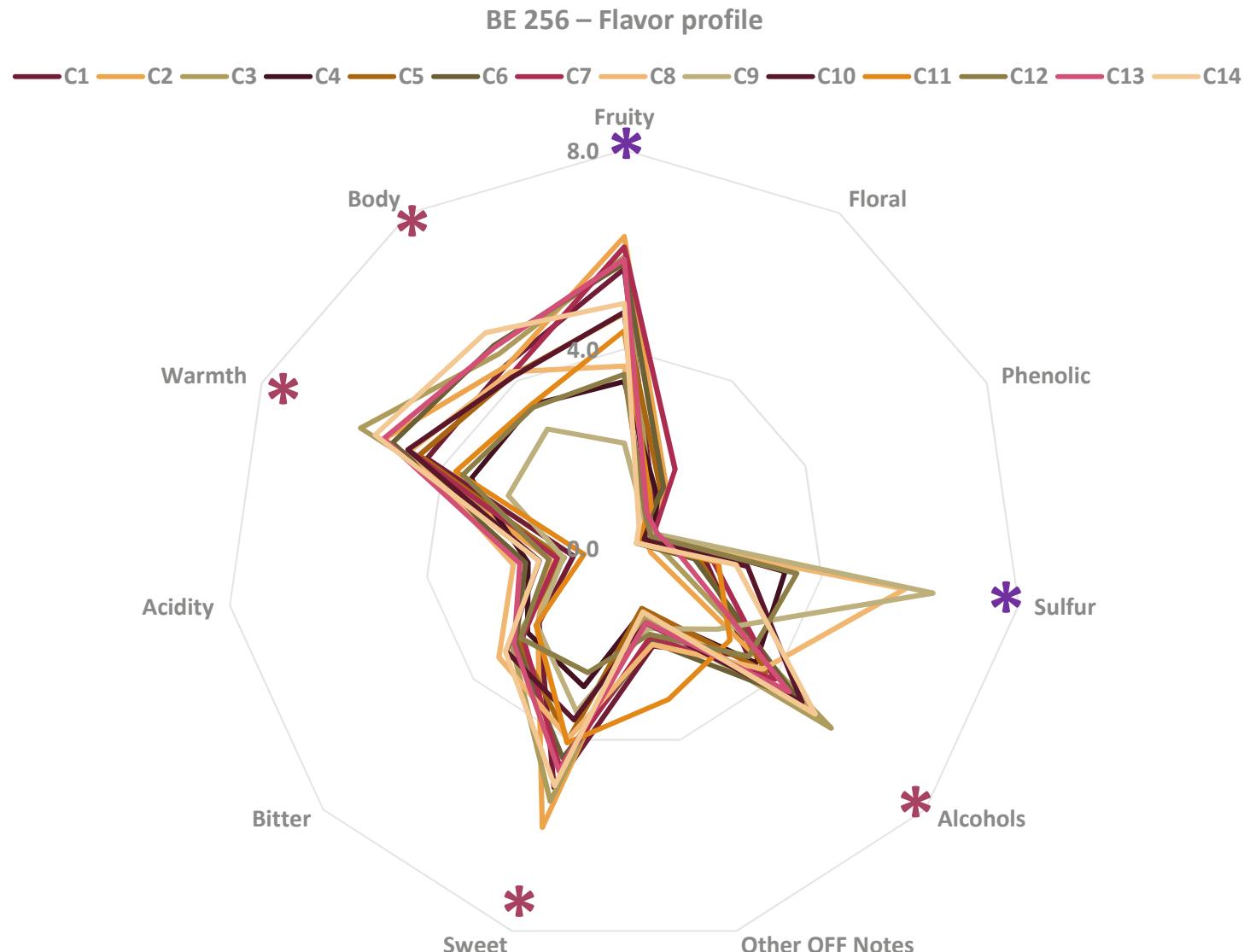
Ethyl Acetate



Ethyl Hexanoate



SENSORY ANALYSIS - PILOT TRIALS



*p<0,001

DOCUMENT TITLE • 29/x

BE256	Scale	Condition	Density (°P)	Temperature (°C)	Pitching rate (g/hL)
1	Pilot	C1	16	12	50
2	Pilot	C2	20	24	50
3	Pilot	C3	20	24	100
4	Pilot	C4	12	20	50
5	Pilot	C5	16	20	50
6	Pilot	C6	20	20	50
7	Pilot	C7	16	20	25
8	Pilot	C8	16	20	100
9	Pilot	C9	12	20	100
10	Pilot	C10	16	16	100
11	Pilot	C11	12	12	25
12	Pilot	C12	12	16	50
13	Pilot	C13	20	16	25
14	Pilot	C14	20	12	100

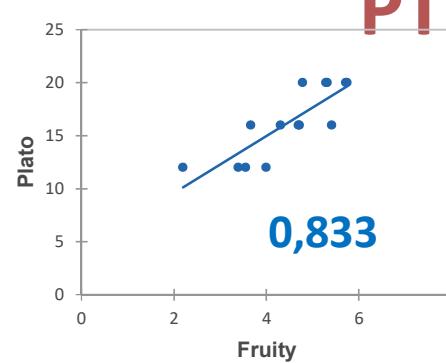


Fruity

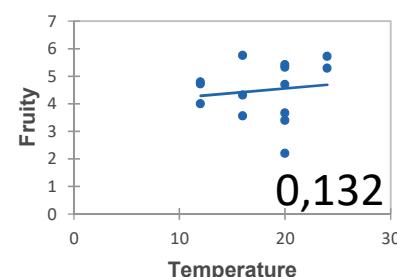
C1 C10 C11 C12 C13 C14 C2 C3 C4 C5 C6 C7 C8 C9

Means(Fruity) - Condition

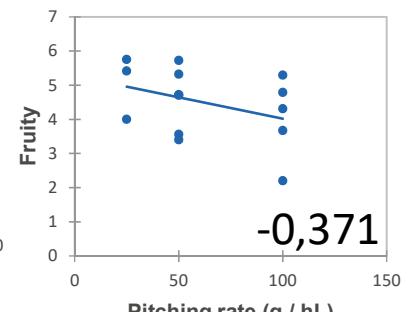
Condition



0,833

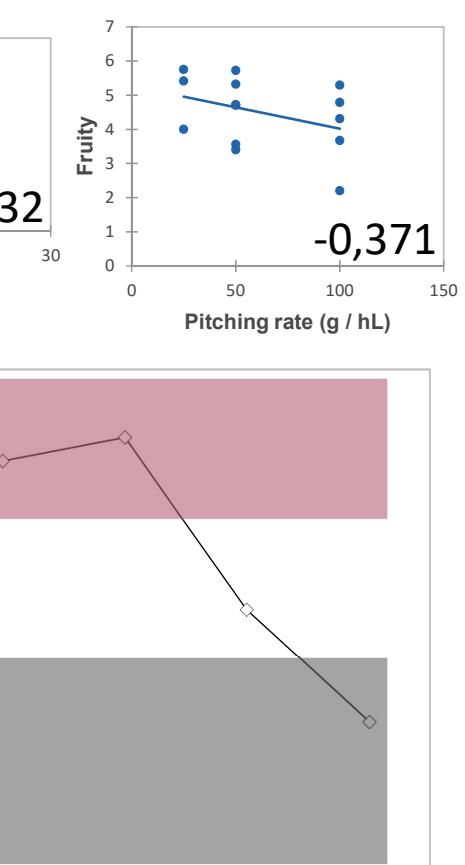
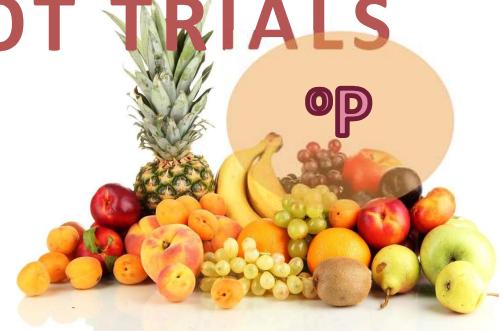


0,132



-0,371

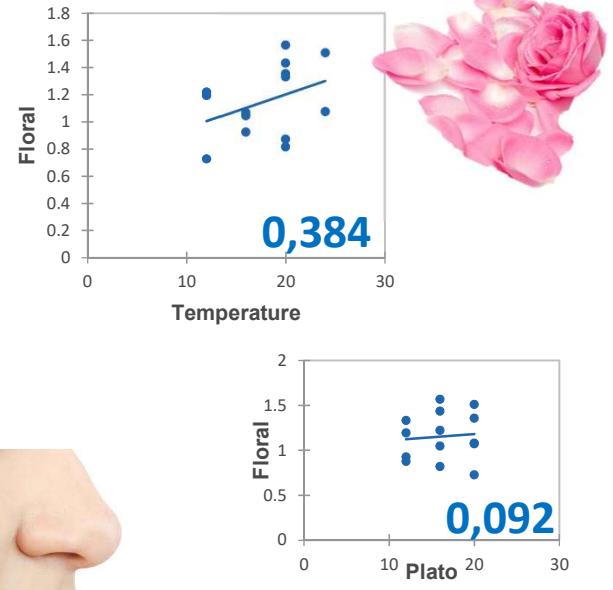
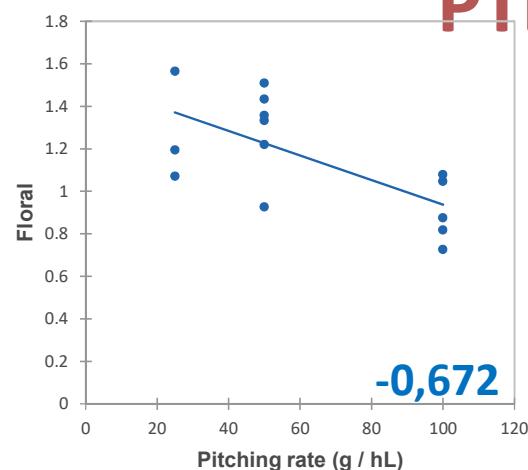
PILOT TRIALS



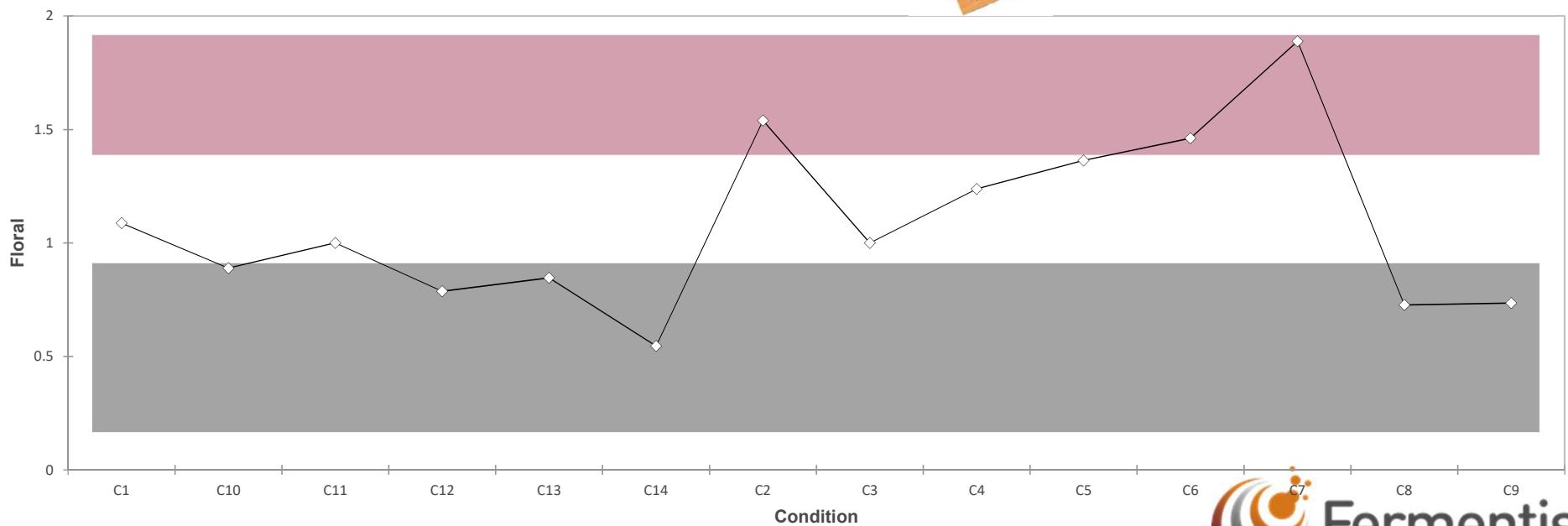
 Fermentis
by Lesaffre

PILOT TRIALS

BE256	Scale	Condition	Density (°P)	Temperature (°C)	Pitching rate (g/hL)
1	Pilot	C1	16	12	50
2	Pilot	C2	20	24	50
3	Pilot	C3	20	24	100
4	Pilot	C4	12	20	50
5	Pilot	C5	16	20	50
6	Pilot	C6	20	20	50
7	Pilot	C7	16	20	25
8	Pilot	C8	16	20	100
9	Pilot	C9	12	20	100
10	Pilot	C10	16	16	100
11	Pilot	C11	12	12	25
12	Pilot	C12	12	16	50
13	Pilot	C13	20	16	25
14	Pilot	C14	20	12	100

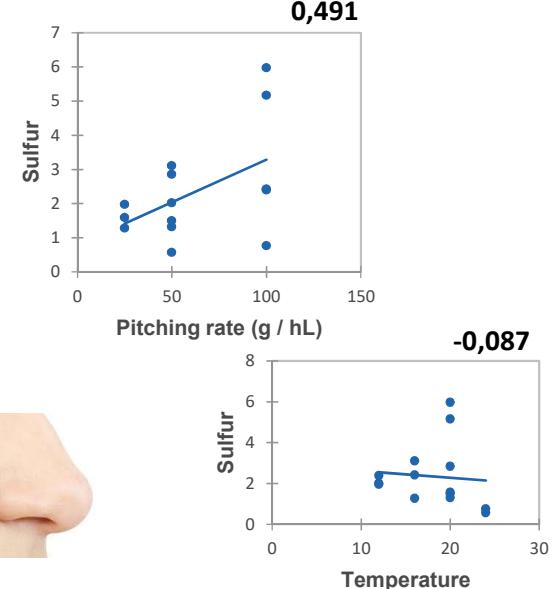
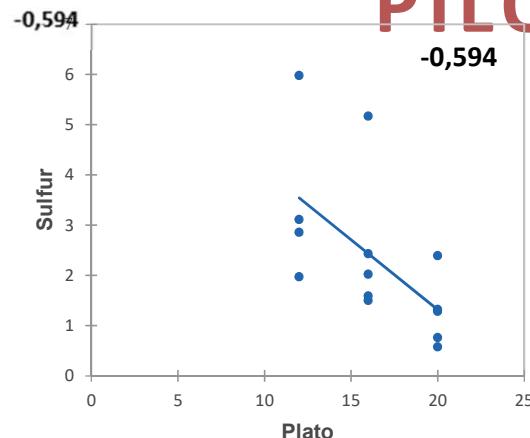


Means(Floral) - Condition

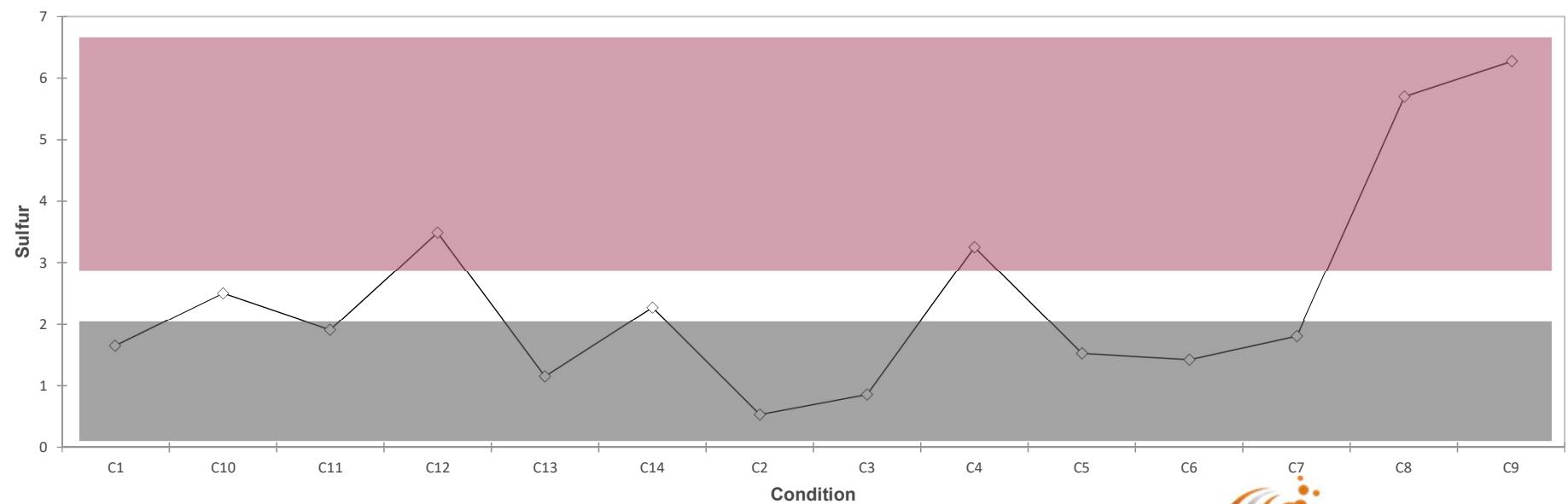


PILOT TRIALS

BE256	Scale	Condition	Density (°P)	Temperature (°C)	Pitching rate (g/hL)
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2	Pilot	C2	20	24	50
3	Pilot	C3	20	24	100
4	Pilot	C4	12	20	50
5	Pilot	C5	16	20	50
6	Pilot	C6	20	20	50
7	Pilot	C7	16	20	25
8	Pilot	C8	16	20	100
9	Pilot	C9	12	20	100
10	Pilot	C10	16	16	100
11	Pilot	C11	12	12	25
12	Pilot	C12	12	16	50
13	Pilot	C13	20	16	25
14	Pilot	C14	20	12	100



Means(Sulfur) - Condition



Density has the bigger impact

Fruity perception – all esters studied,
except phenyl ethyl acetate

Fusel alcohols -> along with sensory
alcohols and warmth perception

Residual Sugars – along with sweetness
perception and Body

Sulphury perception (-)



Temperature impacts

Fermentation time (-)

Diacetyl levels (-)

Specific fusel alcohol
and esters (phenyl ethyl
alcohol) (isobutyl acetate,
phenyl ethyl acetate and ethyl
decanoate)

DOCUMENT TITLE • 33/x

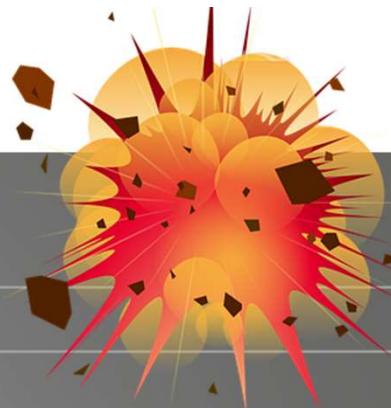
Pitching rate impact

Real degree of fermentation
Increase risk of sulphur
notes

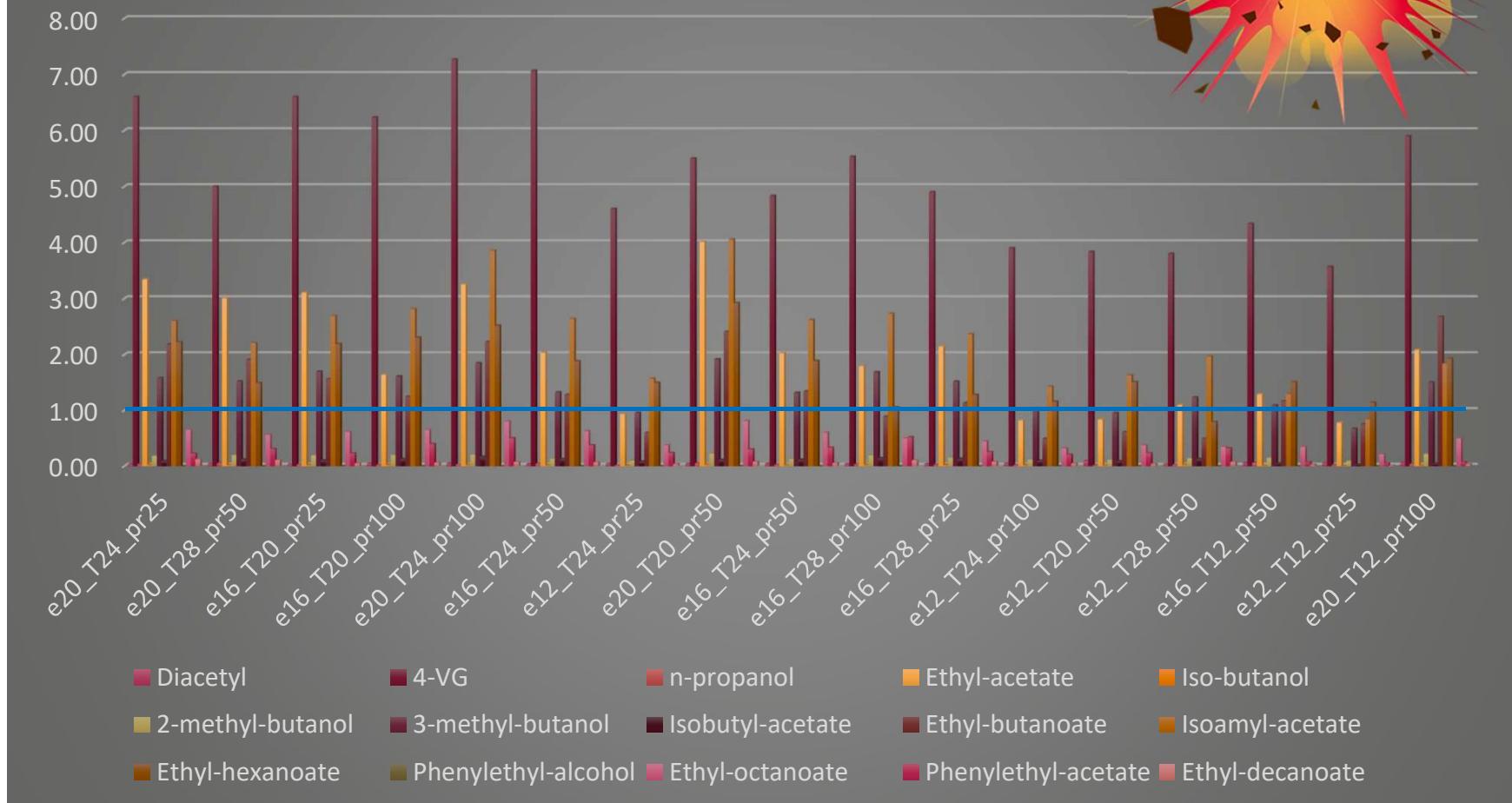
floral perception (-)



Fermentis
by Lesaffre



Aroma Profile - Flavor Units

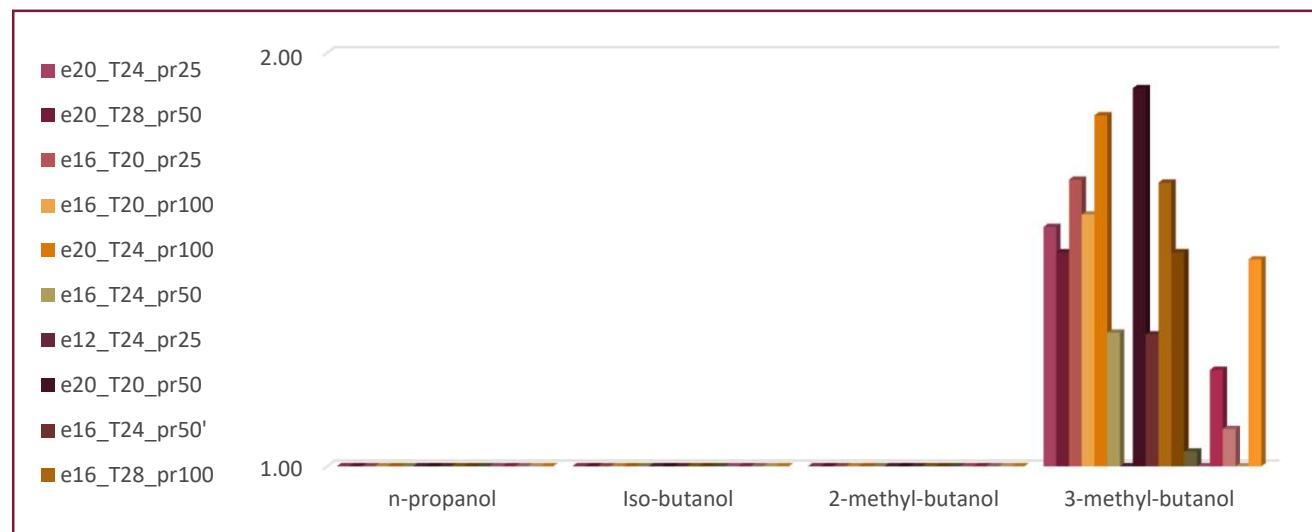
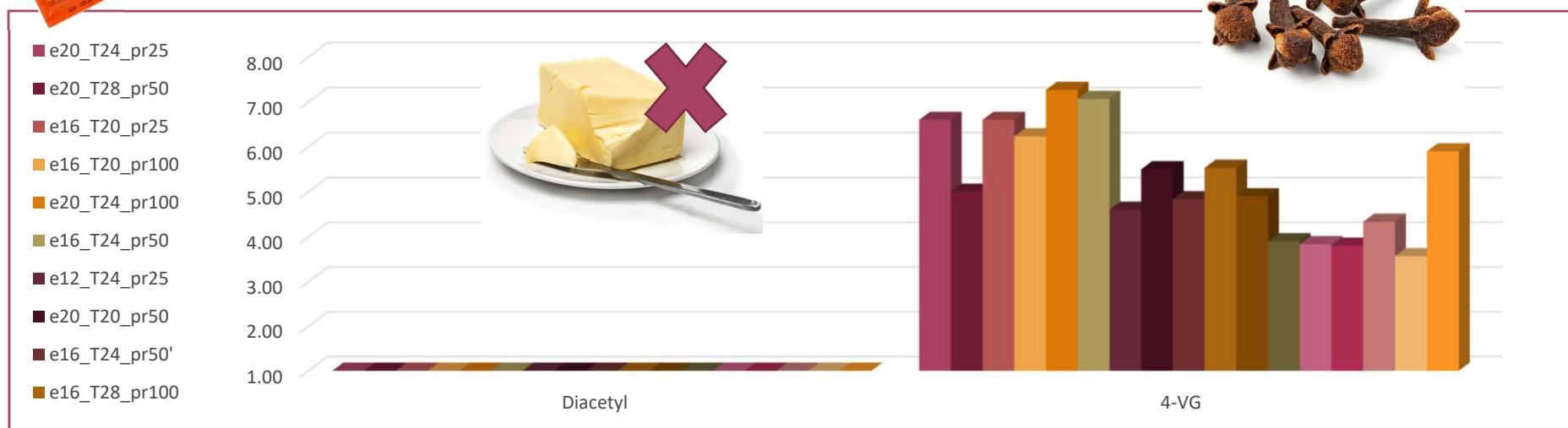


Flavour units = Concentration
Threshold

SAFALE™ BE-134

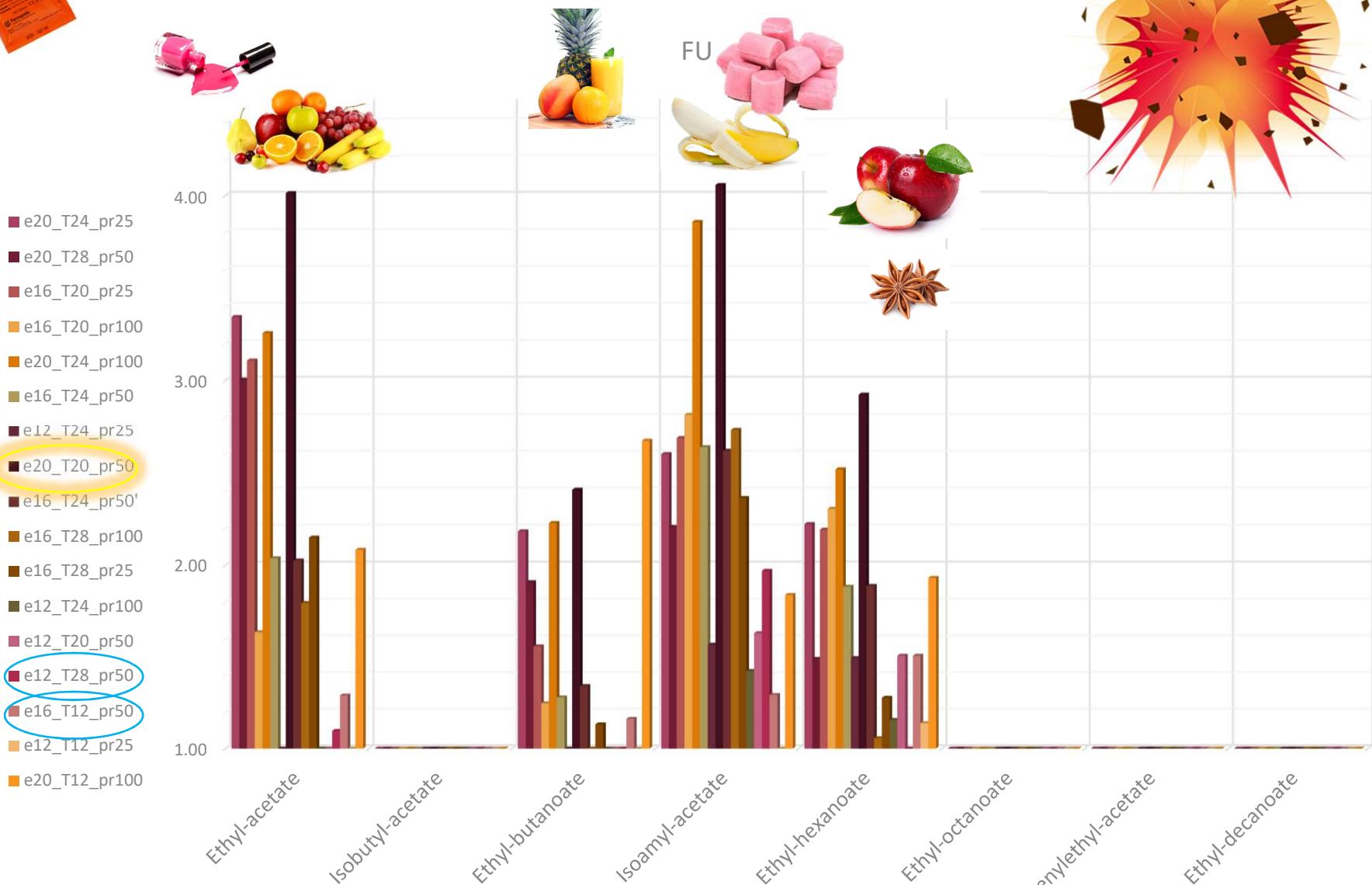


VOLATILES - FLAVOR PROFILE



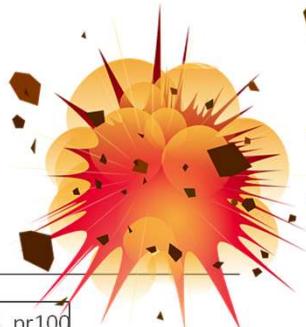
SAFALE™ BE-134

VOLATILES - ESTERS

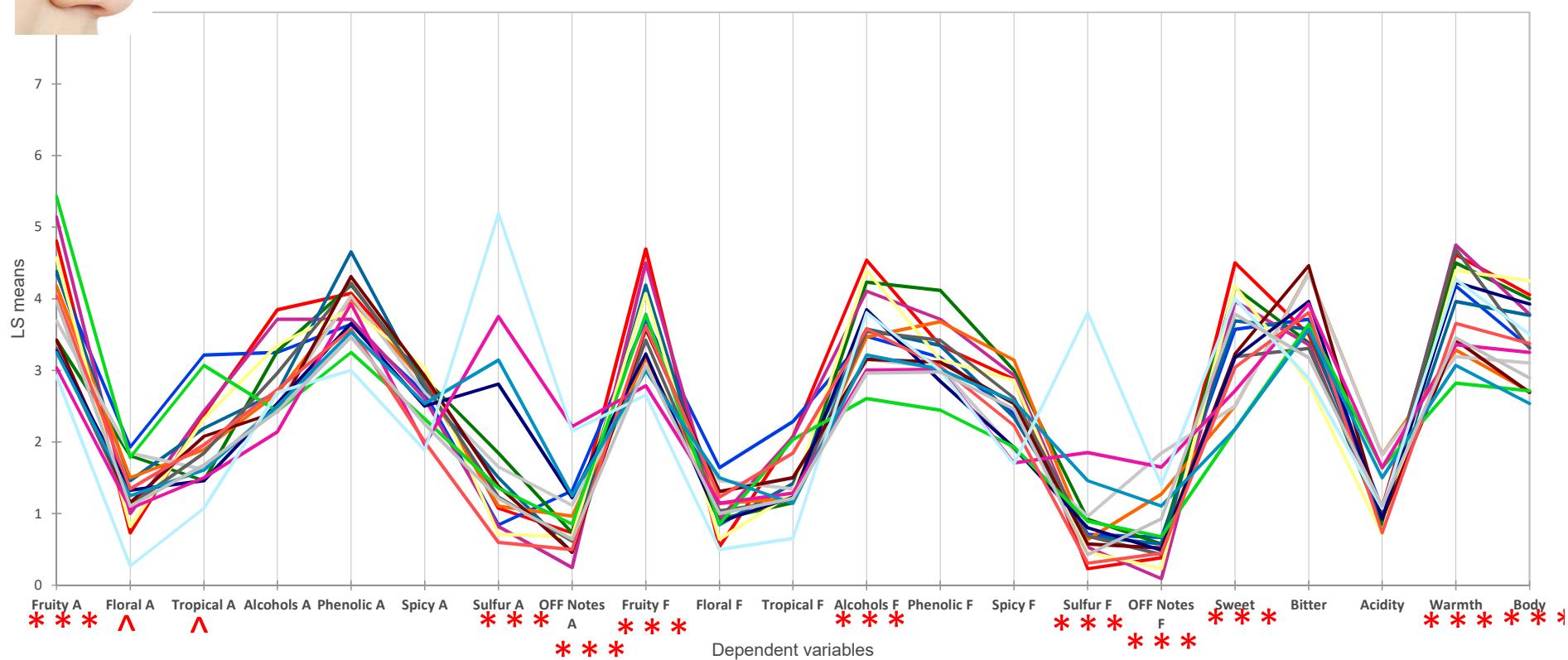


SAFALE™ BE-134

SENSORY PROFILE



e20_T24_pr25	e16_T20_pr25	e20_T24_pr100	e20_T20_pr50	e16_T12_pr50	e12_T24_pr100
e12_T24_pr25	e20_T12_pr100	e16_T28_pr25	e16_T24_pr50	e16_T28_pr100	e12_T20_pr50
e12_T12_pr25	e16_T20_pr100	e12_T28_pr50	e20_T28_pr50	e16_T24_pr50'	



SUMMARY

PILOT

Correlation coefficient Data

Variables	Temperature	Plato	Pitching rate (g / hL)
Total Fermentation time	-0,771	0,347	-0,239
Alcohol	0,003	0,994	0,164
Density	-0,056	0,969	0,160
Real Extract	-0,022	0,994	0,161
App. Extract	-0,055	0,969	0,161
Orig. Extract	-0,003	0,995	0,162
Real Degree of Fermentation	0,204	-0,123	-0,045
App. Degree of Fermentation	0,152	-0,693	-0,135
Calories	-0,004	0,995	0,163
Fruity A	-0,401	0,135	0,000
Floral A	-0,079	-0,508	0,069
Tropical A	-0,385	-0,002	-0,208
Alcohols A	-0,047	0,747	0,027
Phenolic A	-0,289	0,017	-0,062
Spicy A	0,000	0,220	0,086
Sulfur A	0,251	-0,086	-0,137
OFF Notes A	0,068	-0,265	-0,238
Fruity F	-0,334	0,561	0,079
Floral F	0,094	-0,623	-0,214
Tropical F	-0,288	0,039	-0,242
Alcohols F	-0,014	0,832	0,335
Phenolic F	0,025	0,440	0,224
Spicy F	0,034	0,361	0,304
Sulfur F	0,204	0,014	-0,176
OFF Notes F	0,109	-0,604	-0,292
Sweet	-0,125	0,943	0,069
Bitter	0,090	-0,646	-0,033
Acidity	0,091	-0,805	-0,326
Warmth	0,043	0,857	0,059
Body	-0,292	0,775	0,253
Glucose	-0,005	0,581	0,076
Maltose	-0,020	0,957	0,101
DP3	-0,009	0,996	0,194
DP4	-0,108	0,876	0,047
DP5	-0,060	0,882	0,193
DP6	-0,349	0,694	0,214
DP7	-0,001	0,518	0,210
Diacetyl	-0,570	-0,204	0,184
4-VG	0,115	0,698	0,219
n-propanol	-0,143	0,691	0,003
Ethyl-acetate	0,183	0,873	-0,061
Iso-butanol	0,582	0,530	0,352
2-methyl-butanol	0,042	0,856	0,410
3-methyl-butanol	0,316	0,798	0,303
Isobutyl-acetate	0,797	0,246	0,288
Ethyl-butanoate	-0,194	0,949	0,152
Isoamyl-acetate	0,367	0,660	0,227
Ethyl-hexanoate	-0,200	0,683	0,088
Ethyl-octanoate	0,226	0,782	0,198
Phenylethyl-acetate	0,717	0,216	0,397
Ethyl-decanoate	0,724	0,559	0,057

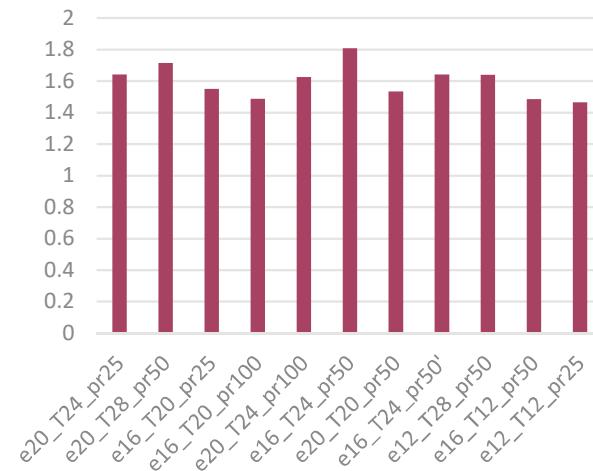
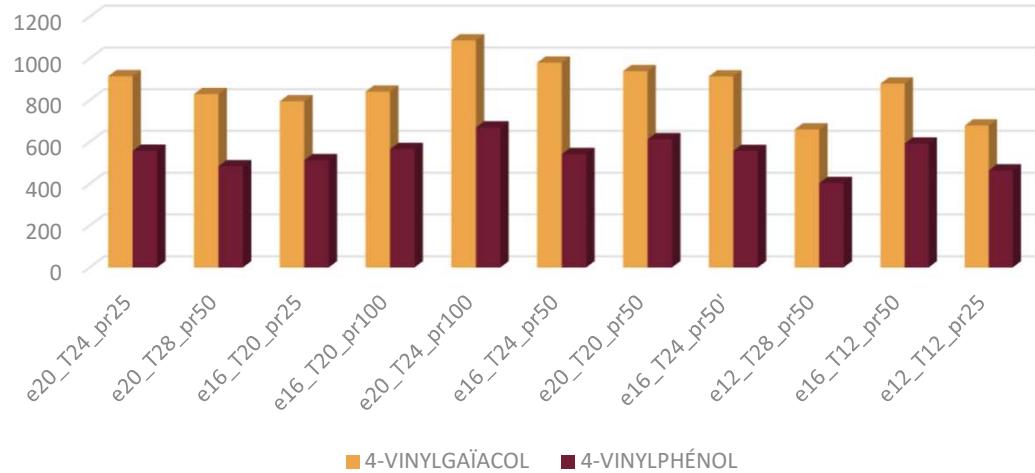
Values in bold are different from 0 with a significance level alpha=0,05



4VG X PHENOLIC X SPICY



Ratio



Variables	4-VINYLGAIACOL	4-VINYLPHÉNOL	Density	Temperature	Pitching Rate
4-VINYLGAIACOL	1	0,892	0,746	0,175	0,461
4-VINYLPHÉNOL	0,892	1	0,673	-0,180	0,511
Density	0,746	0,673	1	0,320	0,232
Temperature	0,175	-0,180	0,320	1	0,185
Pitching Rate	0,461	0,511	0,232	0,185	1

Values in bold are different from 0 with a significance level alpha=0,05

Density has the bigger impact

Esters – all studied, unless phenyl ethyl acetate along with Fruity Flavor perception

Fusel alcohols -> along with sensory alcohols and warmth perception

Residual Sugars – along with sweetness perception and Body

Off flavor perception (-)
Phenolic components (-)
production (4VG and 4VP)



Temperature impacts

Fermentation time (-)

Specific fusel alcohols
(isobutanol*) and specific esters
(isobutyl acetate, phenyl ethyl acetate and ethyl decanoate)

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Pitching rate impacts

... ?

Safale™ BE-134



Temperature impacts

Fermentation and flavor production. Fermentations must be preferably $>20^{\circ}\text{C}$



Pitching rate impacts

Certain flavor profiles. Rich flavor results / fermentation performance were obtained in pitching rates of 50g/hL.



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