



Fermentis
by Lesaffre

ADY and the World of Taste and Pleasure


24 August 2023


Andrew de Groot

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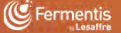
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1. Insights on Active Dry Yeast (ADY)


Production and Performance

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Fermentis yeast production plant (Ghent Belgium)

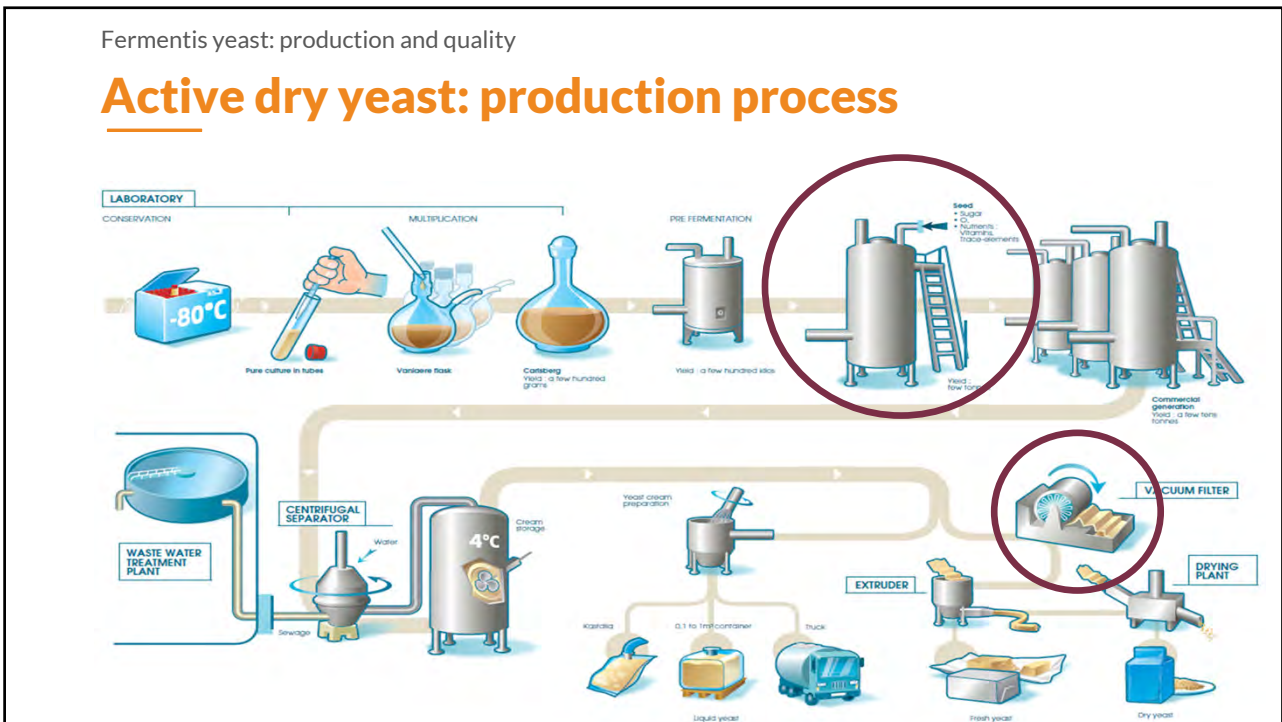


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Fermentis yeast: production and quality

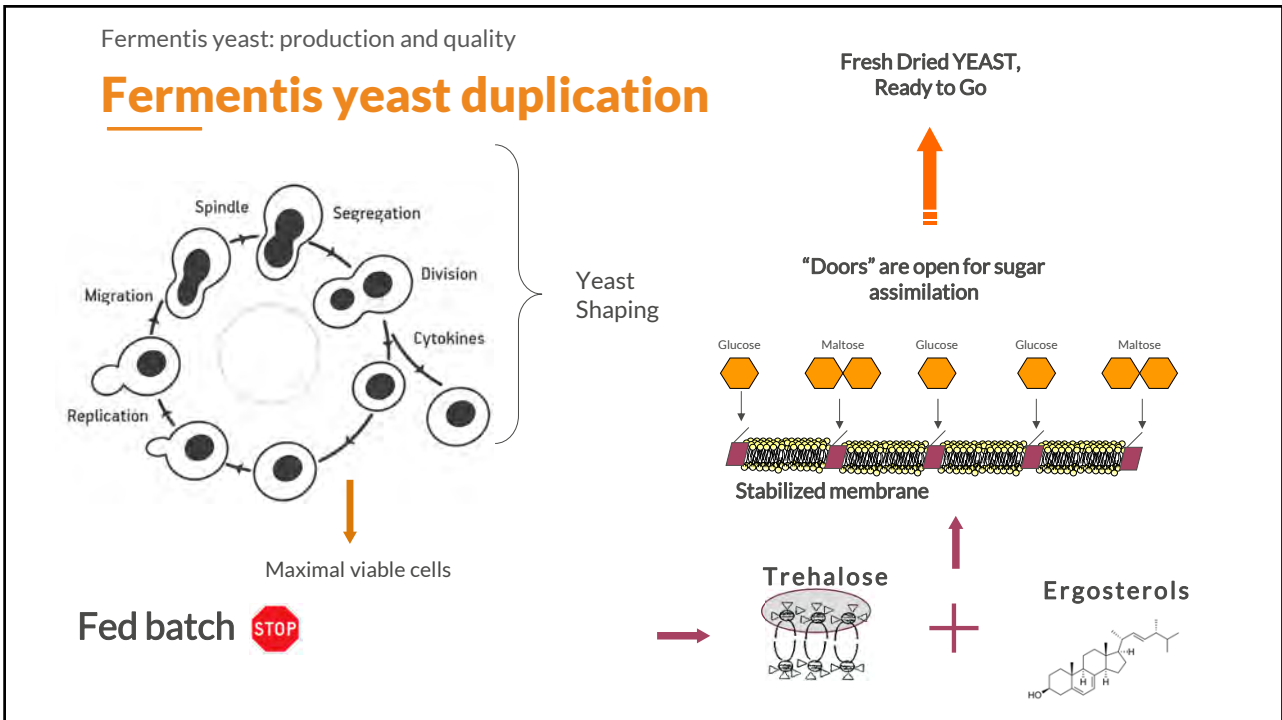
Active dry yeast: production process



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Fermentis yeast: production and quality

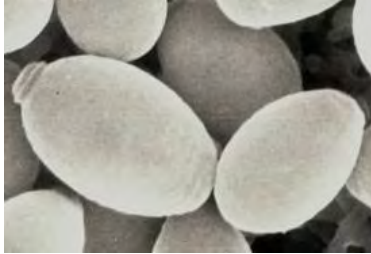
Fermentis yeast duplication



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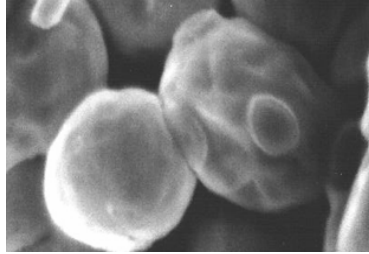
Fermentis yeast: production and quality

Process under the microscope



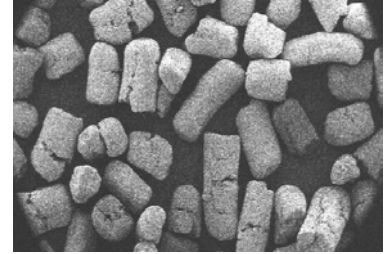
Before drying

- 25-30% dry matter
- Smooth surface



After drying

- 94-96,5% dry matter
- Uneven surface (membrane intact)



ADY (~ 1mm)
Microgranules

- vacuum-packed: preserve from oxygen and moisture
- shelf life: 3 years



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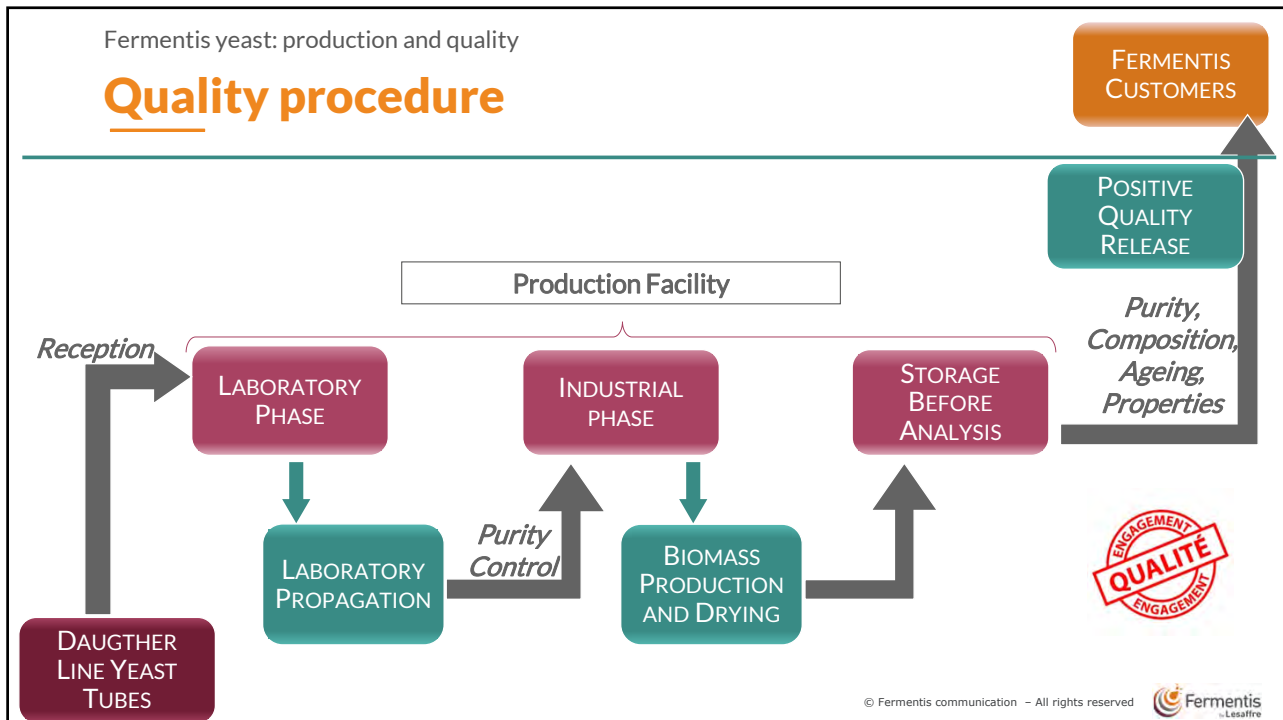
Fermentis yeast: production and quality

Quality procedure

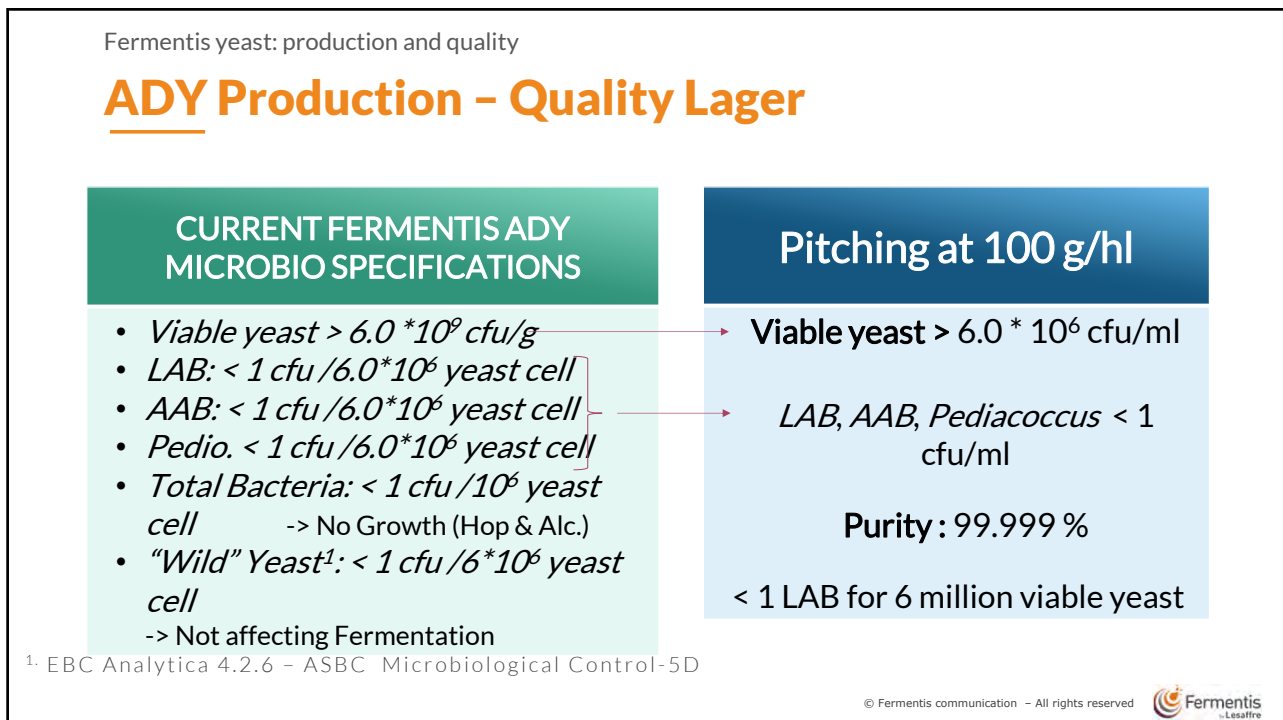


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Fermentis yeast: production and quality

ADY Production – Quality Ale


CURRENT FERMENTIS ADY MICROBIO SPECIFICATIONS

- *Viable yeast* > $1.0 * 10^{10}$ cfu/g
- *LAB*: < 1 cfu / 10^7 yeast cell
- *AAB*: < 1 cfu / 10^7 yeast cell
- *Pedio.* < 1 cfu / 10^7 yeast cell
- *Total Bacteria*: < 5 cfu / 10^7 yeast cell
-> No Growth (Hop & Alc.)
- *“Wild” Yeast¹*: < 1 cfu / 10^7 yeast cell
-> Not affecting Fermentation

Pitching at 50 g/hl

- **Viable yeast** > $5.0 * 10^6$ cfu/ml
- *LAB, AAB, Pediacoccus* < 1 cfu/ml
- **Purity**: 99.999 %
- < 1 LAB for 10 million viable yeast

¹ EBC Analytica 4.2.6 – ASBC Microbiological Control-5D

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Fermentis yeast: production and quality

Fermentis yeast advantages



EASY TO SOURCE

- No need for yeast bank management
- Low weight & volume
- Often sent with other brewing ingredients, no need for refrigerated transport
- Short lead-time



EASY TO STORE

- No loss in viability with a storage at low temperature (0-10 °C)
- 3 years shelf life
- Opportunity to maintain a backup stock




EASY TO USE

- No need for specific propagation equipment, No propagation costs
- Easy planning: Direct pitching is possible
- Flexibility: immediate switch from one strain to another
- Wide range available for all types of beers (that can be tweaked by the brewer)



RELIABLE, CONSISTENT

- Accurate conversion of dry matter weight into yeast cell count
- Guaranteed microbial quality
- Fast fermentation start

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Fermentis BU



We develop products and solutions to the benefit of the brewer.

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Fermentis BU

Fermentis product range

15 ACTIVE DRY YEASTS

1 BACTERIA

SafSour Lp 652
Lactobacillus plantarum

1 FUNCTIONAL PRODUCTS

SpringBlanche™

1 FERMENTATION AIDS


SpringFerm™ BR-2

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We understand and share HOW products and solutions work to the benefit of the brewer.

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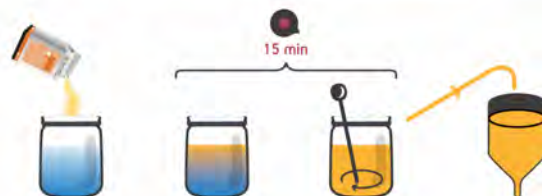
2. How to Use Fermentis yeast

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Rehydration process

DRY YEAST REHYDRATION



THE REHYDRATION STEP IS DONE IN A VESSEL OUTSIDE THE FERMENTER. The objective is to allow the yeast to recover all its functionalities before pitching.

Lager (SafLager™)
21 – 25 °C

Ale (SafAle™)
25 – 29 °C



Storing temperature before pitching (°C)	Maximum time before pitching (h)
4	18
20	6
25	4

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Direct pitch

DRY YEAST DIRECT PITCH



Step 1

Start to fill your fermenter with hopped wort until the cone is filled



Step 2

Sprinkle dry yeast directly in the hopped wort



Step 3

Finish to fill the fermenter

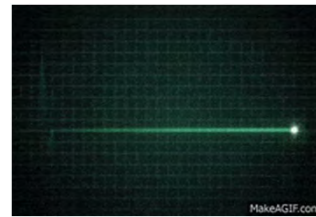
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How to use Fermentis yeast ?

Rehydration or Direct Pitch

What is the impact of rehydration process on Yeas cells viability ?



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How to use Fermentis yeast ?

Viability - conditions tested



Media:

1. WA: Without agitation:

Yeast is placed on liquid surface and rehydration is realized without agitation

2. MA: Moderate agitation:

Yeast is placed on liquid surface, rehydration is realized without agitation during 15 min. and after the agitation is maintained at 100 rpm (30 min)

3. VA: Violent agitation:


Yeast is placed in a sterile flask, the medium is poured on the yeast and a violent agitation is realized every 2 or 3 min. with a vigorous stirring



8, 12, 16, 20, 32 and 40°C

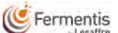
Yeast in 10 times its weight of media

Water: Distilled - Mineral - Tap **Wort:** 7 °P - 15 °P - 25 °P

All strain tested
Relevant data
presented 

Viability measured by Trypan
blue exclusion test of cell
viability




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Viability

Conclusions

- **Agitation** method has the highest impact in rehydration process
> **No or moderate agitation works best**
- **Temperature** does not significantly impact without or with moderate agitation.
- **Type of media** does not significantly influence the viability.
- No difference was observed with different **rehydration times**.
(Rehydration was complete after 15 min).
- Conclusions are similar for **Ales** and **Lagers**.

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How to use Fermentis yeast ?

Rehydration or Direct Pitch

What is the impact of rehydration process on Yeas cells vitality ?



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How to use Fermentis yeast ?

Vitality - conditions tested

Strains



Fermentation



Yeast preparation



Top fermentation

SafAle™* the whole range

Wort gravity: 15 °P



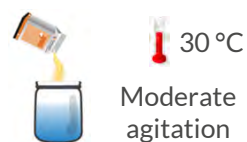
Bottom fermentation

SafLager™* The whole range

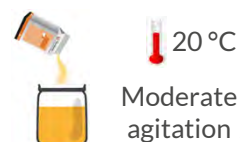
Wort gravity: 15 °P



W



15°P



DP



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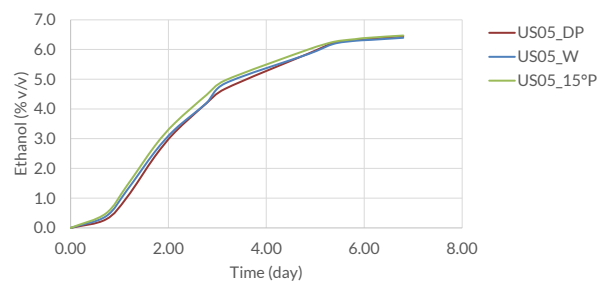
Vitality

Conclusions

No significant differences

between direct pitch (DP), rehydration in water (W) and rehydration in wort (15 °P) for:

- Fermentation kinetics
- Ethanol production & attenuation
- Volatiles production



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How to use Fermentis yeast

Conclusions

Direct pitching in wort or rehydration under a wide range of conditions can be used for all* Fermentis brewing strains



Make it easy!

* Except SafAle™ F-2 (pitched in beer), HA-18 and DA-16


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3. Yeast and Flavour Diversity

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THERE ARE NOT ONLY BREWERS

THERE ARE 'YEAST SHEPHERDS'
(TRYING TO MAKE THE BEST 'CULTURE MEDIA AND CONDITIONS' FOR THE YEAST TO PRODUCE GOOD OR BETTER BEERS!)



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PAST-PRESENT-FUTURE

MARKET SELECTION

Its all about the consumer
PLEASURE !

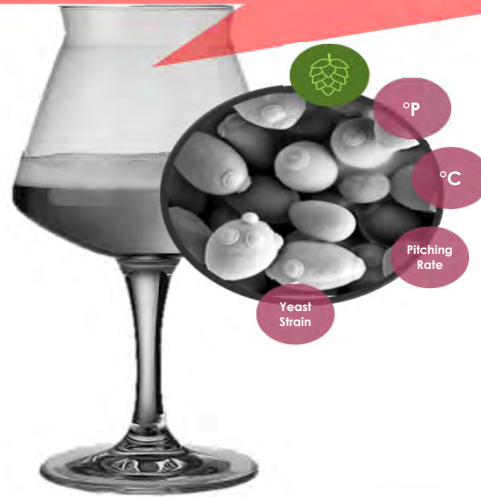
Pleasures
Are followed by consequences


I HAVE A PLEASURE ROOM
DO YOU WANT TO SEE IT?

1900 2000 2100

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The yeast is the main actor in flavour formation during fermentation...
But how big can the 'flavour role' of the yeasts be when process / parameters / ingredients change?




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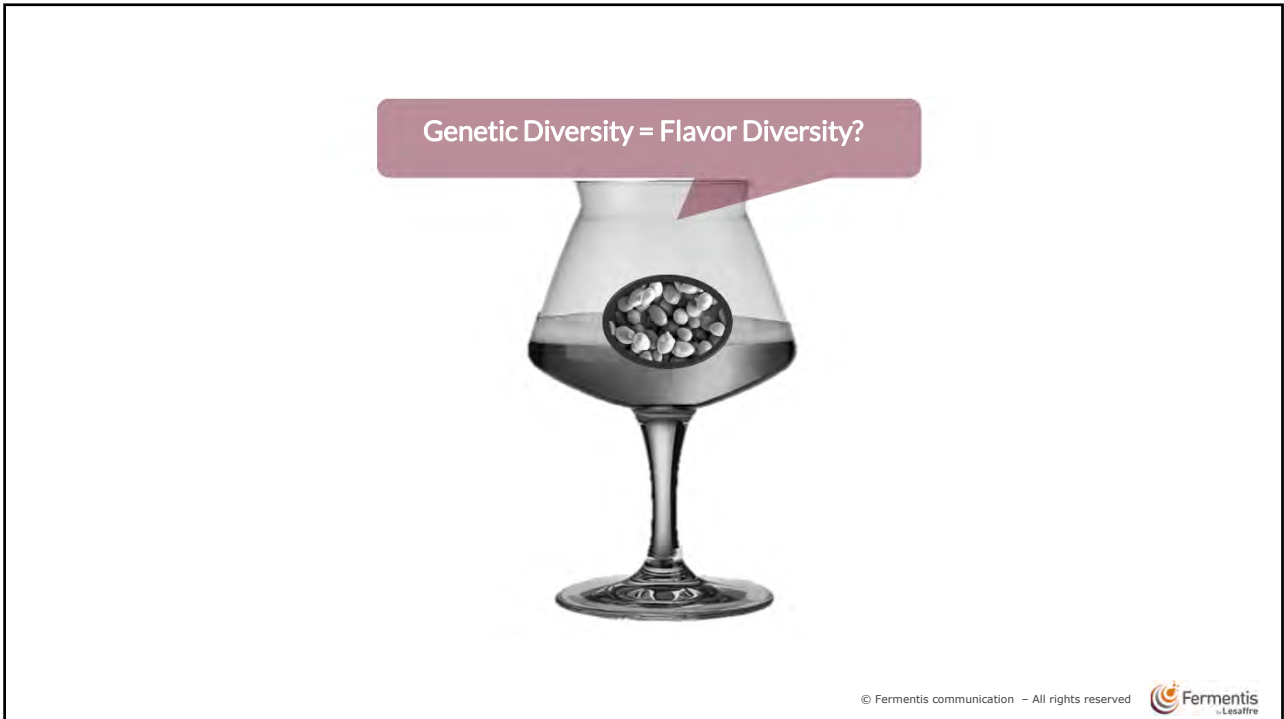
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Could the yeast be driven then to
Produce specific flavors to enhance pleasure?

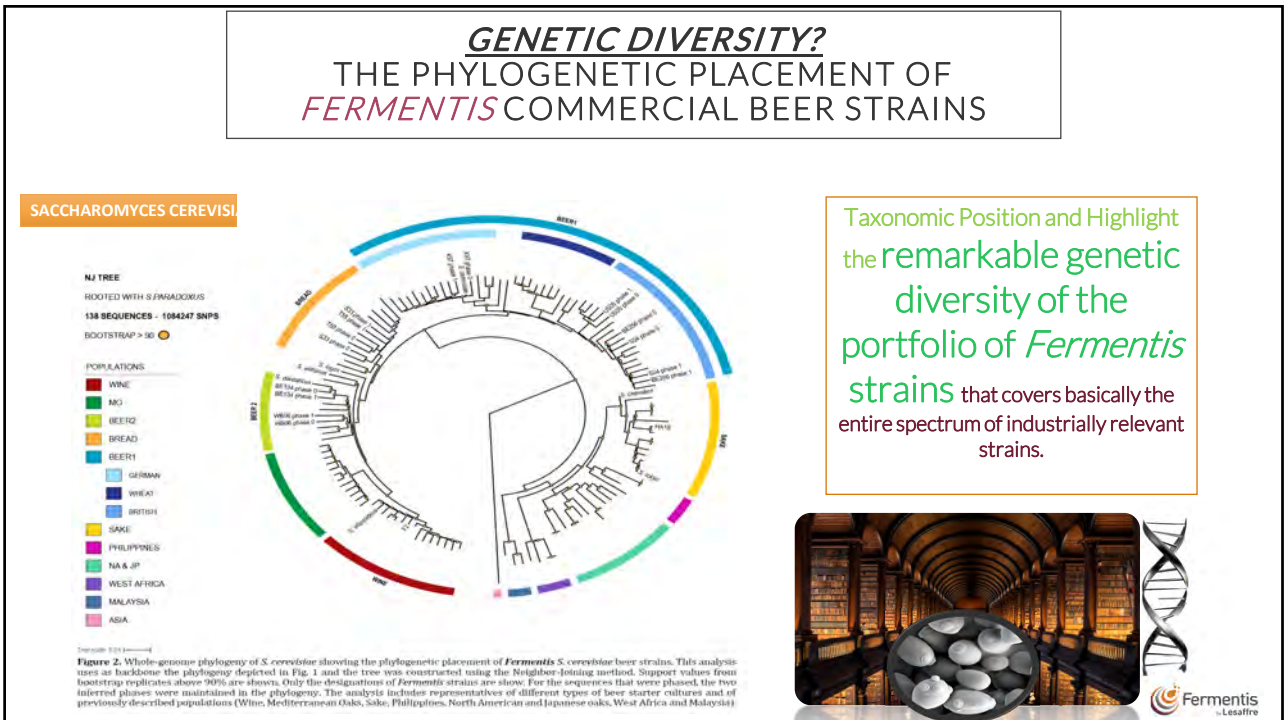


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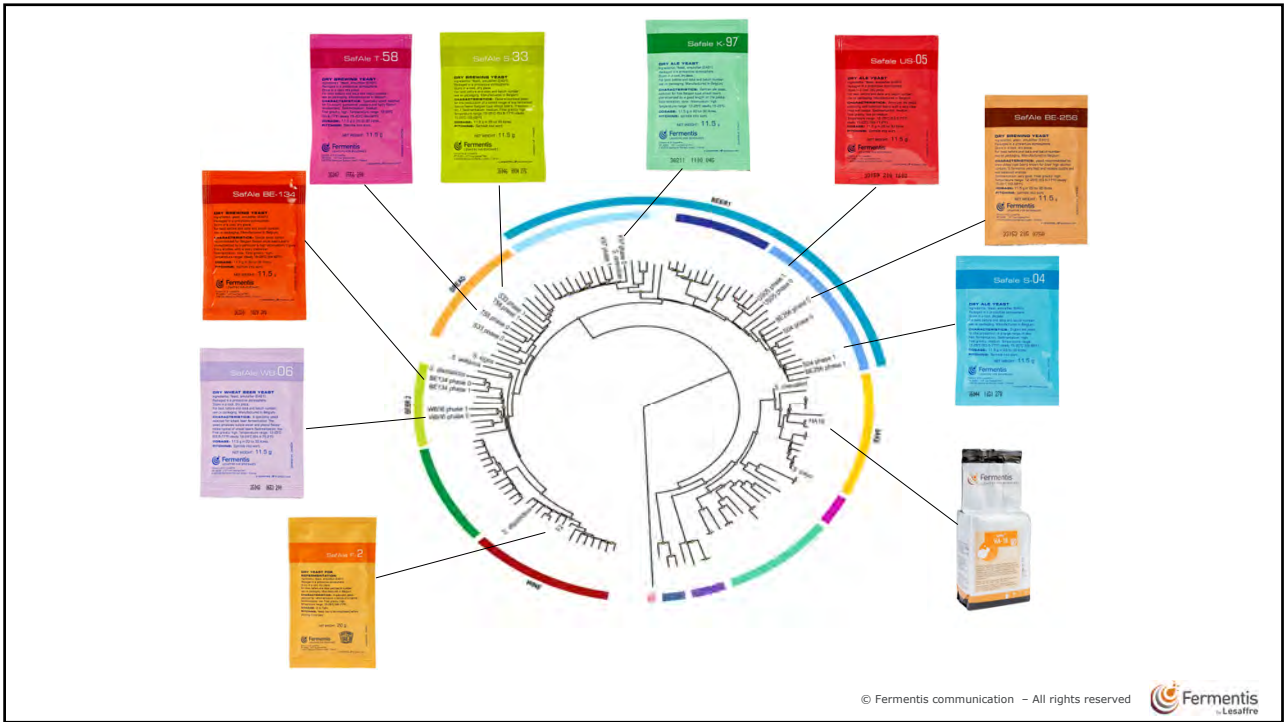
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Flavour diversity?

Explore Further Classical Beer Yeasts

Saccharomyces pastorianus

BOTTOM FERMENTATION
Cold

TOP FERMENTATION
Warm

Saccharomyces cerevisiae

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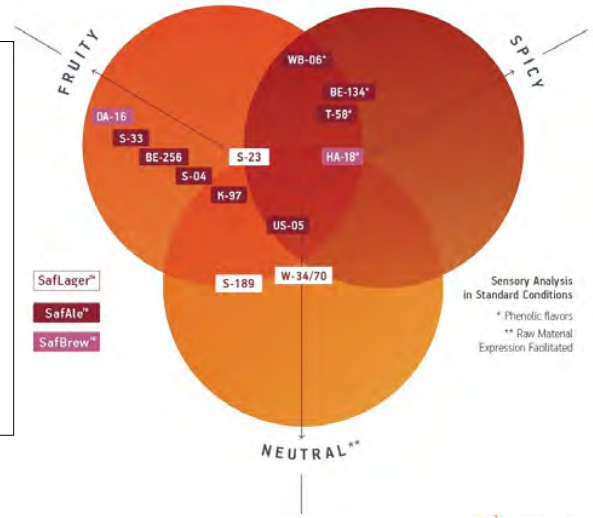
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Flavour diversity?

The Baseline

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

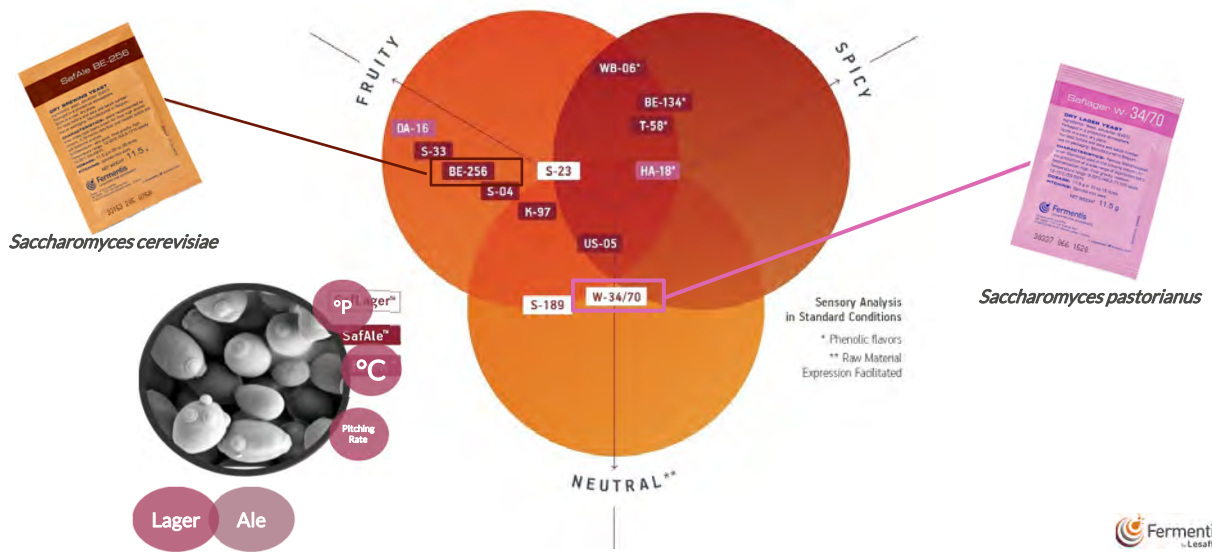
A PICTURE OF ALL THE YEASTS IN THE SAME CONDITIONS



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Baseline flavour and aromas



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Yeast Strain

OP
12°P
16°P
20°P

°C
12°C
16°C
20°C
24°C

Pitching Rate
25g/hL
50g/hL
100g/hL
200g/hL

↓

Fermentation Performance

Volatiles

Sensory Analysis

PROTOCOLS

- All malt wort (pils)
- 28 EBU
- Direct pitching

STUDIED CONDITIONS (14)

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

LAB TRIALS

PILOT TRIALS

100ML

50L

✓

✓

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Fermentis Beer Panel

Random, blind, repetitions, statistics tests!

Weekly Sessions

40 panelists


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4. Make your choice with SafAle™ BE-256

Study summary

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SAFALE™ BE-256

Belgian Ales

- ✓ Belgian Blond Ales
- ✓ Belgian Dubbel
- ✓ Belgian Tripel
- ✓ Belgian Quadrupel
- ✓ *Abbey Beers

Belgian Strong Ales

- ✓ Belgian Strong Golden Ales
- ✓ Belgian Dark Strong Ales

British Strong Ales

- Imperial Porters
- Imperial Stouts
- Barley Wines

American Strong Ales

- Am. Imperial Porters
- Am. Imperial Stouts
- Am. Barley Wines

Special and Strong Ales



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How process parameters might affect the **FRUITY** flavor profile produced by BE-256?

MAIN QUESTION

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Conclusions

SUMMARY PILOT All data

Density has the biggest 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 ↑

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

↓ Fermentation time (-)

↓ Diacetyl levels (-)

Pitching rate impact ↑

↑ Real degree of fermentation

↓ Increase risk of sulphur notes

↓ floral perception (-)

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ACTIVE DRY YEASTS

SafAle™ BE-256

A VERY AROMATIC YEAST

E2U
EASY USE
by Fermentis

CONCLUSIONS

- Provides fruity flavors over different fermentation conditions, specially at higher densities and high fermentation temperatures.
- This yeast is ideal to brew strong and flavor rich Belgian ales.

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5. Make your choice with SafLager™ W-34/70

Study summary

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SAFLAGER™ W-34/70

Lagers

- Light Lagers**
 - ✓ Lite American Lager
 - ✓ Standard American Lager
 - ✓ Premium American Lager
 - ✓ Munich Helles
 - ✓ Dortmunder Export
- Pilsners**
 - ✓ German Pilsner (Pils)
 - ✓ Bohemian Pilsener
 - ✓ Classic American Pilsner
- Amber Lagers**
 - ✓ Vienna Lager
 - ✓ Oktoberfest/Märzen
- Dark Lagers**
 - ✓ Dark American Lager
 - ✓ Munich Dunkel
 - ✓ Schwarzbier
- Bocks**
 - ✓ Maibock/ Helles Bock
 - ✓ Traditional Bock
 - ✓ Doppelbock
 - ✓ Eisbock





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How process parameters might affect the NEUTRAL flavor profile produced by W-34/70?

MAIN QUESTION




°P

°C

Pitching Rate

Yeast Strain

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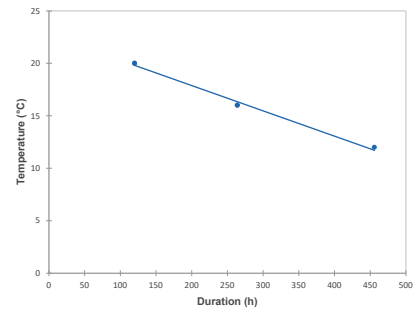
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W-34/70 Fermentation Performance

Conclusions 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



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W-34/70 Fermentation Performance


Conclusions Part 2:

↑
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



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ACTIVE DRY YEASTS

SafLager™ W-34/70

IDEAL FOR NEUTRAL
LAGER BEER


E2U[®]
EASY USE
by Fermentis

CONCLUSIONS


- Relatively neutral
- Very robust and stable over many different conditions
- Ensures faster fermentation at higher temperatures, without affecting the flavor

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6. Yeast and Hop interaction

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Yeast + hops

Yeast and Hop interaction



(Hop + Yeast) Aroma:
a **mystery box!**

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Yeast + hops

Yeast and Hop interaction



(Hop + Yeast) Aroma:
a **mystery box!**


Volatiles
Sensory Analysis

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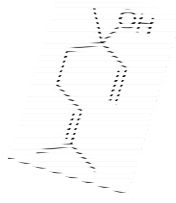
Sensory Analysis


Hop Components Analysis




CC(C)=C/C=C/C(O)C

Monoterpene Alcohols	Hop derived Esters	Terpenes	Ox. Sesquiterpenes	Ketons	Aldehydes
Linalol	2+3 Methylbutylpropanoate	β-Myrceen	Caryophyllen oxide	β-Damascenon	Citral
Geraniol	3-Methylbutyl-2-methylpropanoat	α-Humuleen		2-Undecanon	
Citronellol	2-Methylbutyl-2-methylpropanoat	Limonene			
α-Terpineol	2-Methylbutyl-3-methylbutanoate				
1-Terpinen-4-ol	Methylctanoate				
	Methylgeranate				
	Geranylacetaat				







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Case 1: New England IPA - HAZY IPA

Juicy Beer?












A reference NEIPA recipe with:




3 hops varieties

2 lager Yeasts


7 ale Yeasts (2 POF+)

Fermentation Performance

Volatiles Profile

Sensory Analysis

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New England IPA


Recipe

Yeasts Studied

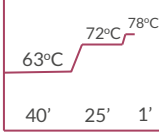
S33
S04
US05
K97
BE256
BE134
T58
S189
S23

Wort

16°P
 10% flaked oats
 10% flaked wheat
 80% pils malt



Mash



Fermentation:
23°C

Maturation (25%)
10°C


Centrifugation


Hops


Citra
 Simcoe
 Mosaic

1 kg/hL

Regimes:
 15' whirlpool (25%)
 Fermentation 2 days (25%)
 Fermentation 4 days (25%)






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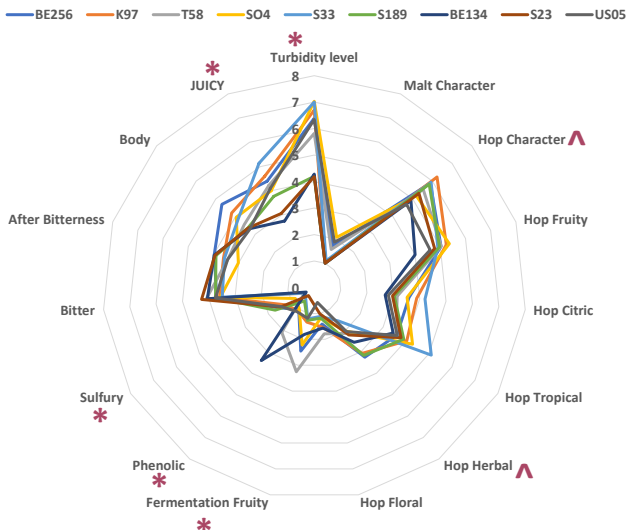
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New England IPA

Sensory characteristics




* Statistically relevant tendency

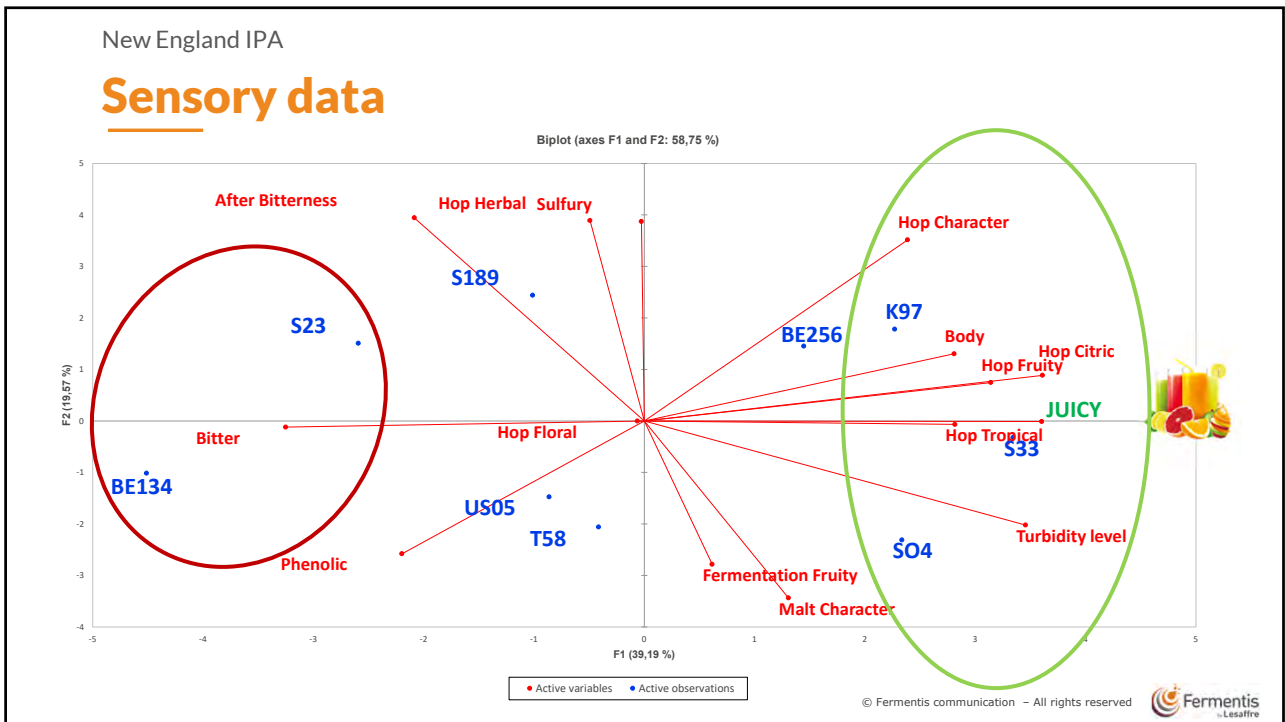


Legend: BE256 (blue), K97 (orange), T58 (grey), S04 (yellow), S33 (light blue), S189 (green), BE134 (dark blue), S23 (red), US05 (black)

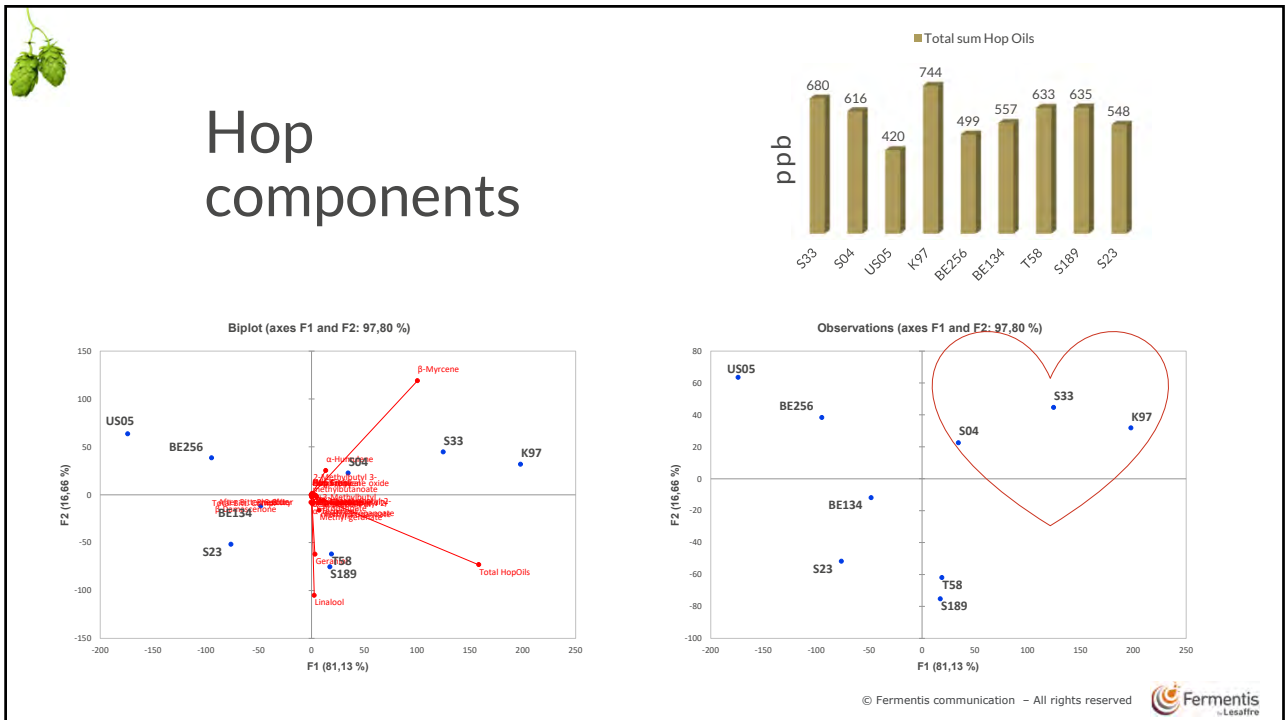
Attributes: Turbidity level, Malt Character, Hop Character, Hop Fruity, Hop Citric, Hop Tropical, Hop Herbal, Hop Floral, Fermentation Fruity, Phenolic, Sulfury, Bitter, After Bitterness, Body, JUICY, Turbidity level, Malt Character, Hop Character, Hop Fruity, Hop Citric, Hop Tropical, Hop Herbal, Hop Floral, Fermentation Fruity, Phenolic, Sulfury, Bitter, After Bitterness, Body, JUICY

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SafAle™ S-55

SafAle™ S-33

SafAle™ S-04

SafAle™ K-97

ACTIVE DRY YEASTS

RETHINK YOUR NEIPA

We have selected 3 Fermentis active dry yeasts to help you get a juicy, hoppy and hazy beer!

SafAle™ K-97 | SafAle™ S-04 | SafAle™ S-55

Fermentis
LESAFFRE FOR BEVERAGES

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Case 2: Brut IPA – Champagne IPA

The Birth of the Brut IPA

An enzyme long used to help make big imperial stouts a little easier on the palate has found a new purpose in an emerging style of IPA. The Brut IPA is a dry-0° Plato-version of the style that was created just months ago and is now spreading like wildfire.

JOHN HOLL 7 months ago

Is Brut IPA the Newest Hop Trend?
Beer News

Most the next big IPA substyle in craft: Brut IPA.

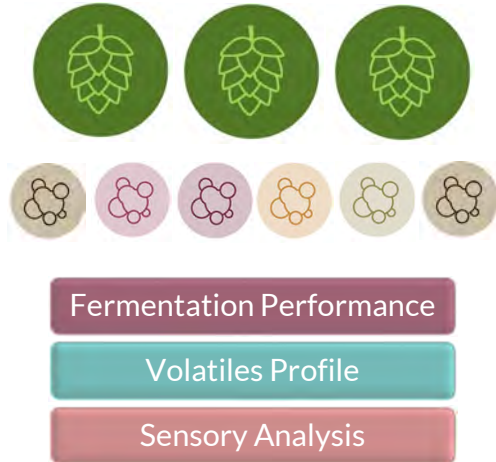
“Think of a sparkling glass of dry Champagne but with fruit-forward hop aromas”

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Case 2: Brut IPA – Champagne IPA

1 type of **BRUT IPA** reference recipe
+ 6 Mixes (1 POF+)



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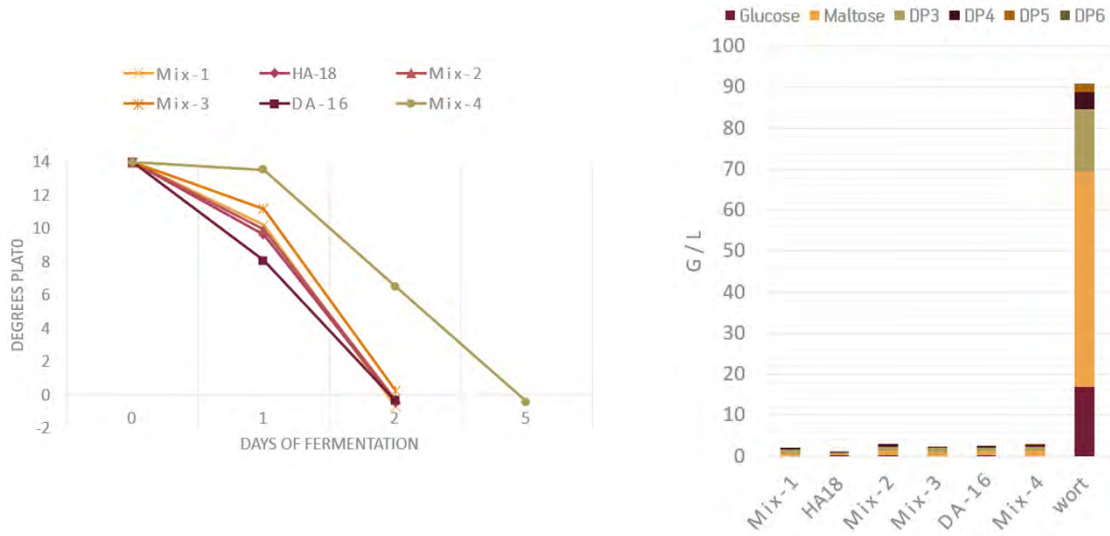
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Recipe	Wort	Mash						
<p>Yeasts studied</p> <table border="1"> <tr><td>Mix 1</td></tr> <tr><td>HA-18</td></tr> <tr><td>Mix-2</td></tr> <tr><td>Mix-3</td></tr> <tr><td>DA-16</td></tr> <tr><td>Mix-4</td></tr> </table> <p>Hops 700 g / hL whirlpool </p> <p>*1/3 each: Cascade / Mosaic / Citra</p>	Mix 1	HA-18	Mix-2	Mix-3	DA-16	Mix-4	<p>13°P 85% pils malt 15% sugar (at boiling)</p> <p>Fermentation: 24°C Maturation: 0°C (2w) Centrifugation: 1,5 hl/h Re-fermentation F2 -> 14g/ hL</p>	<p>Bitterness: 28 IBU ABV : 6,5-7 % CO₂: 7 g/l</p>
Mix 1								
HA-18								
Mix-2								
Mix-3								
DA-16								
Mix-4								

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Brut IPA - Fermentation & sugar profile

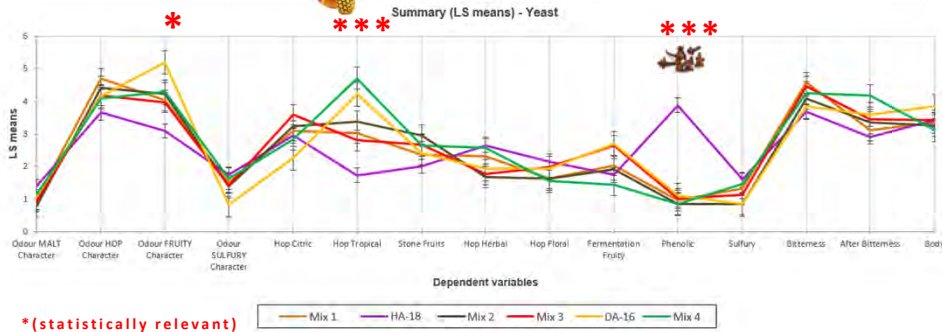


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Brut IPA - Intensity Profile

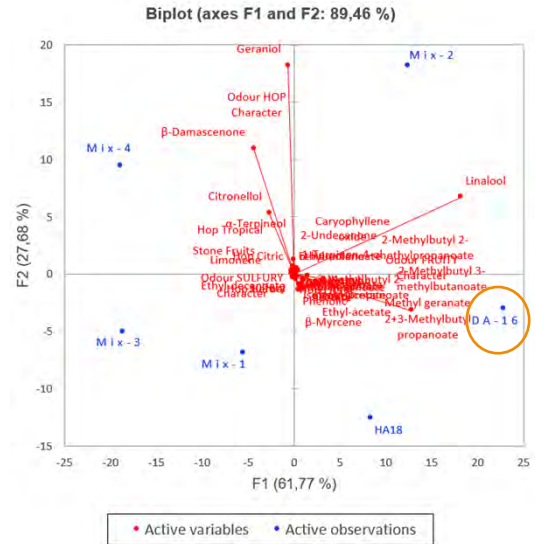
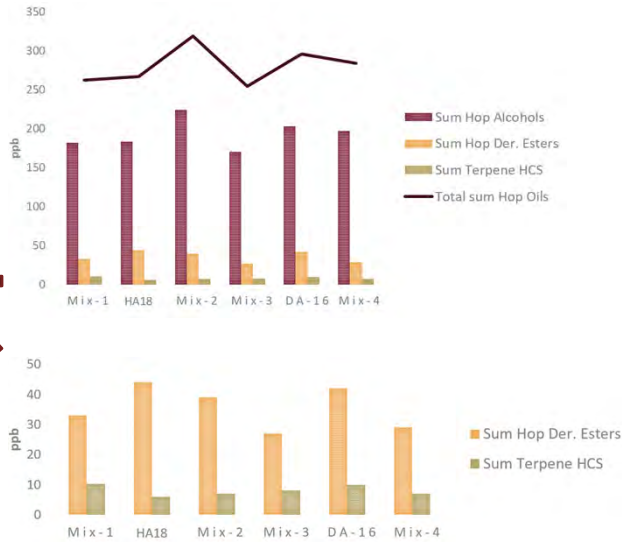
Yeast	Odour MALT Character	Odour HOP Character	Odour FRUITY Character	Odour SULFURY Character	Hop Citric	Hop Tropical	Stone Fruits	Hop Herbal	Hop Floral	Fermentation Fruity	Phenolics	Sulfury	Bitterness	After Bitterness	Body
Mix 1	0,979 a	4,688 a	4,021 ab	1,500 a	3,083 a	3,021 bc	2,354 a	2,313 a	1,625 a	2,021 a	0,956 b	1,313 a	4,563 a	3,104 a	3,333 a
HA-18	1,376 a	3,646 a	3,083 b	1,729 a	2,938 a	1,721 d	2,000 a	2,637 a	2,151 a	1,729 a	3,872 a	1,591 a	3,667 a	2,896 a	3,417 a
Mix 2	0,771 a	4,417 a	4,229 ab	1,375 a	3,229 a	3,367 bc	2,938 a	1,667 a	1,609 a	1,896 a	0,851 b	0,833 a	4,083 a	3,333 a	3,250 a
Mix 3	0,917 a	4,167 a	3,958 ab	1,396 a	3,583 a	2,792 c	2,667 a	1,750 a	1,984 a	2,625 a	1,000 b	1,125 a	4,458 a	3,438 a	3,417 a
DA-16	1,042 a	4,146 a	5,188 a	0,813 a	2,250 a	4,208 ab	2,396 a	1,917 a	1,938 a	2,688 a	1,104 b	0,833 a	3,833 a	3,583 a	3,833 a
Mix 4	1,125 a	4,083 a	4,292 ab	1,625 a	2,833 a	4,700 a	2,646 a	2,563 a	1,547 a	1,438 a	0,831 b	1,445 a	4,250 a	4,167 a	3,104 a
Pr > F(Model)	0,706	0,602	0,046	0,665	0,344	< 0,0001	0,755	0,498	0,704	0,131	< 0,0001	0,525	0,422	0,154	0,721
Significant	No	No	Yes	No	No	Yes	No	No	No	No	Yes	No	No	No	No



*(statistically relevant)

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Brut IPA - Hop volatiles



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NEW
SafBrew™ DA-16
ACTIVE DRY YEASTS

IDEAL FOR DRY, FLAVORFUL BEERS (SUCH AS BRUT IPA)

KEY ELEMENTS

SafBrew™ DA-16 is the perfect choice (consisting of Active Dry Yeast and enzymes) for the production of very dry and flavorful beers, particularly fruity and hoppy ones like Brut IPAs. SafBrew™ DA-16 is also recommended for very high gravity wort, allowing a level of alcohol up to 16% ABV.

Ingredients: yeast (*Saccharomyces cerevisiae*), Maltodextrin, Glucoamylase from *Aspergillus niger* (EC 3.2.1.3), Emulsifier E491: Sorbitan monostearate.



SafBrew™ DA-16

- TOTAL ESTERS: High
- TOTAL SUPERIOR ALCOHOLS: High
- APPARENT ATTENUATION: 98-102%
- SEDIMENTATION: Medium
- FLOCCULATION: -

HOW TO USE IT

TEMPERATURE
Ideally 20-32°C (68-89.6°F).

DOSAGE
100 to 160 g/hl.

INSTRUCTIONS
You can rehydrate or you can pitch directly, depending on your equipment, habits and feelings.

PACKAGING
Available in 10kg and 500g sachets.

STORAGE
36 months from production date. During transport: the product can be transported and stored at room temperature for periods of time not exceeding 3 months without affecting its performance. At final destination: store in cool (< 10°C/50°F), dry conditions.

SHELF LIFE
Refer to "best before" date printed on the sachet. Opened sachets must be sealed and stored at 4°C (39°F) and used within 7 days of opening. Do not use soft or damaged sachets.

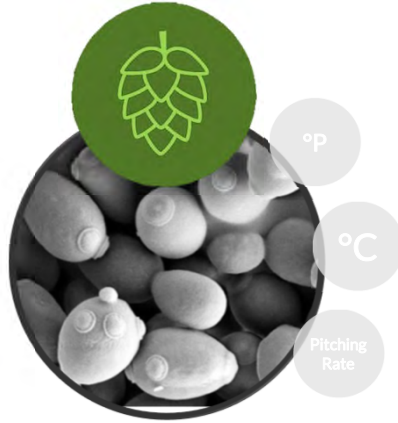
THE OBVIOUS CHOICE FOR BEVERAGE FERMENTATION

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Yeast and Cascade

Yeast and single hop interaction

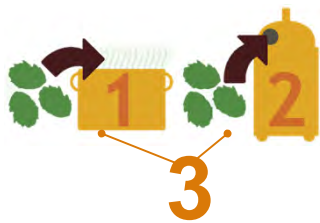


YEAST + CASCADE

- Single hop trials
- Lack of knowledge in Yeast & Hop Interaction AND THE Potential of Fermentis yeasts in late-hopped beers;
- Most popular American hop, presents spicy, citrus aroma with hints of grapefruit.
- Important flavours and flavour precursors

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CASCADE HOP



(3 late hopping regimes)

Code	Hop Addition	Amount (g/hL)
1	Lh Late Hopping	300
2	Dh Dry Hopping	300
3	LDh Late Hopping+Dry Hopping	150+150

+ 11 Fermentis yeasts
3 lagers, 7 ales (3 POF+)



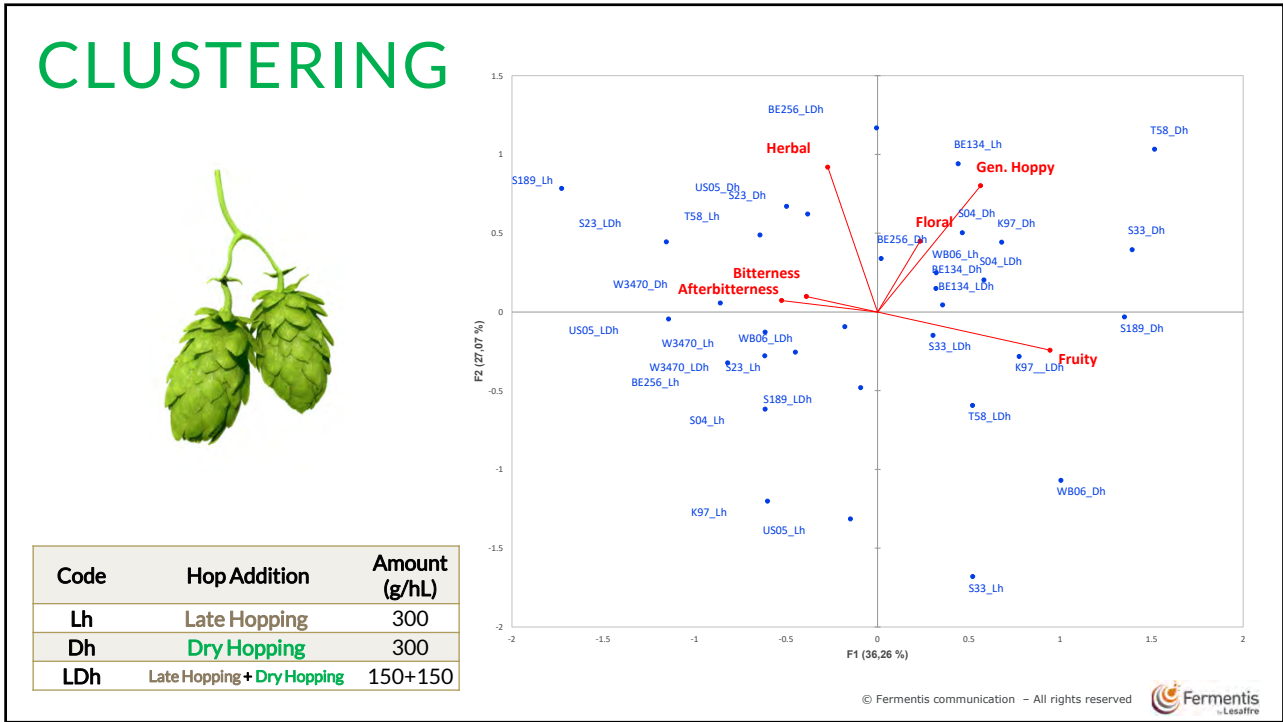
Late Hopping - Added at beginning of pumping the wort in the whirlpool (pumping takes 10 minutes, then 15 minutes of settling), around 90°C

Dry Hopping* - added 24h after filling of vessel, Fermentation day 1 (24 °C).

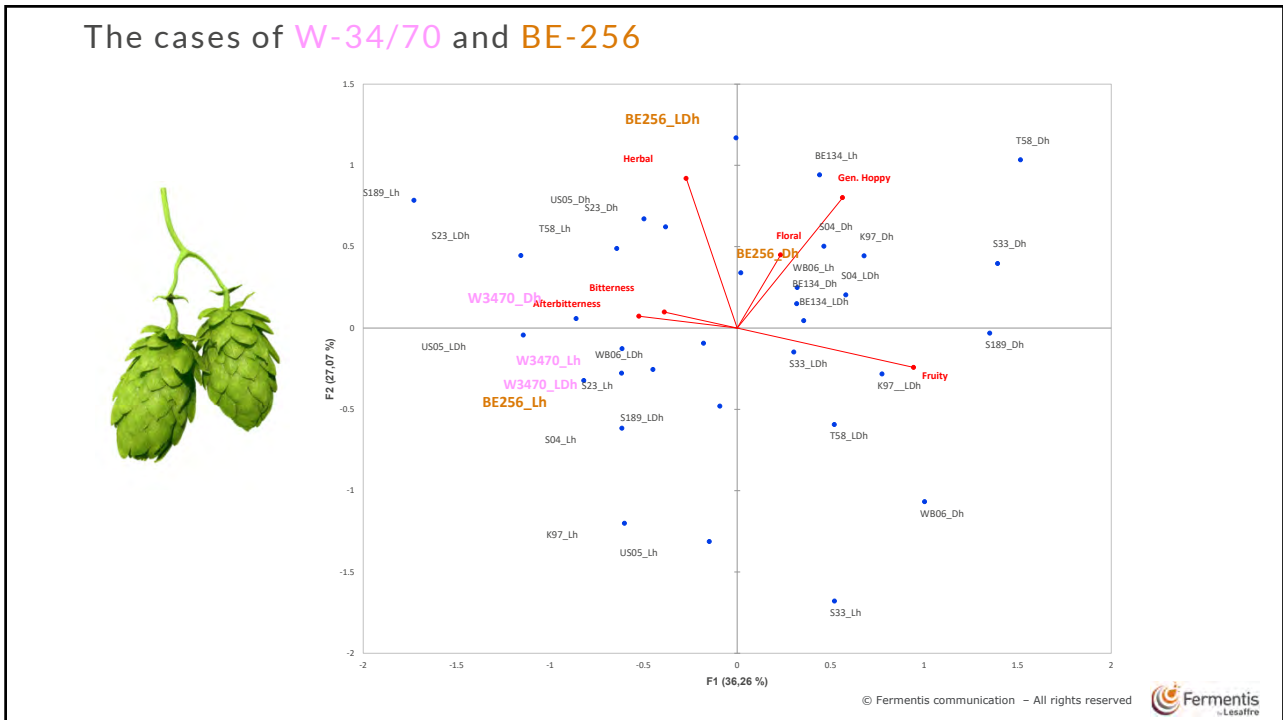
- Fermentation Performance
- Volatiles Profile
- Sensory Analysis

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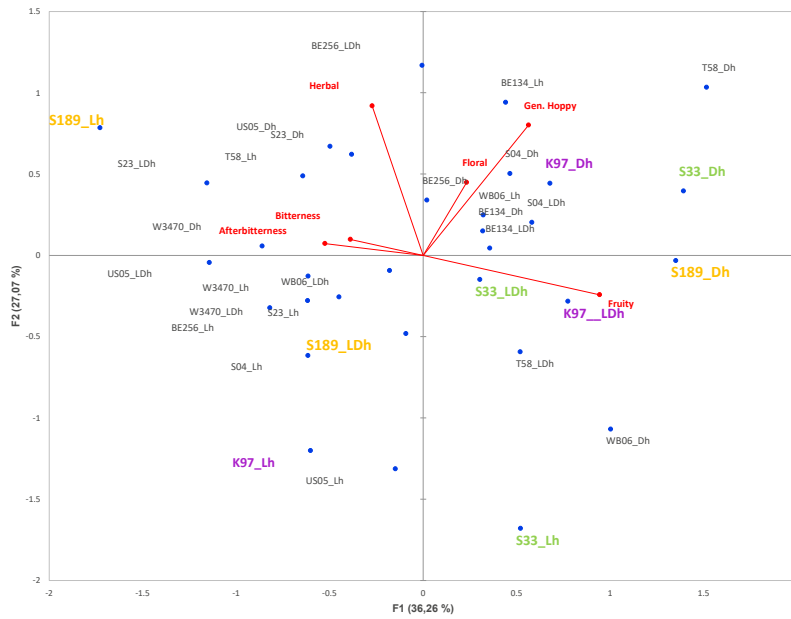


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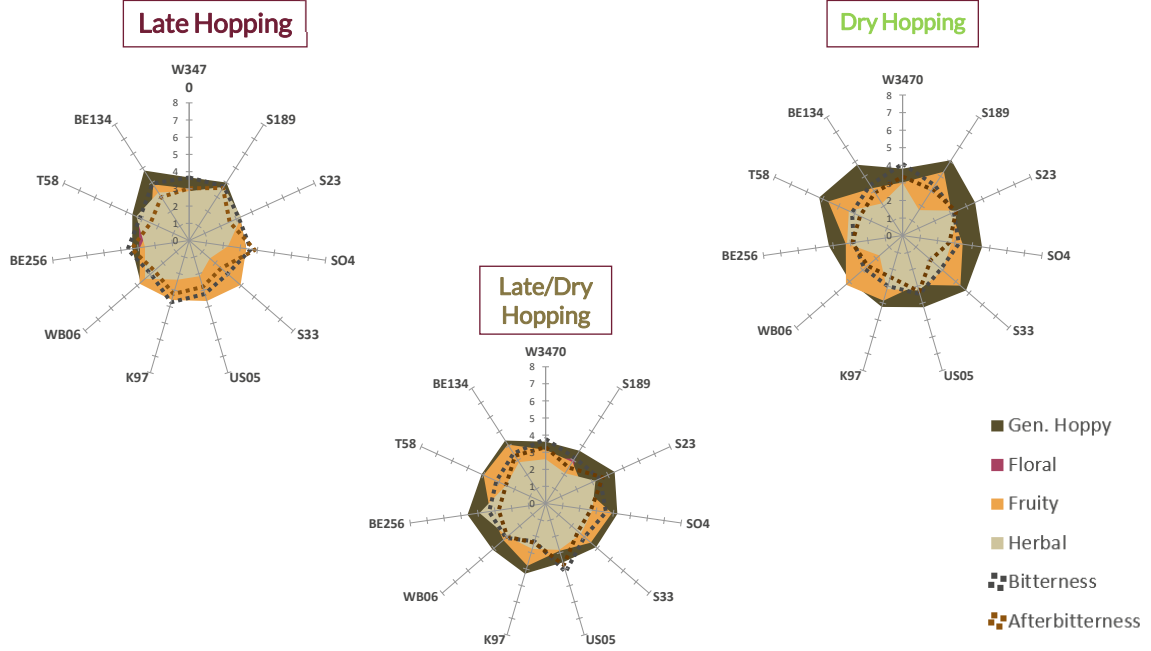
The gypsies S-189 (lager), K-97 and S-33 (ales)



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YEASTS + CASCADE




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Yeast and Cascade

Conclusion 1




- ❖ Globally, different hop regime will affect more or less hop flavor perception.
- ❖ For every hop treatment the yeasts will deliver a specific intensity / quality flavor profile.
- ❖ Yeasts may deliver different notes and in association with Cascade Hops, the Yeasts S33, K97 and S189 appear to be more interesting.
- ❖ But...

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The yeasts “MOVE” into the hop flavors possibilities – but what would be the impact of the primary **fermentation flavors** in the overall hop-fruity perceptions?



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Integrating a 'Blanco'(non hopped)




BLANCO + 1 LATE HOPPING REGIMES


Hop Addition	Amount (g/hL)
NO LATE Hopping	0
Late Hopping + Dry Hopping*	200+200

Late Hopping - Added at beginning of pumping the wort in the whirlpool (pumping takes 10 minutes, then 15 minutes of settling), around 90°C

Dry Hopping* - added 24h after filling of vessel, Fermentation day 1 (24 °C).

- + Detailed Sensory (discriminating fermentation from hop flavors)
- + Analytics

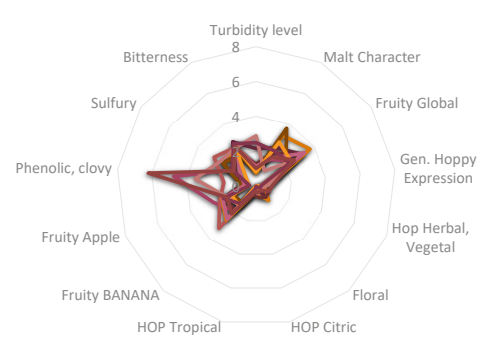
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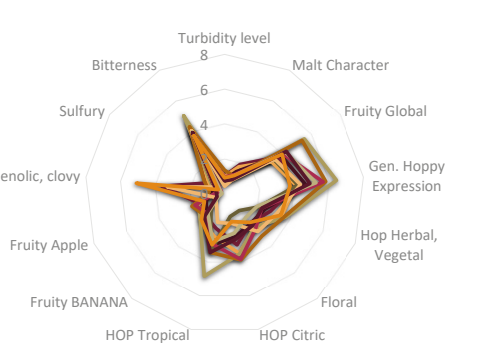
Yeast and Cascade

All Yeasts!

Non hopped



Hopped



BE134 BE256 K97 S04


S189 S23 S33 T58


US05 W3470 WB06

BE134_h BE256_h K97_h S04_h

S189_h S23_h S33_h T58_h

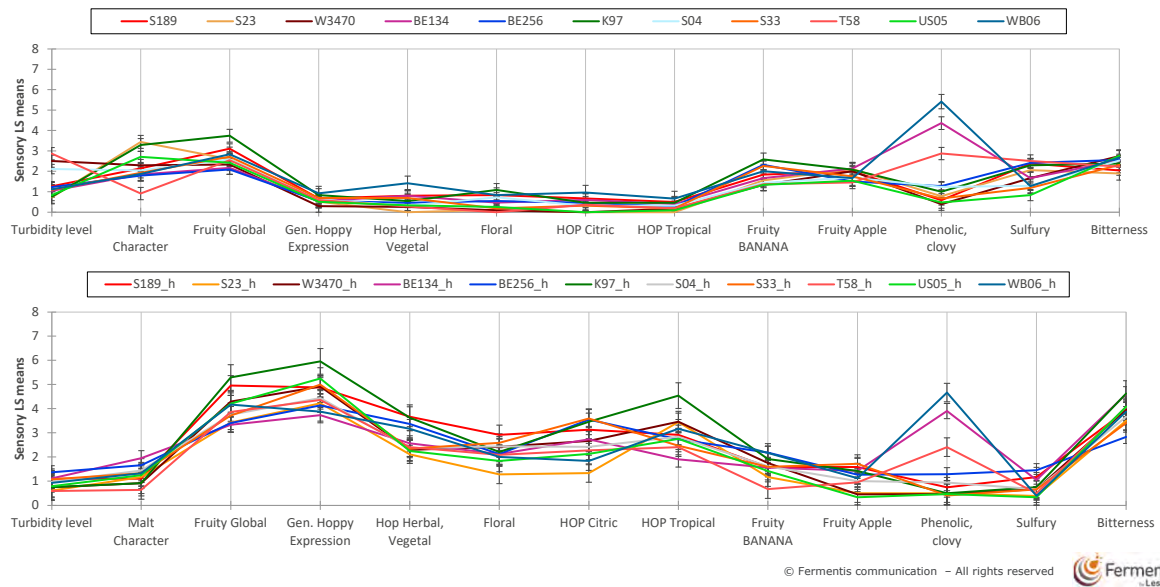
US05_h W3470_h WB06_h



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Yeast and Cascade

All Yeasts!


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YES ! THE YEAST CHANGE CONSIDERABLY THE HOP FLAVOR perception IN THE FINAL BEER!

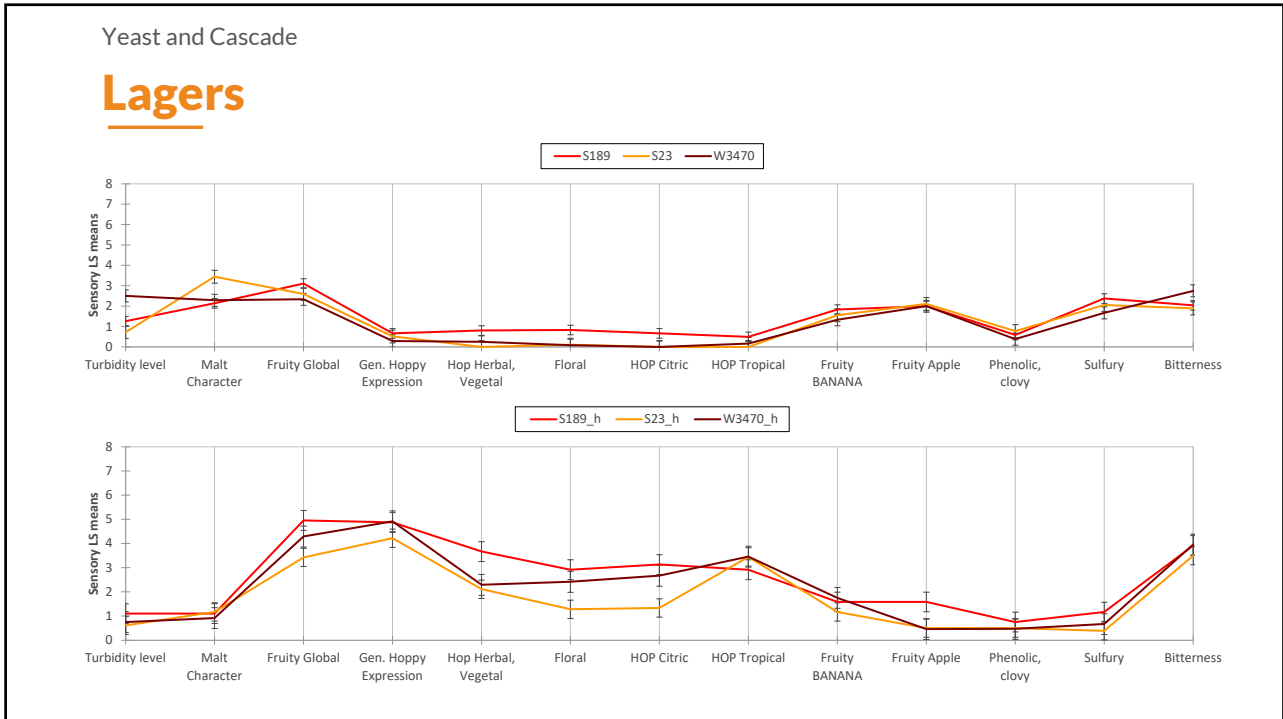
Following: a look into the effects between the yeast groups:

1. Lager
2. Ales POF+
3. Ales POF-

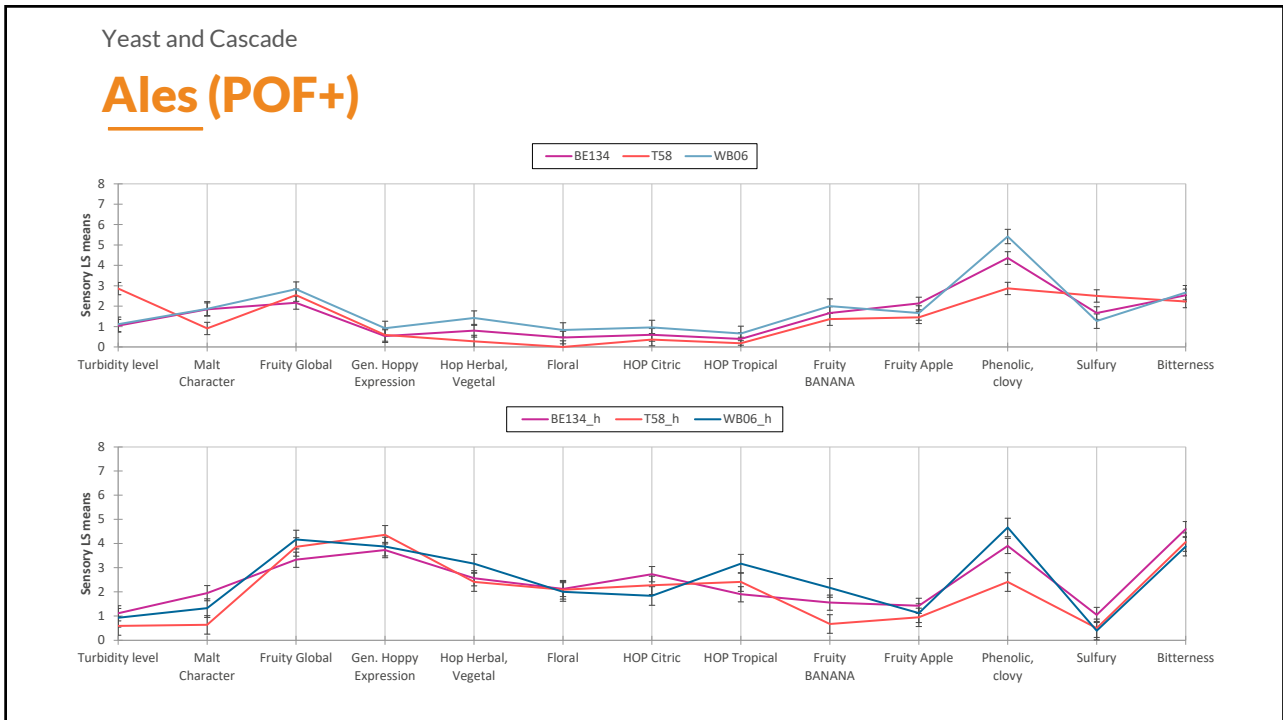


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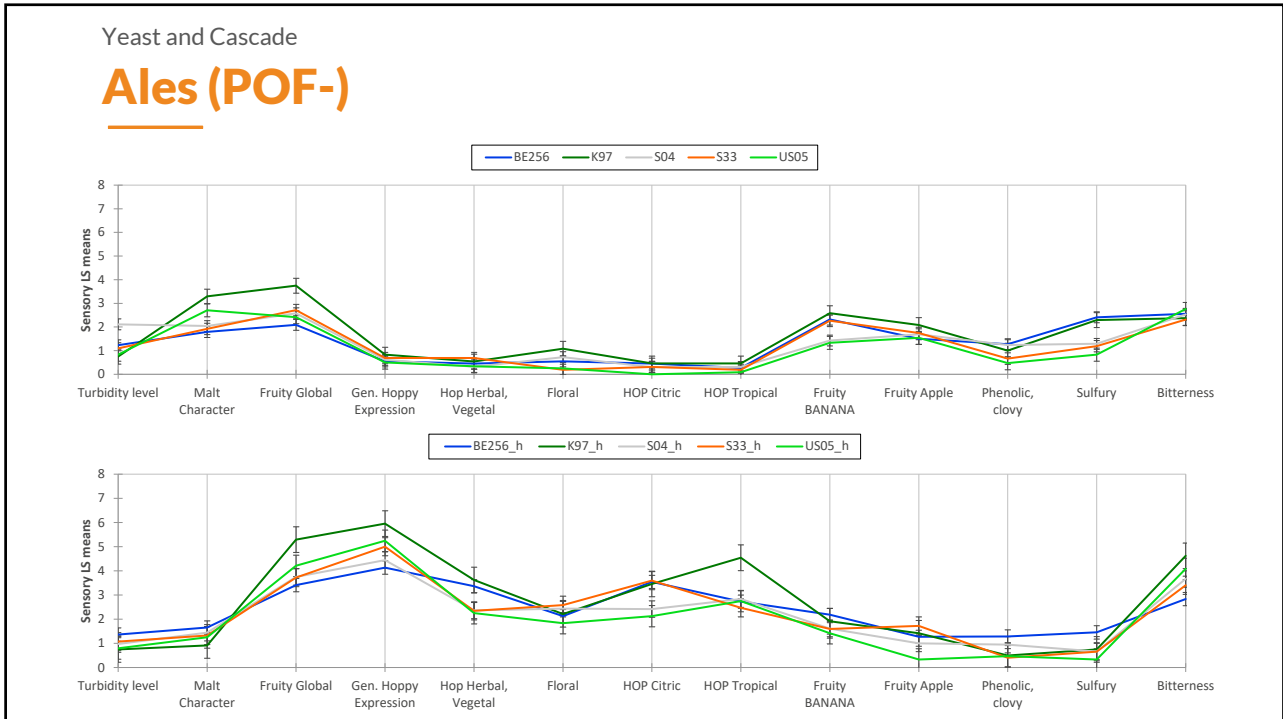
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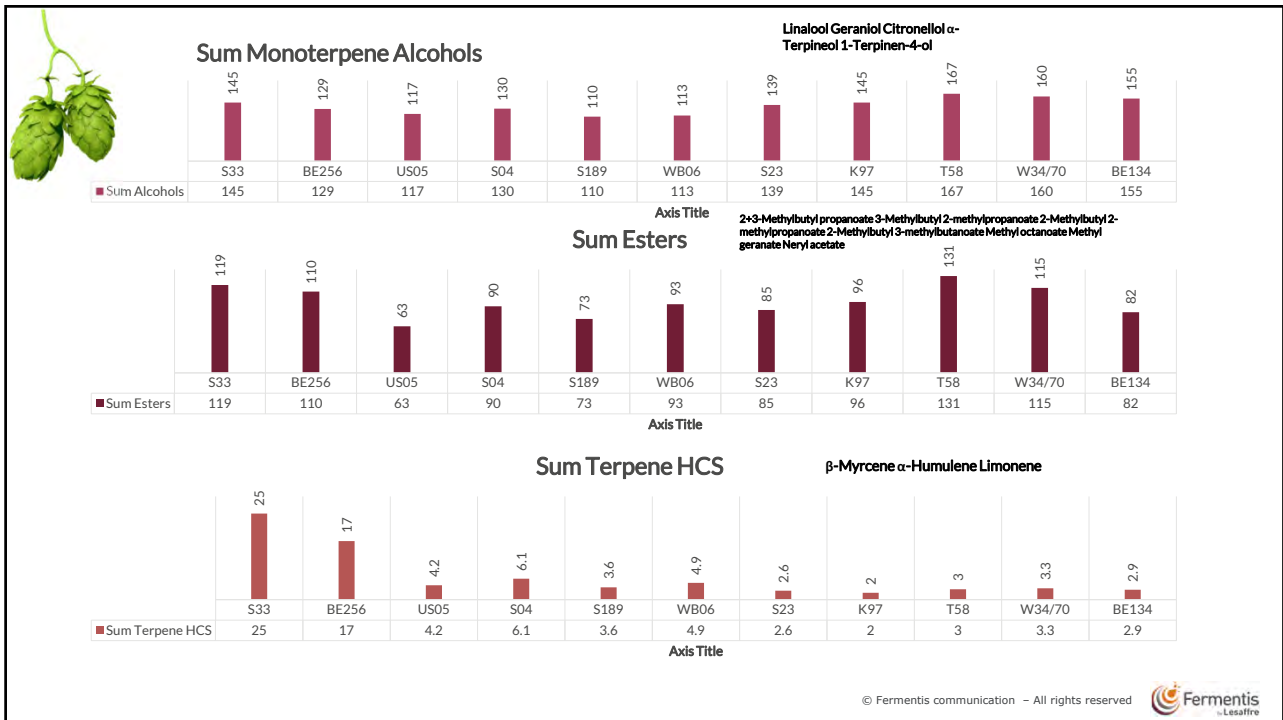
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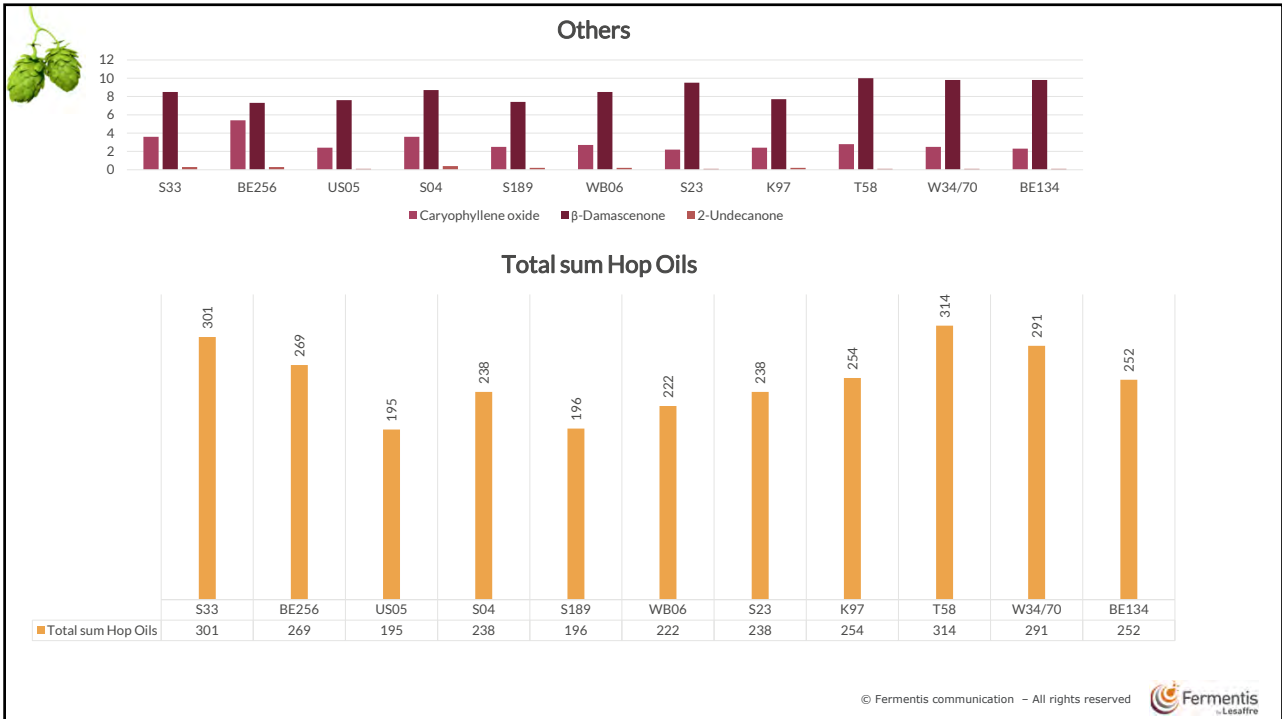
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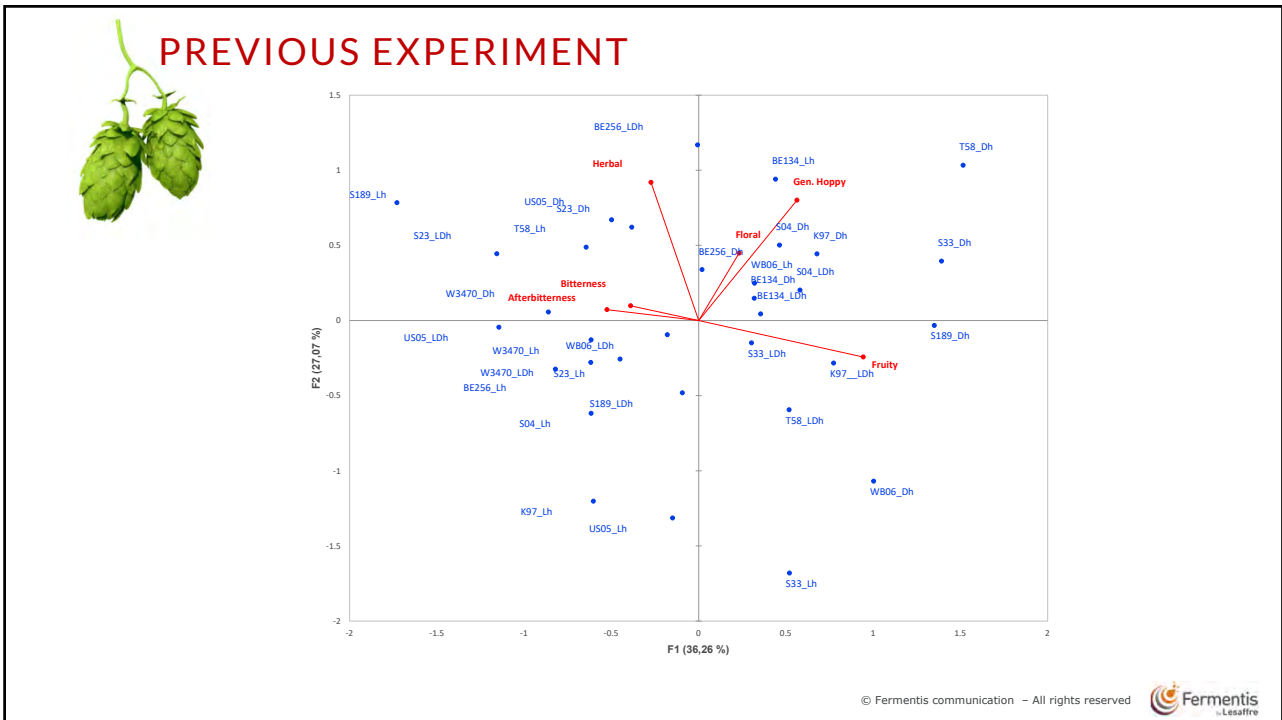
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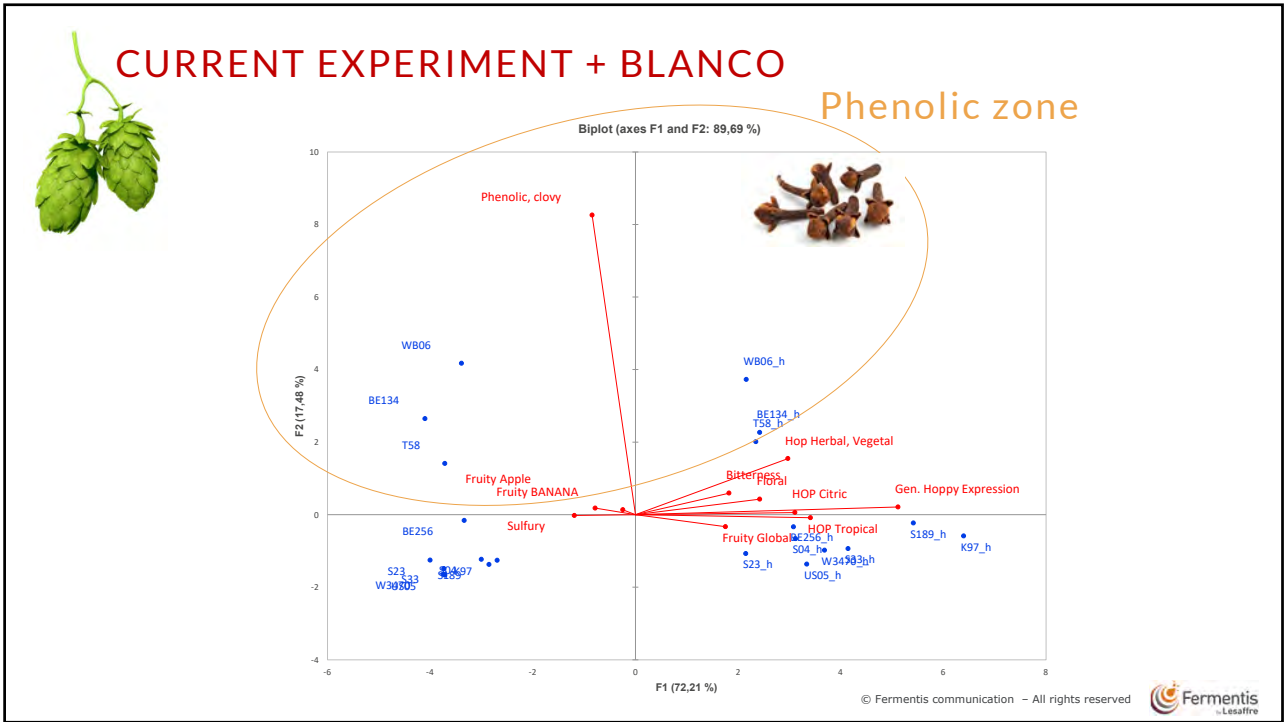
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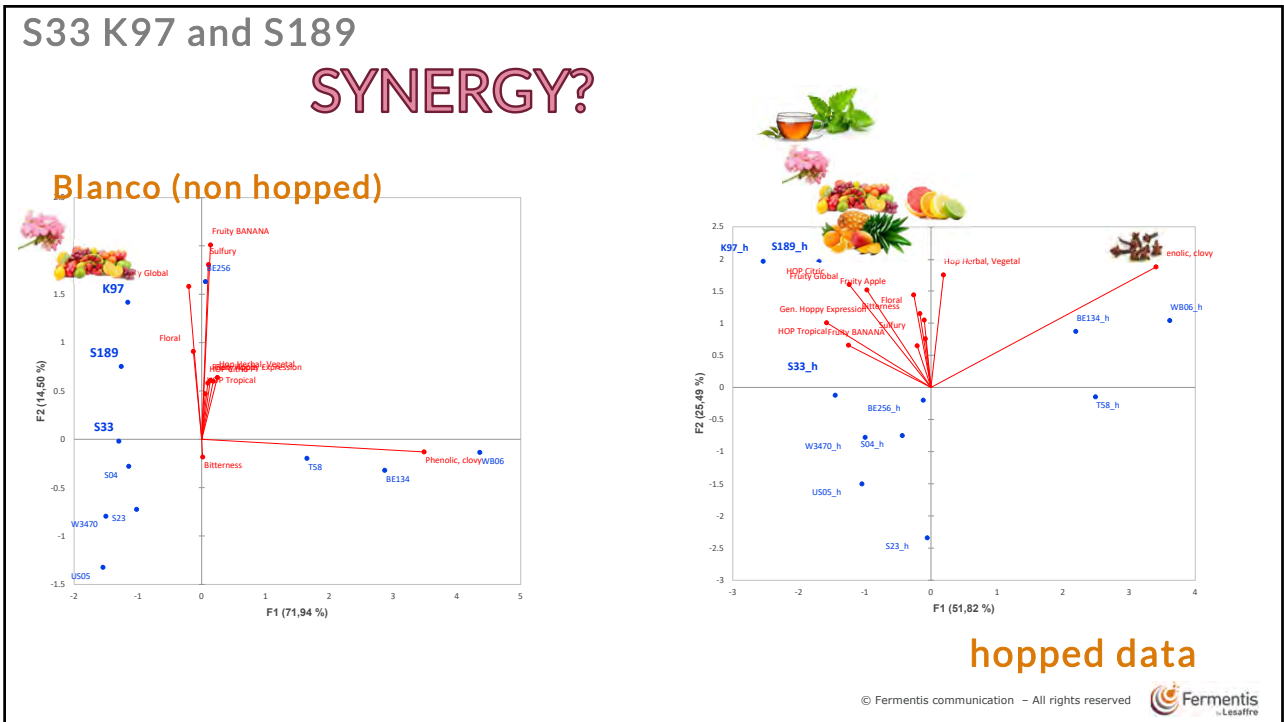
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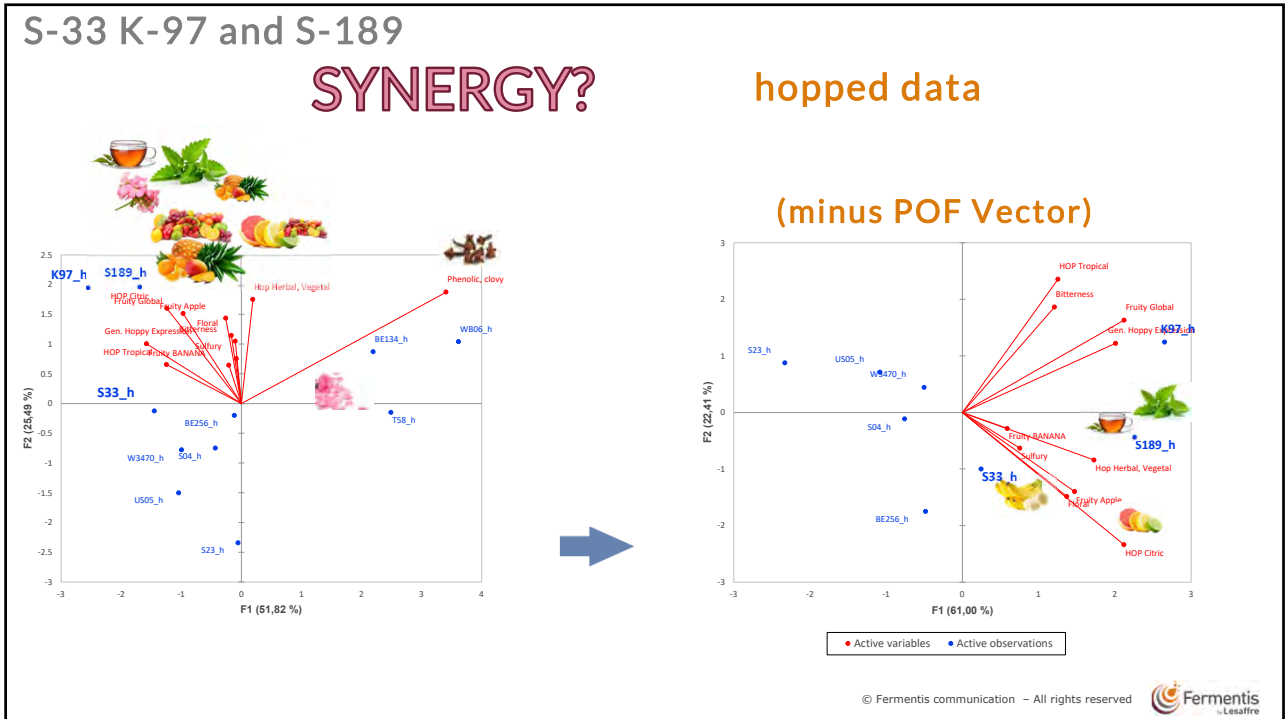
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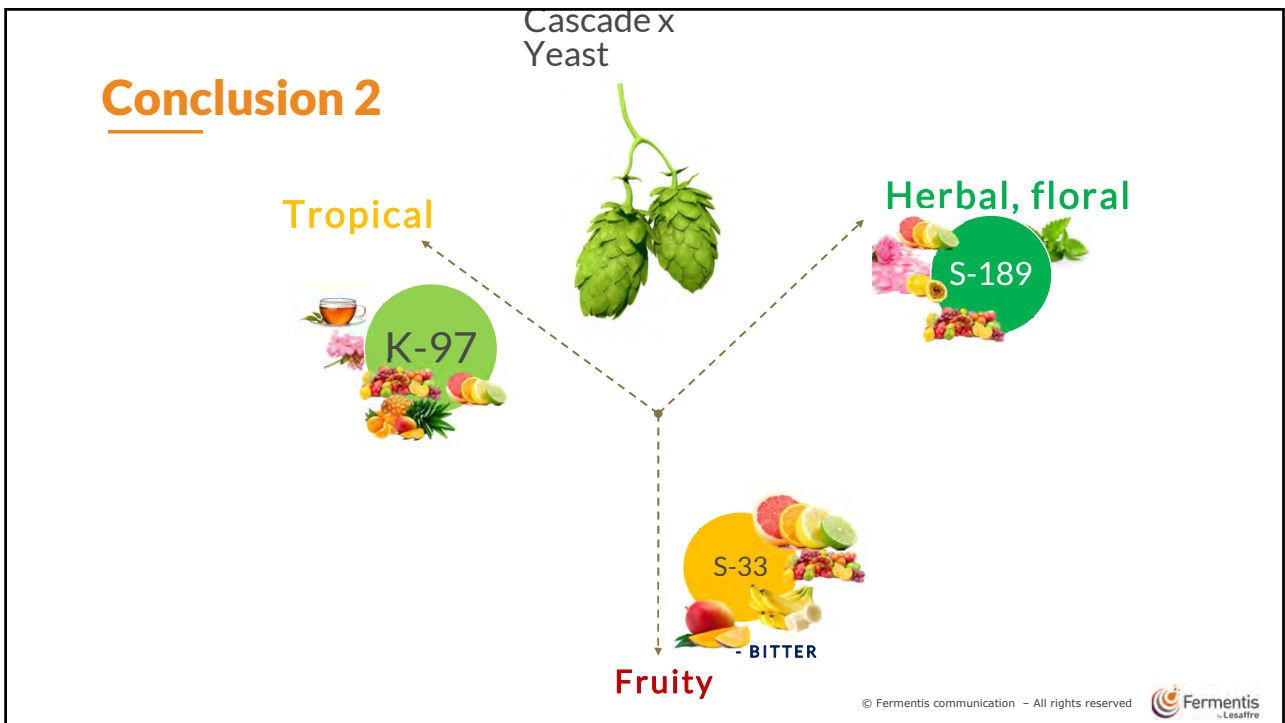
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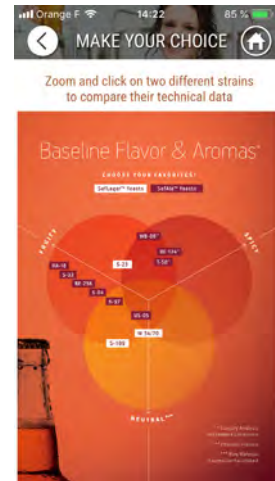


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Fermentis Application




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Thank you for your attention!
Do you have any questions ?



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