

evodia



What if yeast could
produce hop aroma?



Quick show of hands



**Who brews
non-alcoholic beer?**



**Who worries about hop
costs and supply?**



**Who has lost beer
during dry hopping?**

If you raised your hand - the next 30 minutes are for you.

The brewer challenge



Beer loss

Vegetal matter absorbs beer. Dry hopping can significantly reduce yield.

Batch inconsistency

Hop composition varies by harvest, season, and lot.

Hop cost & supply risk

Price volatility and supply uncertainty increase brewing risk.

NAB flavor challenge

Without alcohol, aroma delivery and mouthfeel become harder to achieve.

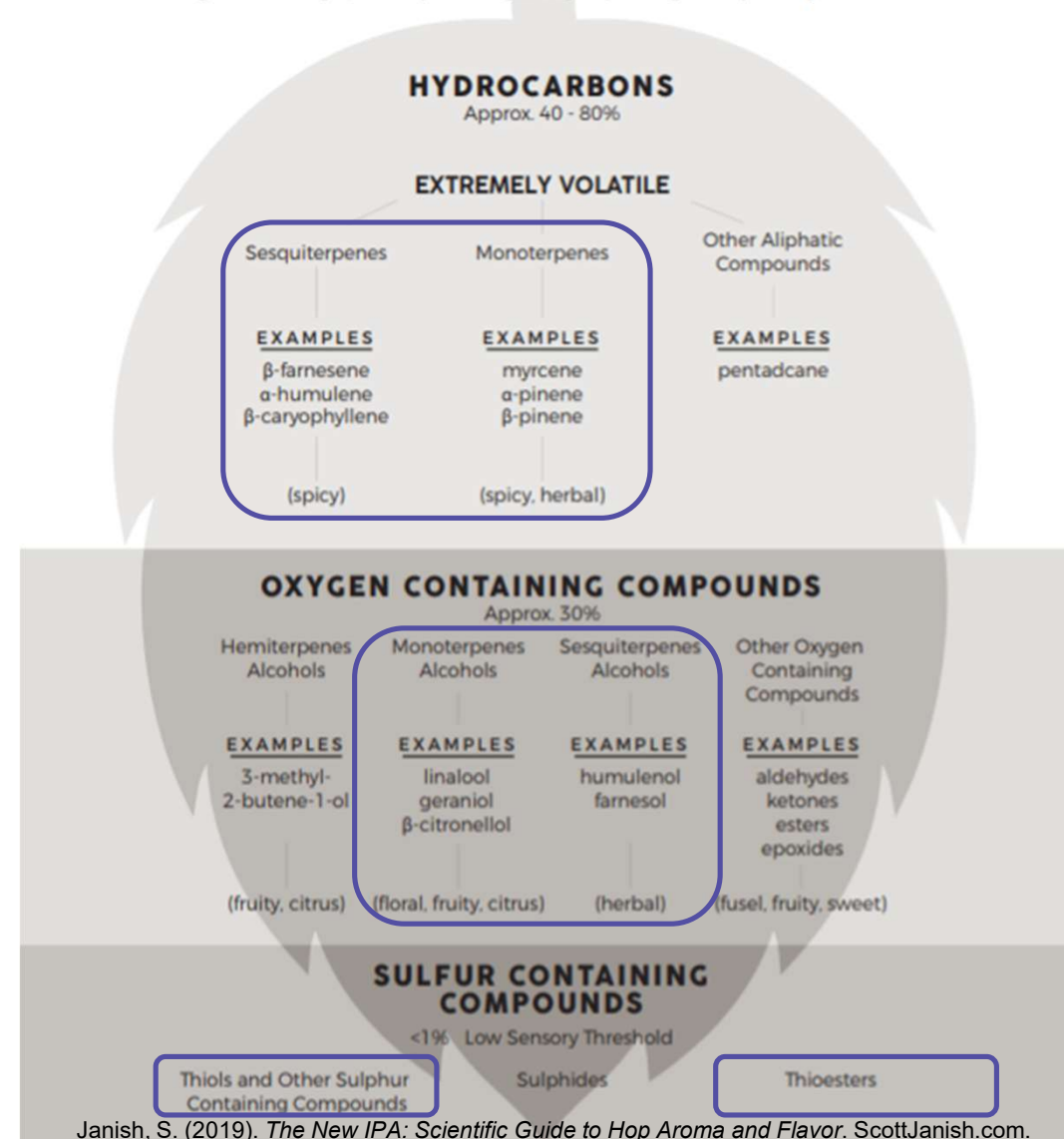
What are terpenes?

Terpenes are small molecules with a huge sensory impact.

- **They drive key hop notes**
Resinous, citrus, floral, fruity
- **They are powerful at low levels**
Perceptible from ppb to low 100s ppb
- **They are hard to retain in beer**
Volatile and hydrophobic

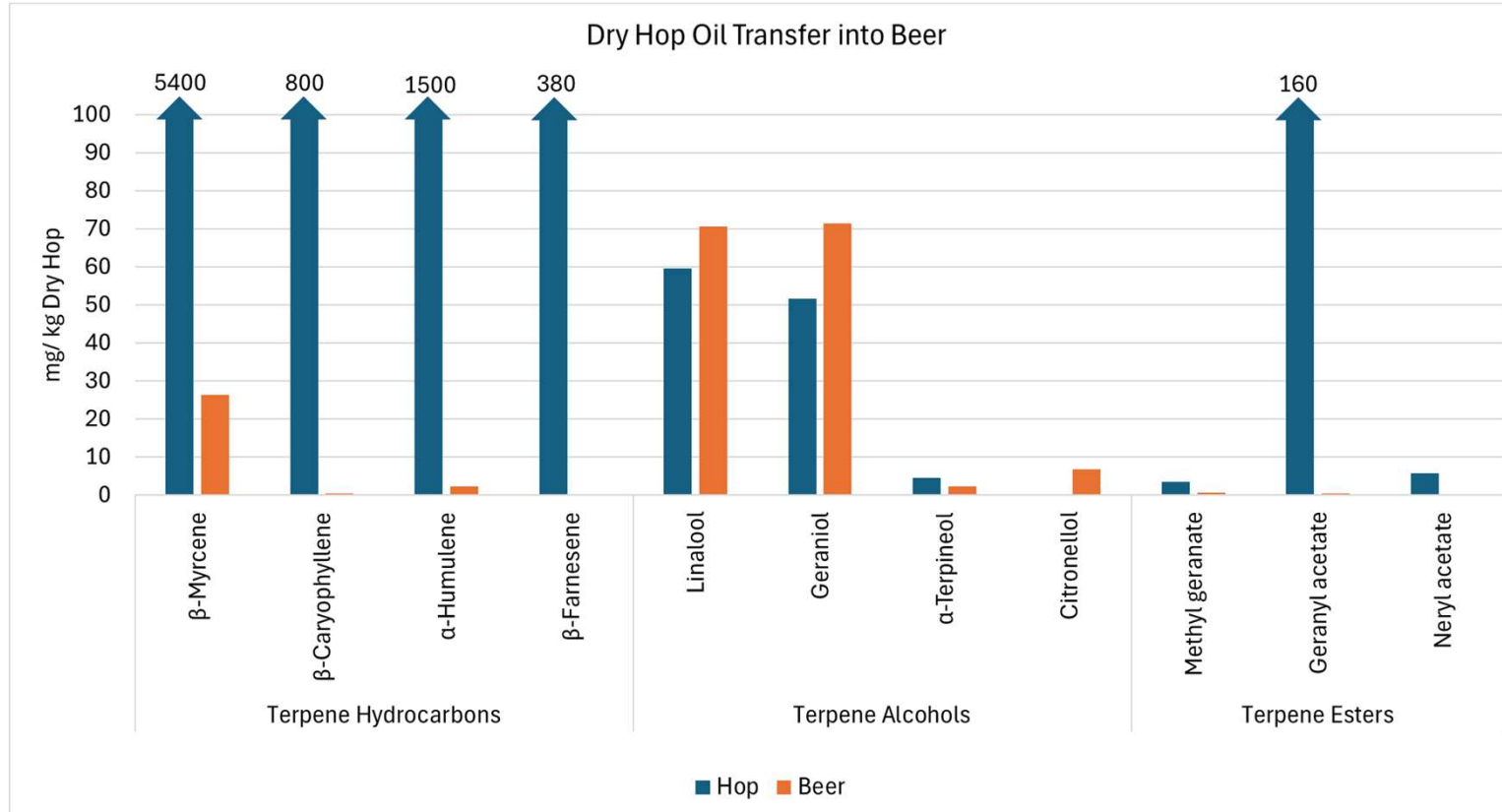
CHEMICAL COMPOSITIONS OF THE ESSENTIAL OILS OF HOPS

Based on general averages, actual percentages vary depending on hop variety and other factors.



Janish, S. (2019). *The New IPA: Scientific Guide to Hop Aroma and Flavor*. ScottJanish.com.

Most hop aroma never makes it into the beer



Sources: Lafontaine, S. R., & Shellhammer, T. H. (2018). Impact of static dry-hopping rate on the sensory and analytical profiles of beer. *Journal of the Institute of Brewing*, 124(4), 434–442. <https://doi.org/10.1002/jib.517>, Hauser, D. G., Lafontaine, S. R., & Shellhammer, T. H. (2019). Extraction Efficiency of Dry-Hopping. *Journal of the American Society of Brewing Chemists*, 77(3), 188–198. <https://doi.org/10.1080/03610470.2019.1617622> and Haslbeck, K., Minkenberg, D., & Coelhan, M. (2018). Investigations into the Transfer Rate of Volatile Compounds in Dry Hopping Using an Octanol-Water Partition Coefficient Model. *Journal of the American Society of Brewing Chemists*, 76(3), 169–177. <https://doi.org/10.1080/03610470.2018.1483701>



Our solution

Hop aromas reinvented by fermentation

evodia

Yops®: a patented fermentation platform for beer aroma



Years of pioneering research led to a cost-effective, biotechnological platform for pure aroma molecules identical to those found in plants



Featured in

nature
communications

Science

PNAS

Natural

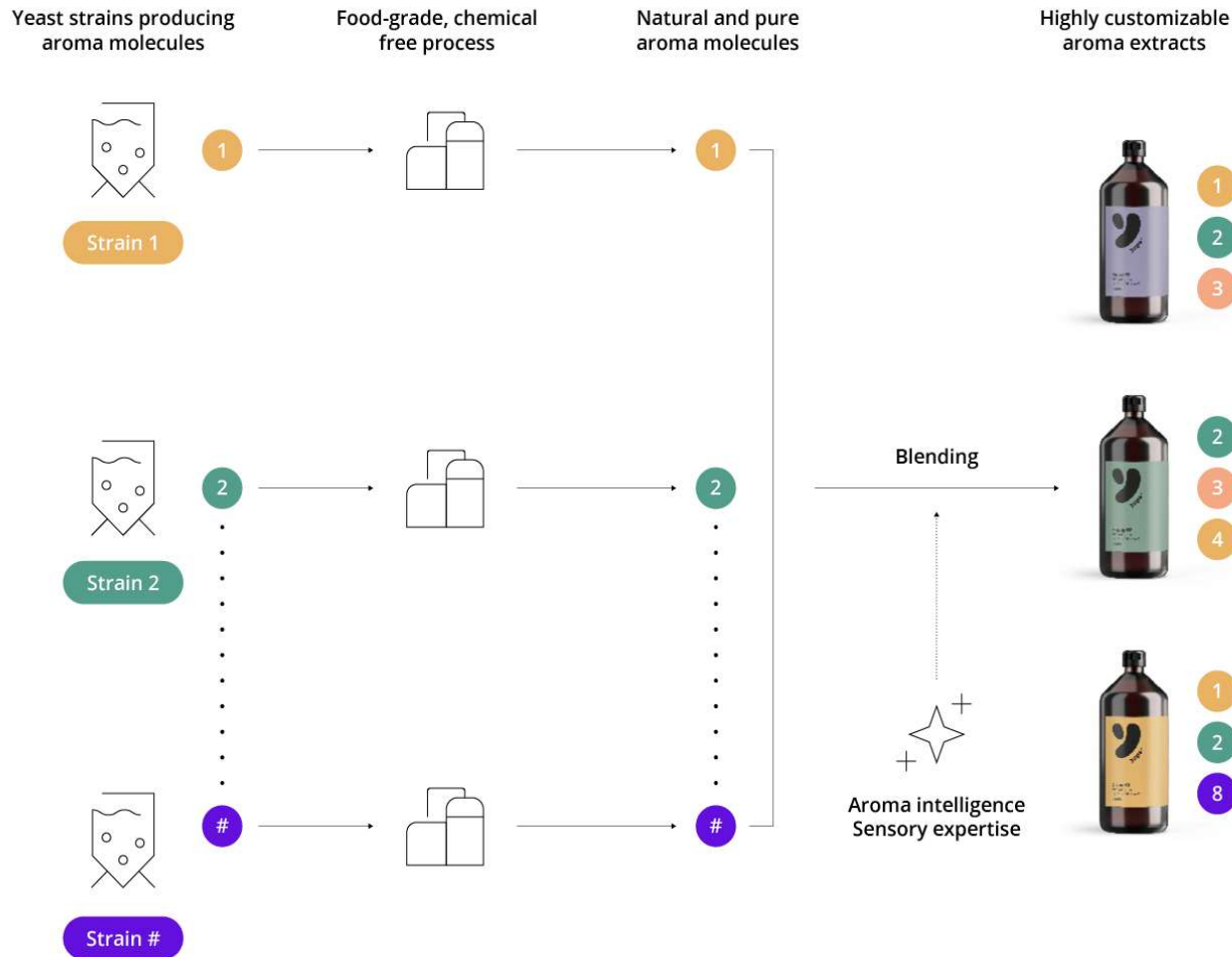
Sustainable

Scalable

>90% pure

Patented technology

Yops® Natural flavors by yeast fermentation



Yops®, a range of consistent, sustainable high-quality flavors

Based on a patented technology using fermentation, we achieve:

- Yeasty signature
- Uniqueness
- Customizable flavors
- Consistent, repeatable, and sustainable by design
- Scalable
- Easy to dose, transport, store



The solution

Hop Aromas Reinvented

Natural and sustainable aromas by yeast fermentation



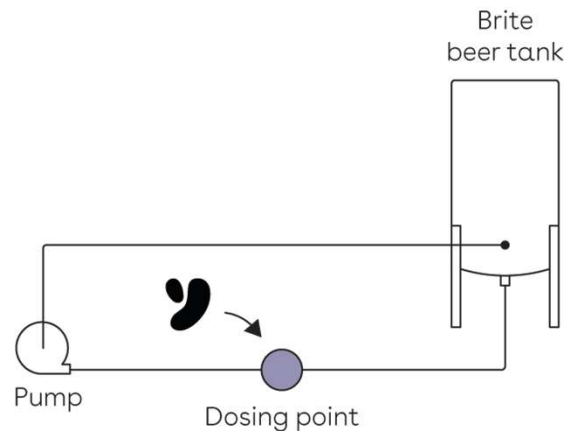
Improves aroma – Lower environmental footprint – consistent – high quality – scalable production

How to: Inline dosing

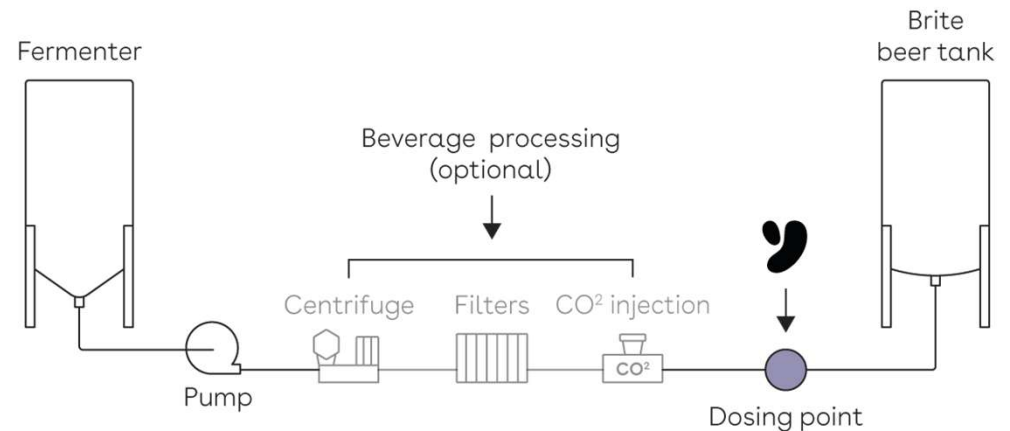


- Dosing should be made close to the final storage vessel to avoid stripping terpenes on suspended solids and beverage processing equipment.
- To guarantee proper mixing we recommend dosing Yops™ into transfer or recirculation flow.
- Dosing over time will lead to the most homogenous result.

Option 1 - Recirculation method



Option 2 - Transfer mixing method




THIRD-PARTY SCIENCE

Validated by the world's leading brewing research institutes




Across commercial brews and third-party studies, Yops has been shown to reduce beer loss, improve shelf life, remain stable during pasteurization, and do so without negatively affecting beer quality.



YIELD

Improved yield


Up to 12% less beer loss



SHELF LIFE

Improved shelf life

Extended aroma stability



STABILITY

Pasteurization stable

Stable even after pasteurization

Validated by



Glen Fox, Ph.D.
Anheuser-Busch Endowed Professor
of Malting and Brewing Sciences



Reduced oxidization, better aroma, longer shelf life.



OBJECTIVE

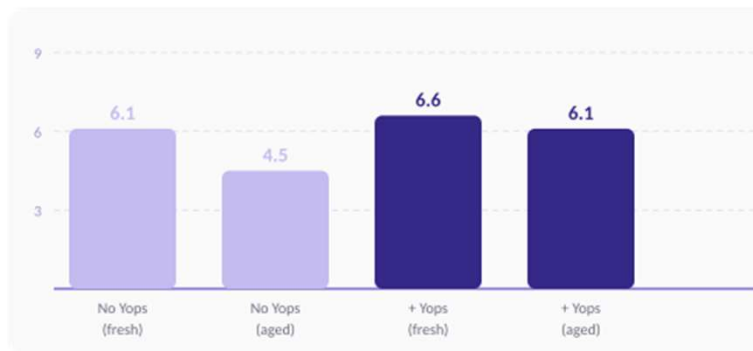
Does Yops improve aroma and flavour stability in a non-alcoholic lager?



METHOD

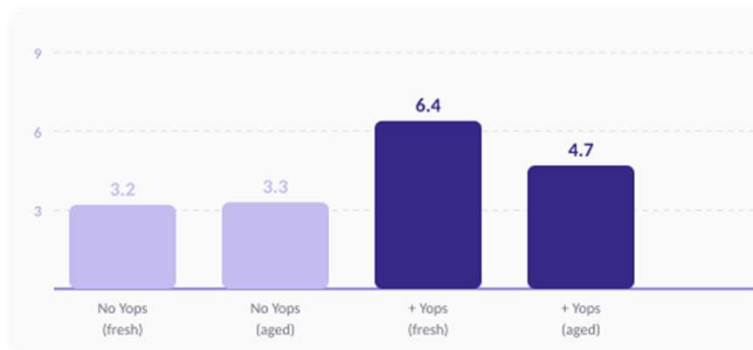
- Beer type: Alcohol-free Lager
- 0.5 mL/L Yops vs. no Yops
- Force-aged: 24h shaking + 4 days at 40°C
- Panel: n=10 trained tasters
- Scale: 1–9 (Terrible → Excellent)
- Tests: Quality, Descriptive & Preference

GENERAL QUALITY SCORE (1–9 scale)



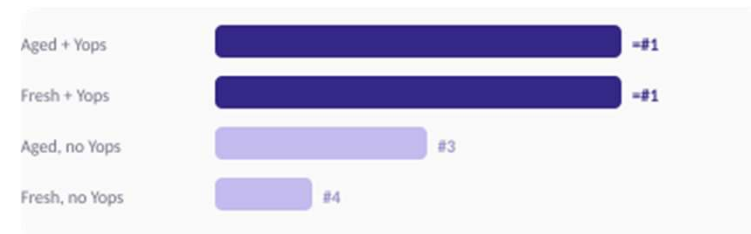
Note: difference not statistically significant ($p=0.099$)

HOP AROMA SCORE ($p<0.001$ — highly significant)



Oxidation score: No Yops aged = 2.3 → Yops aged = 1.8 (lower = better)

PANEL PREFERENCE (1=most preferred)



Aged beer + Yops ranked #1. Force-aged Yops beer outperformed aged beer without Yops — oxidation notes masked by hop aroma.

KEY CLAIMS (VLB, Feb 2024)

- ✓ Yops significantly increases hop aroma complexity (floral, citric, rose) — $p<0.001$
- ✓ Yops significantly increases odour intensity — $p<0.01$
- ✓ Aged beer + Yops preferred #1 by panel — oxidation notes masked
- ✓ Quality maintained through force-ageing (both samples robust at 40°C)

Pasteurise your NA beer. Yops will still perform.



OBJECTIVE

Assess Yops stability during pasteurization and its ability to preserve beer aroma in a non-alcoholic lager.



METHOD

- Beer type: Non-alcoholic Lager
- Two versions: with Yops vs. without Yops
- Both pasteurized under identical conditions
- Sensory: aroma, complexity, quality & preference
- Panel: VLB Berlin trained sensory panel

SENSORY OUTCOMES (VLB Panel)

- ✓ **Heat stable:** Yops remains stable and effective after pasteurization
- ✓ **Better aroma:** Pasteurized beer with Yops scored significantly higher in general quality
- ✓ **Better complexity:** Higher scores for overall complexity floral and citrus hop characteristics
- ✓ **Panel preferred:** VLB panel scored pasteurized NA beer with Yops higher than without



The literature tells the same story - Terpenes remain stable during pasteurization.

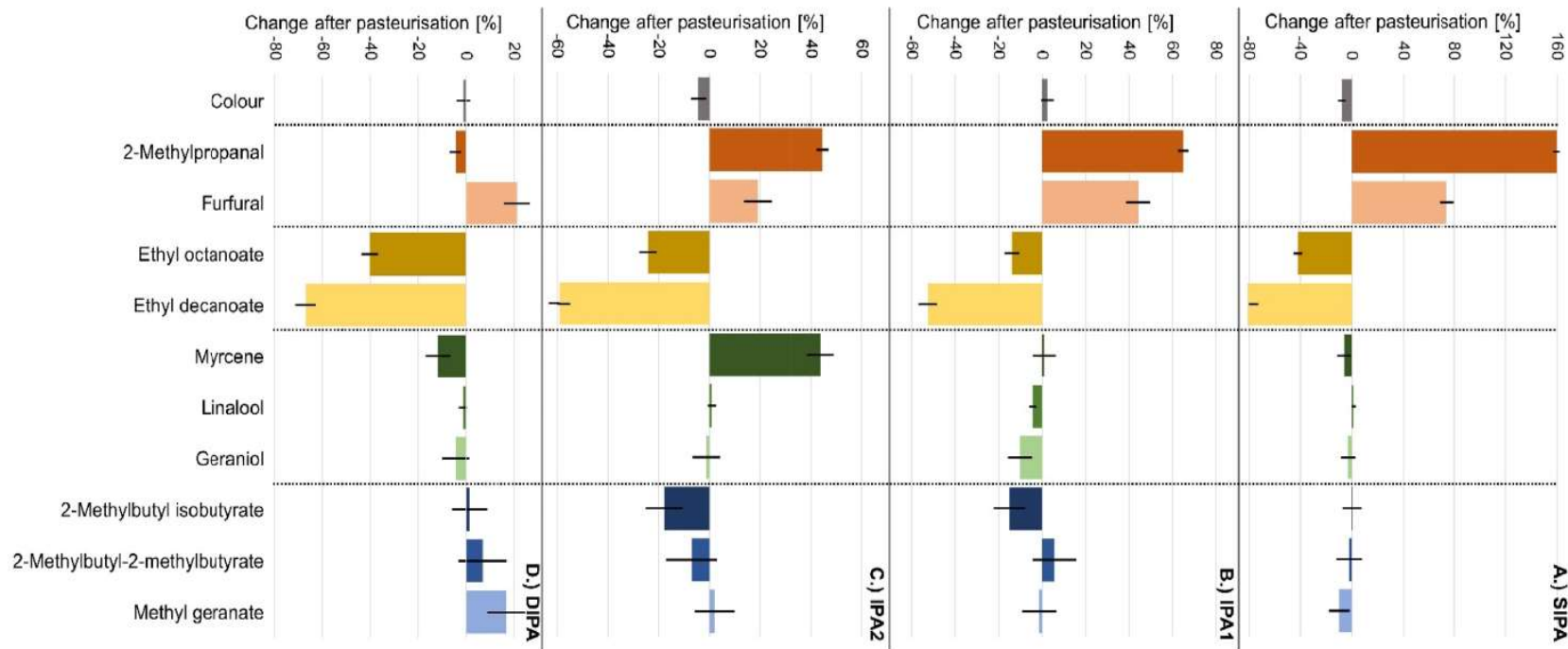


Figure 2. Changes (% - calculated from difference in concentration in the unpasteurised fresh product and the concentration after pasteurisation) of selected analytes in relevant aroma compound classes (staling aldehydes – orange, ethyl esters – yellow, terpene/terpenoids – green, hop related esters – blue) after pasteurization.

Christian Schubert, Scott Lafontaine, Sarah Thörner & Nils Rettberg (2024) Impact of Pasteurisation on Terpenes, Terpenoids, Aldehydes and Esters in Hoppy Ales on Ageing, Journal of the American Society of Brewing Chemists, 82:4, 443-458, DOI: 10.1080/03610470.2024.2379636



THIRD-PARTY SCIENCE

Life Cycle Assessment Study

More environmentally friendly



83%

less CO2 emissions



84%

less energy used



86%

less water use



94%

less land use

vs. traditional aroma hops



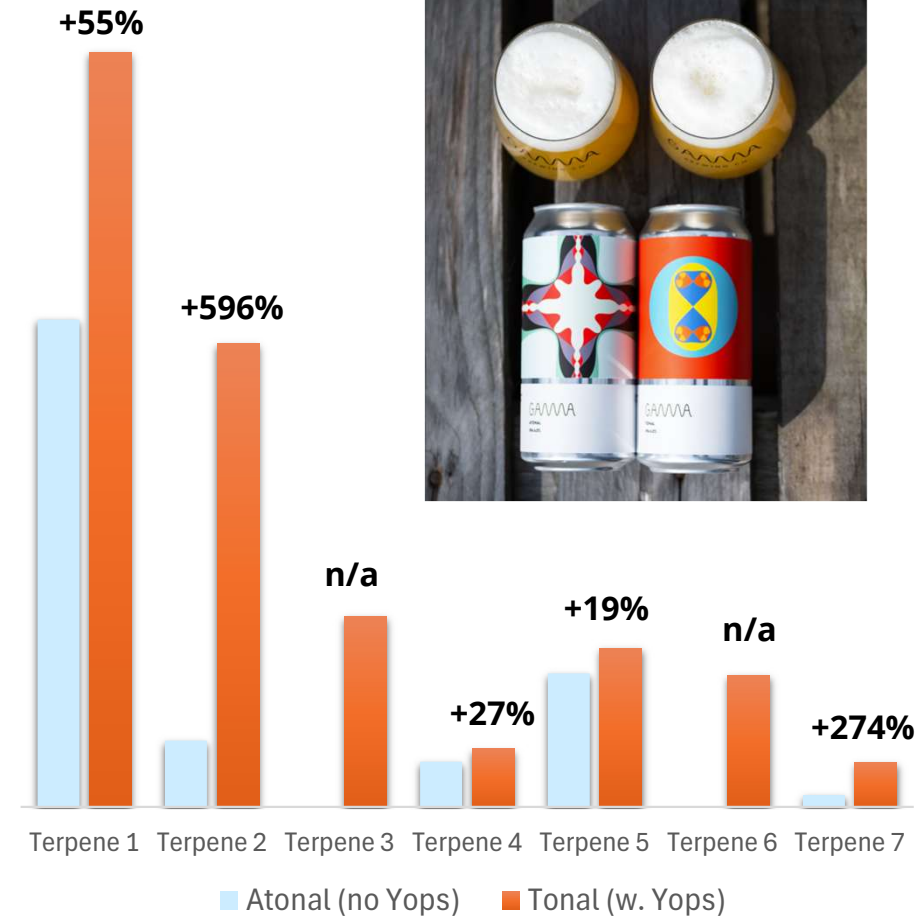
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Comparative Life Cycle Assessment on Yops™, prepared for EvodiaBio ApS by the Danish Technological Institute, Feb 2024. Third-party reviewed according to ISO 14044

Case Study: Yops used as flavor booster for a bold, hop-forward 6% IPA



- **Brewery:** Gamma Brewing (Denmark)
- **Brewer's goal:** To boost hop flavor and aroma.
- **Result:** Adding Yops in BBT increased key terpene content by +142% vs. the same hop-only recipe, without increasing beer loss.
- **Process info:** 2 different beers from 1 beer base
 - "Atonal" beer: Lallemand Verdant yeast. Whirlpool addition of Mosaic. Enigma dry hop.
 - "Tonal" beer: base beer as above plus a mix of 4 Yops added into brite beer tank at 1g/L for a quick twist of the original recipe.
- **Beer:** Tonal - 6% ABV. Bold, punchy, hop-forward IPA. Mango and passionfruit flavors with a tangerine finish.
- **Brewer's quote:** *"Loved the extra kick of hop flavor and the boost in aroma that Yops brought to the final product!"*



Source: Gas Chromatography-Mass Spectrometry analysis

Yops® helps make award-winning beer

- Denmark's Best Non-Alcoholic beer is brewed with Yops



Awarded at the Danish Championship in Alcohol-Free Beer May 2025, with 58 beers from 29 breweries. Judged by experts and the public, Y was praised as 'drinkable' and 'a beer for the people.'

*"Brewing a great non-alcoholic beer is all about capturing that elusive 'beeriness,' and Yops has truly helped us get there. The **result is significantly better** – it feels **more like a traditional beer, with a fuller structure and much better mouthfeel**. Even with minimal hops, the beer has more body and complexity, almost like a 3.5-4% beer. **It's been a game changer for us!**" Jack Delaney, Brewmaster, ÅBEN*



PRESS coverage: [Berlingske](#) [TV2](#) [DR](#) [BT](#) [Avisen Danmark](#) [TV SYD](#)

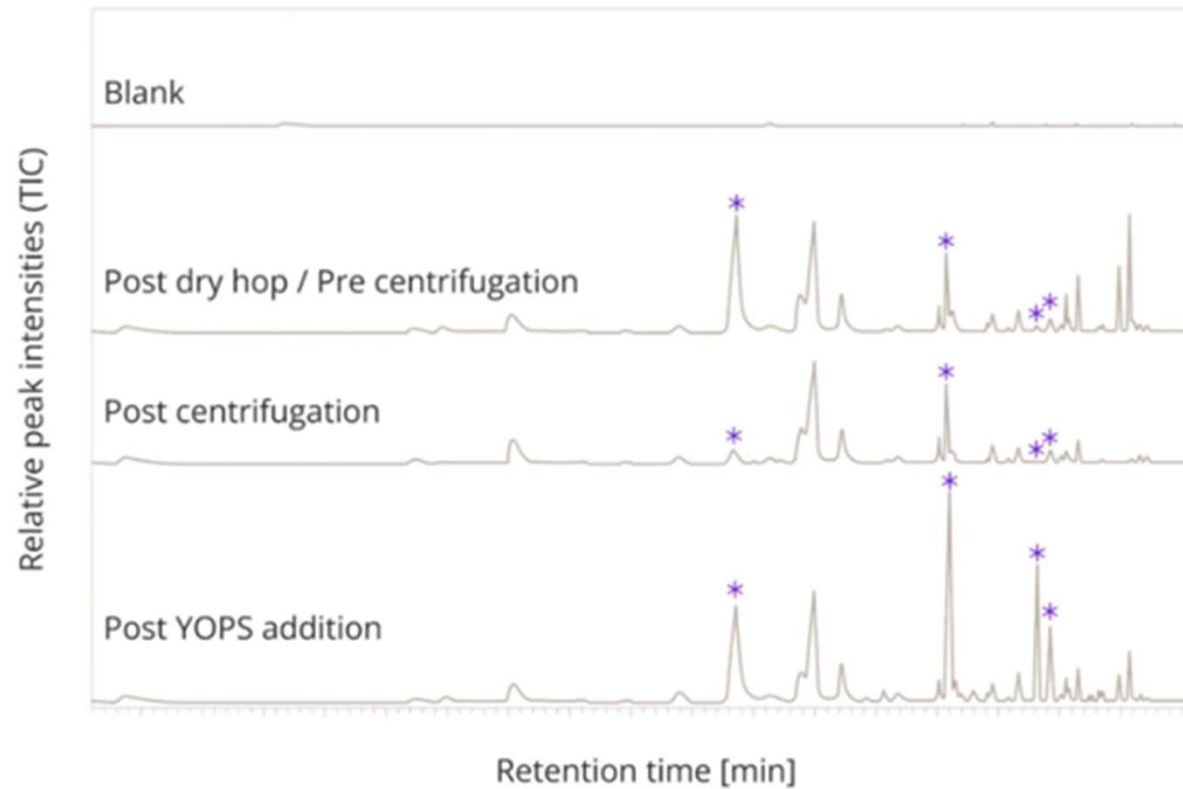
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Recovering lost hop terpenes through processing with Yops



Gas Chromatogram Analysis

* = Key Hop terpenes



Source: Gas Chromatography-Mass Spectrometry analysis

What brewers say about Yops®



- Trusted by brewers across Europe and North America - from craft pioneers to top global players.

"Absolutely the best hop product I have ever tried."

GRANS BRYGGERI



"Probably **the best non-alcoholic beer I have ever tried!**"

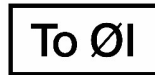
(About a beer brewed with Yops)

SAPPORO-STONE BREWING



"Yops brought the **extra layer of flavor** we were aiming for & added a depth of character to the beer that **really enhances the drinking**"

TO ØL



"Yops is unique. I can't compare it to anything"

IS/WAS BREWING



"Your aroma blends can **really improve the aroma** of non-alcoholic beers"

DAMM BREWERY



"Yops **reduced our beer loss**. interesting tool for all brewers to investigate"

MIKKELLER



"Yops clearly boosted the desired aroma!"

SKOVLYST BRYGGERI



I'm convinced Yops can **truly innovate** the NoLo category. It's like the **5th element for brewers**, bringing natural aroma and flavor to a **whole new level**

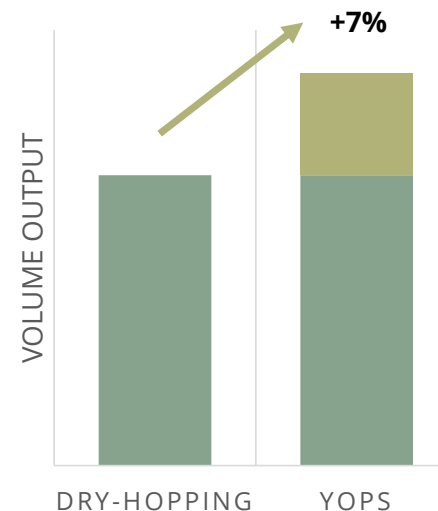
TEEDAWN



Case Study: Boosting efficiency with 100% dry hop replacement - 7% yield improvement



- **Brewery:** Vertiga (Italy)
- **Brewer's goal:** To achieve a fruity and aromatic NA beer without cold-side hopping
- **Result:** 7% production volume increase on 20hL
- **Process info:** Dosed 0.25ml Yops/L into transfer flow. 2 Yops flavors were used. Used hot-side hopping; no other flavoring ingredients added.
- **Beer:** "Bali", session IPA 4.1%. Golden yellow color and a persistent white foam. Notes of ripe yellow-fleshed fruit, passion fruit, mango, tangerine, pineapple on the nose. Light, soft and fruity taste.
- **Brewer's quote:** «By using Yops™ we were able to increase our production by 7% compared to cold-side dry-hopping, achieving a more explosive and defined sensory profile, with the citric and floral markers clearly evident but at the same time well-blended with the beer.»



A photograph of two men in a brewery. The man in the foreground, wearing a black jacket with a 'VERTIGA' logo, is adjusting a piece of stainless steel machinery. The man in the background, wearing a grey hoodie, is looking on. The scene is lit with a purple and blue hue. A large white quotation mark is on the left side of the image.

We increased our yield by 7% vs. dry-hopping, achieving a more explosive and defined profile.

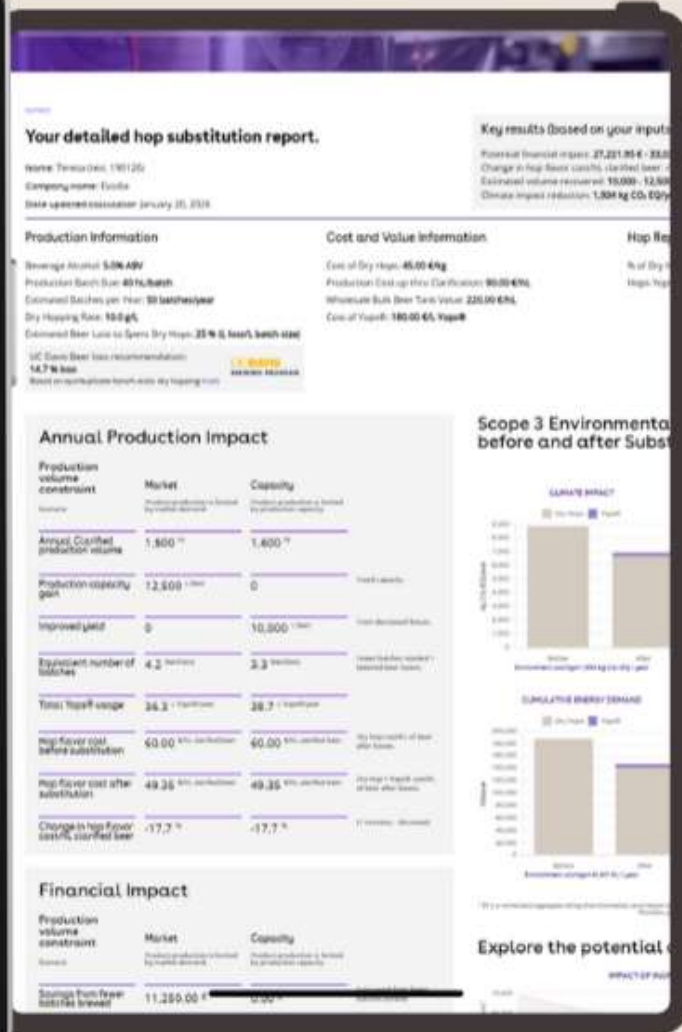
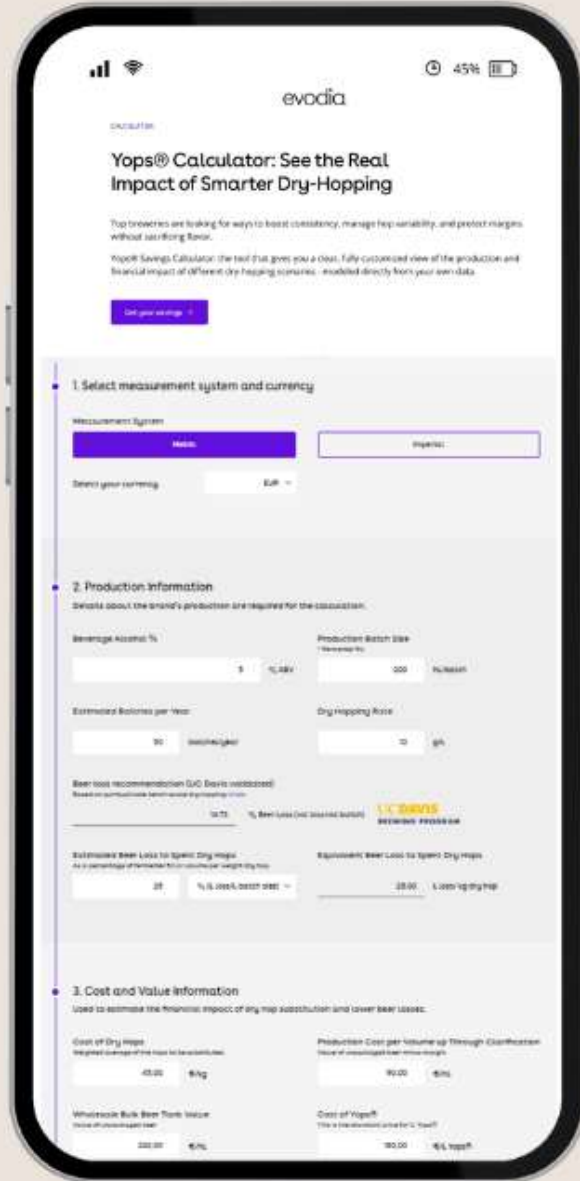
—Claudio Turcato, Head Brewery at Vertiga.



Calculate your savings

With the **Yops® Savings Calculator**

TC1 Teresa: change pictures covers
Teresa Canive; 2026-01-24T18:22:50.251



Yops® Savings Calculator

Each brewery can calculate their savings by partly replace hops with Yops®. Documented through commercial brews and beer study with UC Davis.



Significant Economic and Environmental Impact



Annual Financial Impact

Production volume constraint

Capacity

Product production is limited by production capacity.

Scenario

Savings from fewer batches brewed

0,00 €

Cost saved from fewer batches brewed

Wholesale value of increased volume output

90.000,00 €

Potential value of higher production yield (more beer/batch)

Savings from fewer hops used

57.500,00 €

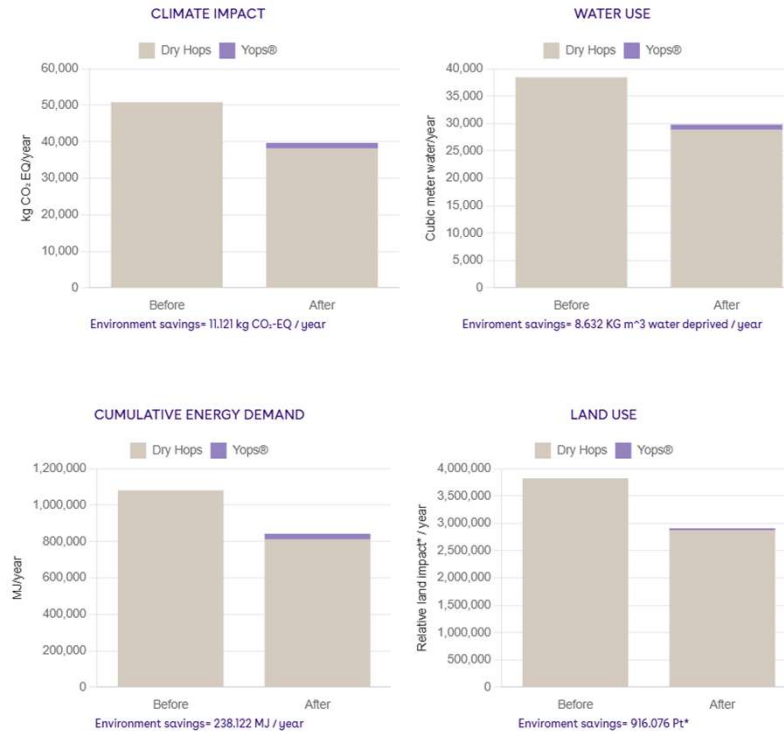
Total cost of Yops®

-40.038,68 €

Potential financial impact (+Gain, -Loss)

107.461,32 €

Scope 3 Environmental impact of hop flavor before and after Substitution⁽²⁾



THE ECONOMICS

Yops® is price competitive and saves you beer on top



€5-50 / hL



Aroma Hops

€2-40 / hL



Hop Oils

€3-15 / hL



Yops®

Cost in use · € per hL of beer

The real calculation: Yops eliminates beer loss (up to 30% with dry hopping), reduces processing time, and removes hop contract risk. For many breweries, the full economic case is even stronger.

ABOUT EVODIADIO BIO

The only company in the world doing this.



Breakthrough innovation

The first company in the world to bioindustrially produce monoterpenes from yeast using a patented technology



Patented technology - located in Denmark

The beer aroma technology platform is patent protected. Own production site, labs, and offices in Denmark



From Lab to market in 3.5 years

From R&D to full-scale industrial production - faster than anyone in the industry.



Strong board — incl. former Chairman of Carlsberg Group

Jarne Elleholm · Anne Cabotin · Flemming Besenbacher (fmr. Chairman, Carlsberg) · Andreas Fibig (fmr. CEO, IFF) · Johan Bitsch Nielsen · Kyle Teamey



Today's Presenters



Camilla K. Fenneberg
CEO

Leads strategy, partnerships, and global commercial growth at EvodiaBio. Also serves in board roles across biosolutions and the flavour industry. Background in start-ups and large life science companies, with a focus on bringing new innovations to market.



Bede Ireland
Sales Manager

Works with breweries and partners across commercial development at EvodiaBio. Previously held sales, marketing, and business development roles at Philter Brewing, Six String Brewing, and Lord Nelson Brewery Hotel.

From lab to leading breweries – Yops in action



Yops available in



KEY FACTS

100+

commercial brews

8

active Top-40 brewery projects

3.5

years from R&D to industrial production

6

standard aroma profiles + custom blend



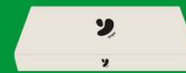
Yops® is now here in Brazil



Available through our partner **Agrária**.

For regular beer, NAB, and everything in between.

You don't need to wait.



**Request a Trial
Kit**

Small batch testing
in your brewery



Talk to us today

Find us at
the Agrária stand



**Savings
Calculator**

Personalised ROI
for your brewery



evodiabio.com

Films, cases,
technical guides

evodia

Now let's taste it.

01 Aroma Enhancement



A commercial beer
without Yops



A commercial beer
With Yops® added

*Notice: aroma lift · mouthfeel improvement
off-flavour masking · freshness*

02 Award winning Non-Alc beer



Denmark's #1 award-winning non-alcoholic IPA.
0.5% ABV. Brewed with Yops.

*Ask yourself: does this taste like a
'non-alc' beer to you?*

evodia



THANK YOU

Bede Ireland
Sales Manager
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Camilla K. Fenneberg
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cf@evodiabio.com

