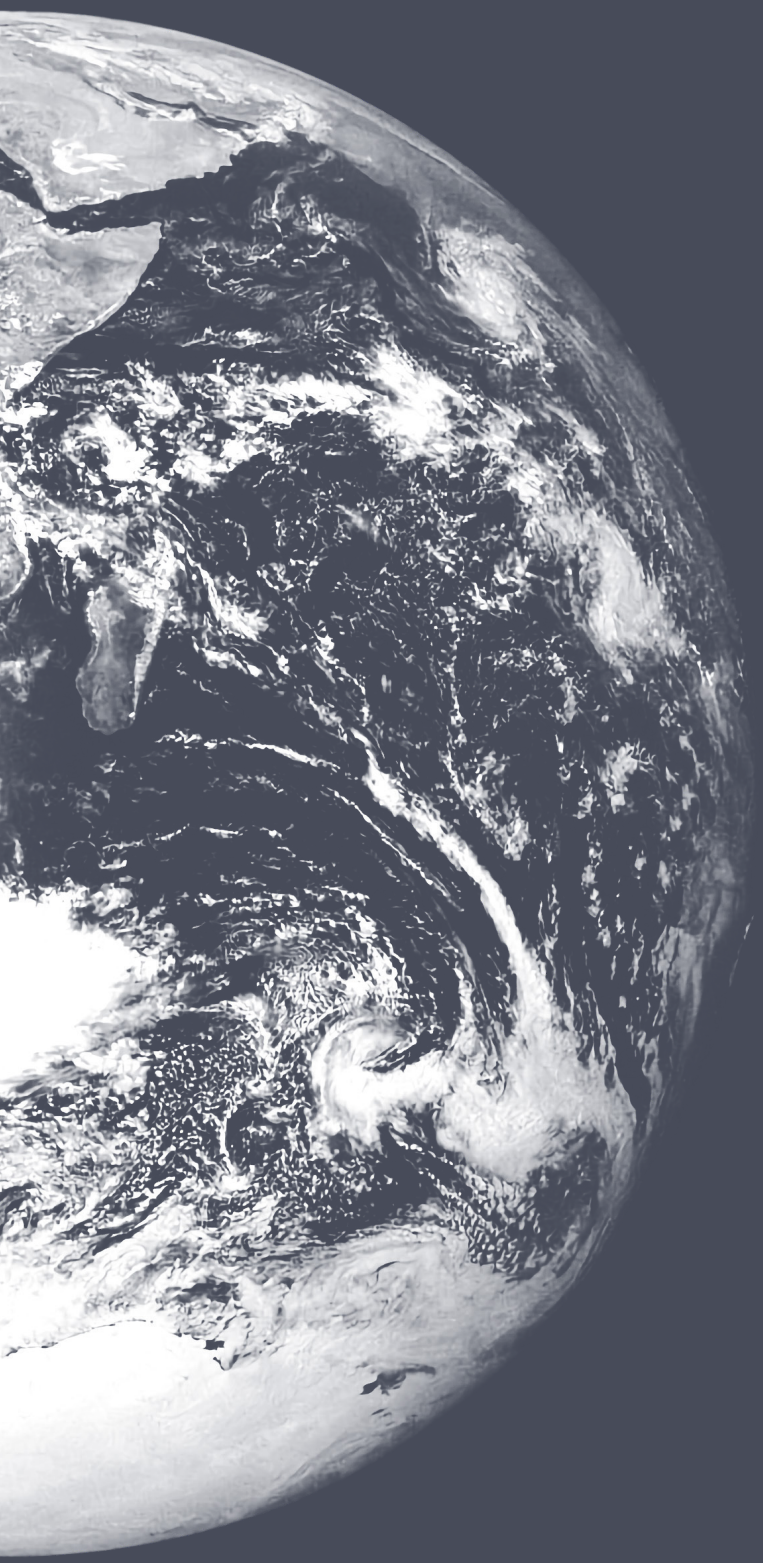
Book of Innovation

AN OMEGA YEAST CATALOG

VOLUME 01

SPRING 25



Welcome to the Book of Innovation.

Access to tools.

Innovation is the process of creating value by applying novel solutions to meaningful problems.

At Omega Yeast, we believe something is innovative if it passes three specific tests.

Does it shake up what's been established?

If not, it's probably more of a permutation than an innovation, and that's just moving stuff around without necessarily moving forward.

Does it solve a meaningful problem?

If not, maybe it's art instead of innovation. That's not to say art isn't valuable, but it's generally not designed to solve a problem. To us, innovation is.

Does it create value?

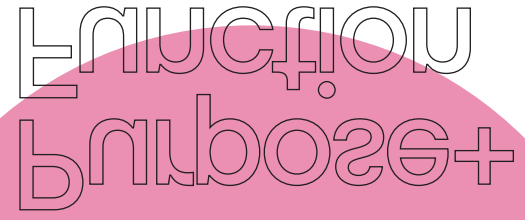
If not, maybe it's an invention rather than innovation. Inventions can create value, but usually not until someone applies them through innovation.

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Contents



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Purpose+ Function

Think of this book as a way to evaluate and access ingredients and technology. A reference to see new things that could work for you. Omega Yeast's Book of Innovation can show brewers what's worth getting and where to get it.

Items in this book are:
- Useful as a tool
- Relevant to independent education
- Of high quality and peak freshness
- Easily available within one week lead time
- Accessible year round, without limits

Innovation addresses unmet needs in novel ways. When embraced, it empowers the individual to educate themselves, find their own inspiration, shape their own environment, and share their adventure.

The Book of Innovation is designed to spark discussion and provide resources to those who want to push things forward.

To order or discuss any of the tools mentioned, email orders@omegayeast.com for a cadre of brewers, microbiologists, and TTB-certified chemists.



Access to Tools

Omega Yeast's toolkit of innovative yeast strains is divided into two series, PLUS and NEXT, based on their application. Each tool in these series is an innovative, proprietary technology that allows us to create better yeast strains to address industrywide pain points and unlock new experiences. To understand these strains, it's important to know the tools that make them unique.

To navigate, look for the pills.

DKO LUMINA POF- STA- THIOLIZED ZING

PLUS Series

Sharpened tools for optimized brewing. Streamline efficiency and quality.

Consider these innovative house strains to make fermentation easier. The enhanced capabilities of the PLUS strains allow you to achieve your desired flavor and aromatic specs more efficiently without making other recipe adjustments.

- Cut costs and unnecessary steps
- Streamline cellar efficiency
- Block lingering, unwanted quality issues at the source
- Improve tank times

NEXT Series

New tools for innovative brewing. Unlock flavor and aromatic potential.

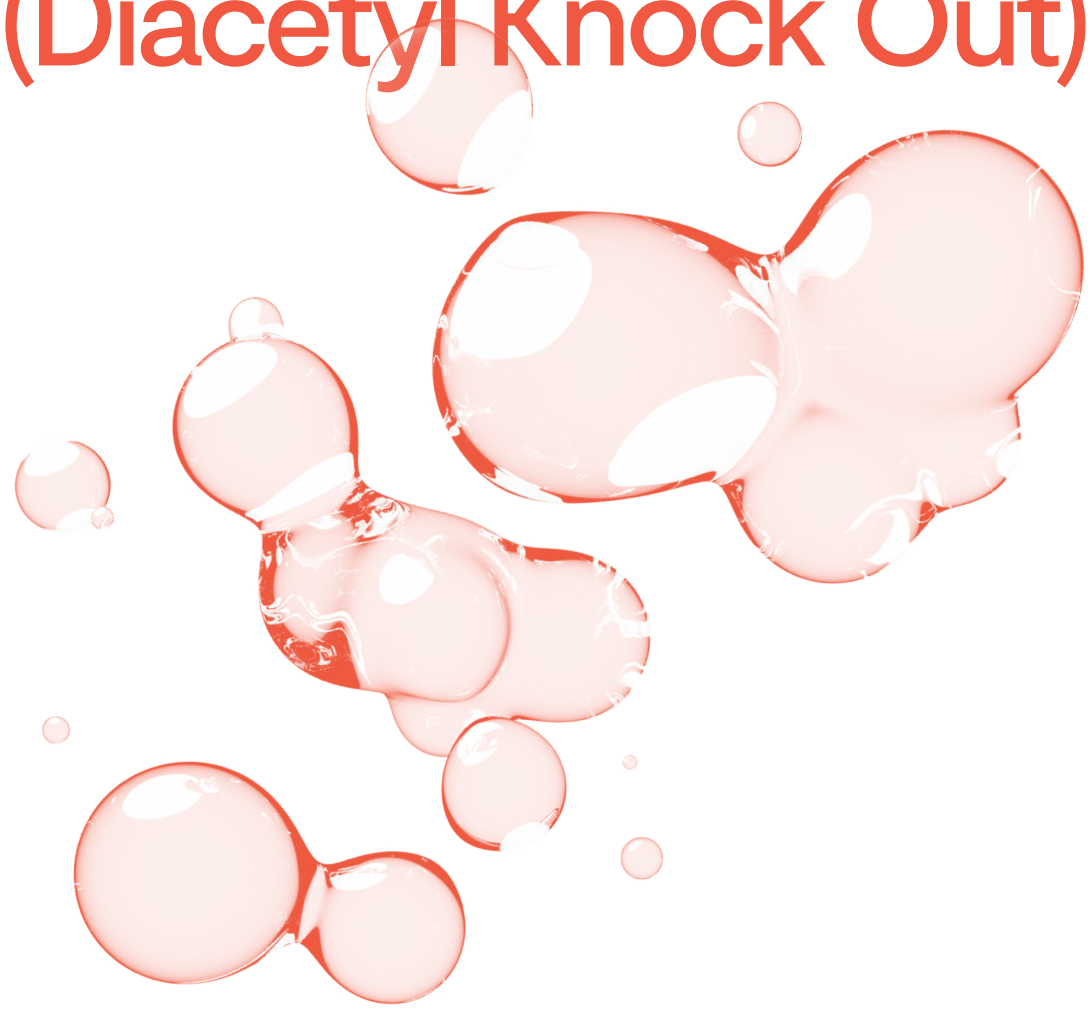
The number one question we get asked is “What’s next?”. That simple prompt became our driver to seek out new sensory experiences through the NEXT series. These strains help you explore novel flavors and aromatics to push ideas forward. Harness our R&D to bend the lines of classic styles, expressive IPAs, or even discover something wholly new.

- Unlock tropical potential with Thiolized
- Unmask hidden ester potential with POF-
- Tap into tangy tartness with Zing
- Re-juice West Coast IPAs

(Diacetyl Knock Out)
DKO

DKO LUMINA POF- STA- THIOLIZED ZING

DKO
(Diacetyl Knock Out)



[Function]

Expresses the ALDC enzyme to block diacetyl production.

The yeast makes its own ALDC enzyme, which cuts costs, speeds up tank times, and eliminates the hassle of adding ALDC enzyme during fermentation. And for the hop lovers out there, diacetyl from hop creep is no longer a concern. This tech is an easy step to modernizing your brewing practices.

Lumina

[Function]

Removes the *HZY1* gene responsible for yeast-derived haze.



Lumina helps eliminate haze in both PLUS and NEXT strains. With Lumina strains, you can approach modern bright styles with a clear pathway and no surprises from yeast-derived haze. Breathe easy and achieve lager-like clarity.

For PLUS application: You address lingering, unwanted haze directly. Bright to brighter. For strains with Lumina and DKO technology, see West Coast I+ and Point Loma+ on page 25.

For NEXT application: All the hazy, tropical desirables but with a crystal clear new look–West Coast IPA, you say? See DayBreak-V on page 34.

bOt-

POF-



[Function]

Breaks the gene that creates phenolics — aromas of clove and pepper.

POF- technology removes the phenolic gene from traditional Continental yeast strains, which eliminates the aromas of clove in finished beer. Sidelining spicy phenolics allows fruity esters to move to the forefront and opens doors for these strains in a wider range of styles —see Bananza and Sundew.

Research has shown that the absence of phenolic character allowed both yeast esters and complementary hop characters to come forward in a new way, and yield beers that were more intensely fruity. Read more POF sensory on page 42.

DKO LUMINA POF- STA- THIOLIZED ZING

STA-

NEW

STA-



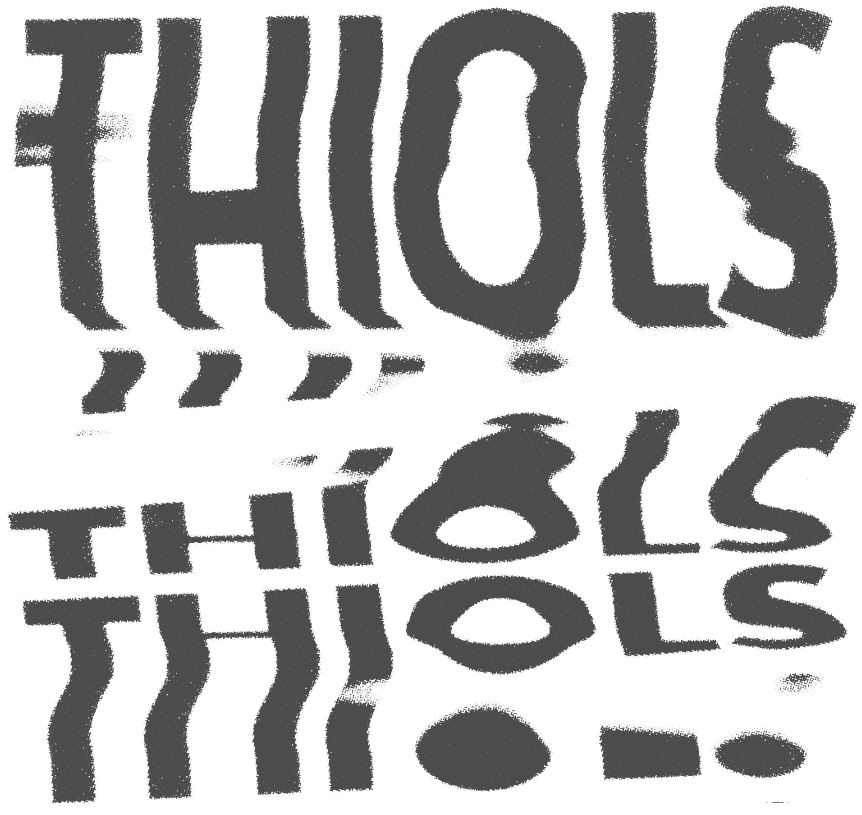
[Function]

Eliminates the *STA1* gene responsible for diastatic activity.

By removing the *STA1* gene, *diastaticus* is nipped at the source. Ease concerns about diastatic strains overattenuating or cross-contaminating other batches in your brewery. These strains won't attenuate as far as the parent strains but will still reach the desirable dryness of a highly attenuated ale or lager. Let's revisit the thirst-quenching saisons of old and explore new uses.

Thiolized

Thiolized



[Function]

Unlocks tropical thiol aromas in hops and malt.

This technology, deployed in certain NEXT series strains, unlocks bound thiols for a sensorial experience that traditional yeast alone can't provide. Imagine swimming in a lake of New Zealand Sauvignon Blanc along the coast of Marlborough—that's a bold, juicy proposition, no?

This aromatic and flavor potential has always been present in your ingredients—primarily base malt and hops rich in bound thiol precursors—they just weren't accessible. Our Thiolized strains can unlock that potential and elevate your IPAs and other bold beers to delicious new heights.

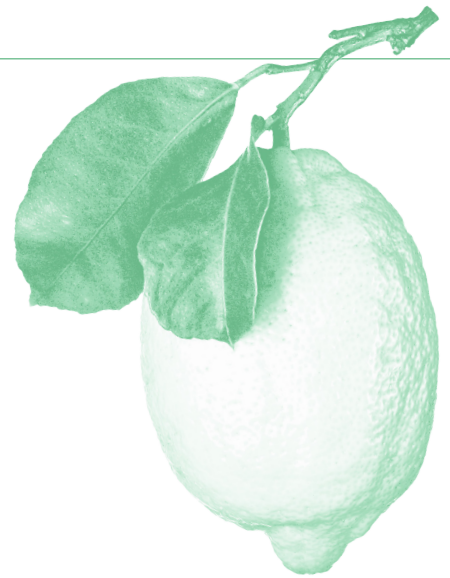
From a practical perspective, Thiolized yeast can also create a more efficient and economical path for your brewery. Adding the support of unlocked thiols to other hop characteristics means you have an opportunity to use fewer hops per batch without sacrificing on standout flavor and aroma. You can get more from less, increasing your yields while saving on other ingredients.

See page 36 for technical tips.



NEW

Zing



[Function]

Produces lactic acid without bacteria.

Produce pleasantly tart, expressive beer with clean, single-strain fermentations using Zing technology. This allows yeast to produce lactic acid during fermentation, with acidity proportional to starting gravity. Adjust your gravity to achieve a bright, clean acidic base without bacteria or kettle souring. Repitching is possible in some cases. Zing modernizes sour beer production.

PLUS Series

Sharpened tools for optimized brewing.

Brings optimal performance to familiar strains. With them, you can streamline cellar efficiency, mitigate risk, and produce reliably clean house beers without making other changes to your recipe. In essence, PLUS tools help you get to where you want to go in the best manner. When adopted, they can make your job a little easier and your beer a little better.

All PLUS strains are genetically stable and their benefits last throughout the lifecycle of the yeast across generations. Other fermentation characteristics are unchanged from the parent strains.

The following technologies are utilized in the PLUS Series. Look for the pills.

DKO LUMINA STA-

OYL-434

Point Loma+

DKO LUMINA

More West Coast clarity
This neutral, versatile, and flocculant strain excels as a house strain candidate by addressing cellar hangups directly. Think of it as a Super West Coast strain—quick fermenter producing dry beers, especially if you're looking for slightly higher perceived bitterness. DKO and Lumina make this strain ideal for the production of a variety of styles, particularly heavy clean IPA producers.

STRAIN TYPE
Ales

FLOCCULATION
Medium–High

ATTENUATION
76–83%

TEMPERATURE RANGE
65–68° F (18–20° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
11% ABV

PARENT STRAIN
Point Loma (OYL-043)

OYL-430

West Coast I+

DKO LUMINA

The updated classic
"Chico" in its best form. This workhorse utilizes DKO and Lumina Technologies, which gives you clean, crystal-clear beer without lingering diacetyl or haze. Well attenuative and moderately flocculating, with crisp, citrus notes when fermented under 66°F (19°C).

Application
Famous for hop accentuation and history of fermenting the world class IPAs and pale ales that built the industry.

STRAIN TYPE
Ales

FLOCCULATION
Medium–Low

ATTENUATION
73–80%

TEMPERATURE RANGE
60–73° F (16–23° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
11% ABV

PARENT STRAIN
West Coast Ale I (OYL-004)

OYL-436

DIPA+

DKO

The souped up historic IPA strain
A strong fermenter popularly referred to as “Conan.” Its peach, apricot, and pineapple notes are a natural boost for hops, complementing modern tropical profiles in particular. Our reliable DIPA yeast but without the worry of diacetyl spikes during hop creep.

Application
IPAs with distinct peachy, stone fruit foundation. Blast it with New World hops. Savvy customers blend DIPA+/British V + for best of both worlds.

STRAIN TYPE
Ales

FLOCCULATION
High

ATTENUATION
71–75%

TEMPERATURE RANGE
64–74° F (18–23° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
10% ABV

PARENT STRAIN
DIPA Ale (OYL-052)

OYL-437

German Lager I+

DKO

The world’s most popular lager strain, improved
Sports a versatile malty profile with light esters at a wide fermentation range. Maintain a more crisp profile by fermenting low or bring out slightly heightened esters at warmer temps (65–68°F). Avoid any hints of diacetyl and up your lager game.

STRAIN TYPE
Lagers

FLOCCULATION
Medium–Low

ATTENUATION
73–77%

TEMPERATURE RANGE
45–68° F (7–20° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
9% ABV

PARENT STRAIN
German Lager I (OYL-106)

OYL-431

British V+

DKO

The modern hazemaker
The ALDC-expressing gold standard for hazies. Reliably hazy with juiciness that boosts hop character with some residual sweetness. The hallmark of any modern, hazy IPA. This version alleviates diacetyl formation from Hop Creep with DKO. Heavily hopped, packaged IPAs made with peace of mind.

Application
Any hazy IPA really.

STRAIN TYPE
Ales

FLOCCULATION
High

ATTENUATION
73–80%

TEMPERATURE RANGE
60–73° F (16–23° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
11% ABV

PARENT STRAIN
British Ale V (OYL-011)

OYL-433

Bayern Lager+

DKO

Enhanced Bavarian efficiency
An all-purpose lager strain known for its traditional clean, crisp character, paired with a distinct malty sweetness. The famous profile lays the groundwork for traditional lagers such as helles, keller biers, and pilsners. DKO allows this version to express the ALDC enzyme so you can get to lagering, faster. A modern classic.

This strain was integral in flooding the beer gardens and beer halls of Munich’s oldest independent brewery.

STRAIN TYPE
Lagers

FLOCCULATION
Medium

ATTENUATION
72–76%

TEMPERATURE RANGE
51–62° F (11–17° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
9% ABV

PARENT STRAIN
Bayern Lager (OYL-114)

OYL-435

Kolsch II+

DKO

A bright alternative
A lager-like ale strain that's lightly fruity, crisp, and clean with a hint of sulfur that quickly disappears with aging. Kolsch II + accentuates hop flavors with a bright, clear presentation while keeping diacetyl out of the picture. It's snappy, hop-forward, and clean, which makes it a bright alternative in IPAs or pale ales.

STRAIN TYPE
Ales

FLOCCULATION
Medium–Low

ATTENUATION
72–78%

TEMPERATURE RANGE
60–73° F (16–23° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
10% ABV

PARENT STRAIN
Kolsch II (OYL-044)

OYL-438

French Saison+

STA-

C'est délicieux
A citrusy, phenolic farmhouse strain without the *STA1* gene's cross-contamination risk or hyperattenuation. Delivers classic lemon, pear, and pepper notes with attenuation comparable to high-performing lager strains. For an extra dry finish, mash in the β-amylase range or add enzymes to boost wort fermentability.

Application
This is a great excuse to revisit saisons.

STRAIN TYPE
Belgian Ales

FLOCCULATION
Low

ATTENUATION
70–80%

TEMPERATURE RANGE
65–77° F (18–25° C)

DIASTATIC
Yes

PHENOLIC
Yes

ALCOHOL TOLERANCE
12% ABV

PARENT STRAIN
French Saison (OYL-026)

OYL-432

Extra Special+

DKO

Extra, extra special
A popular choice to create IPAs and classic English styles full of nuanced character. Drops remarkably clear, leaving behind only nuanced esters with a dash of residual sweetness. It's a sneaky good house strain that's easy to crop and acts as a powerful foundation for hop and malt expression.

Application
It's a truly classic ESB strain that adds a unique, distinct fruitiness when fermented on the higher end of recommended temperature ceiling. This same reason makes it ideal for nuanced IPAs and modern styles. Also, a ridiculously good flocculator.

STRAIN TYPE
Ales

FLOCCULATION
Very High

ATTENUATION
67–71%

TEMPERATURE RANGE
64–72° F (18–22° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
9% ABV

PARENT STRAIN
Extra Special (OYL-016)

Loading new strain.....

Stay tuned for more exciting strains coming soon.

NEXT Series

New tools for innovative brewing.

These new tools are bioengineered strains to give you access to novel flavor and aroma characteristics that were previously unreachable and push new ideas forward. On top of newly accessible sensory qualities, there are new tricks to tailor their expression to your liking. Harness our R&D to bend the lines of classic styles, create more vibrant IPAs, or even discover something wholly new.

All NEXT strains are genetically stable and their benefits last throughout the lifecycle of the yeast across generations. Other fermentation characteristics remains unchanged from the parent strains.

The following technologies are utilized in the NEXT Series. Look for the pills.

DKO · LUMINA · POF- · THIOLIZED · ZING

OYL-402

Cosmic Punch

THIOLIZED

The juicy, Thiolized house strain
Punchy, hazy, and vibrant. Cosmic Punch generates thiols through biotransformation, releasing tropical aromas experienced in Southern Hemisphere hops and New Zealand Sauvignon Blanc.

Expect Cosmic Punch to provide the same performance and haze you get from British Ale V, but with additional thiol aromas.

Application
Experiment with mash hopping or wine grape-derived products to push even more thiols.

STRAIN TYPE
Ales

FLOCCULATION
High

ATTENUATION
71–75%

TEMPERATURE RANGE
64–75° F (18–24° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
10% ABV

PARENT STRAIN
British Ale V (OYL-011)

OYL-405

Helio Gazer

THIOLIZED

Distinctive, thiol-forward hazy IPAs
Helio Gazer starts where Cosmic Punch left off and boosts thiol biotransformation to free thiols 200x above the sensory threshold, pushing guava and New Zealand Sauvignon Blanc aromas. Designed for wildly robust IPAs and other juicy expressions.

Expect Helio Gazer to provide the same performance and haze you get from British Ale V, but with additional thiol aromas.

Application
No mash hopping or wine-grape products required, think of this as an amped up Cosmic Punch.

STRAIN TYPE
Ales

FLOCCULATION
High

ATTENUATION
71–75%

TEMPERATURE RANGE
64–74° F (18–23° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
10% ABV

PARENT STRAIN
British Ale V (OYL-011)

OYL-404

Star Party

THIOLIZED

Thiols head west
A Thiolized version of the beloved Chico strain. Star Party™ is a thiol burst with aromas of passion fruit, dank pink guava, and citrus zest. Expect the same clean fermentation profile and clarity as its parental strain, Chico, but with a big burst of thiols that's perfect for juicing up a West Coast IPA.

Expect the same performance and clarity you get from West Coast I, but with additional thiol aromas.

Application
Modern West Coast IPAs are top of mind.

STRAIN TYPE
Ales

FLOCCULATION
Medium–Low

ATTENUATION
73–80%

TEMPERATURE RANGE
60–73° F (16–23° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
11% ABV

PARENT STRAIN
West Coast Ale I (OYL-004)

OYL-407

Vossa Nova

DKO THIOLIZED

Citrusy tang, now with thiols
Vossa Nova is a Thiolized version of Voss Kveik, known for reliable haze and tangy citrus notes. Our only kveik in the Thiolized series allows for a broad temperature range and the ability to adjust the fermentation speed to your liking.

Expect the same performance and haze you get from Voss Kveik, but with additional thiol aromas.

Application
Fermenting on the hotter side blows off thiols during fermentation. Think of your temperature controller as a thiol dial and adjust accordingly.

STRAIN TYPE
Kveiks

FLOCCULATION
Medium

ATTENUATION
75–82%

TEMPERATURE RANGE
68–95° F (20–35° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
12% ABV

PARENT STRAIN
Voss Kveik (OYL-061)

OYL-403

Lunar Crush

THIOLIZED

Thiolized lager strain for Cold IPAs
This isn't your typical lager yeast. Lunar Crush is the perfect companion for complex, hop-forward styles or even creating something entirely new by simplifying your recipe for the boldest thiol expression. Designed with Cold IPAs in mind, unlock passion fruit, guava, and New Zealand Sauvignon Blanc fruitiness to pair with the lager "pop" we're all familiar with.

Expect the same performance and clarity you get from Mexican Lager but with additional thiol aromas.

STRAIN TYPE
Lagers

FLOCCULATION
Medium

ATTENUATION
70–78%

TEMPERATURE RANGE
50–65° F (10–18° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
9% ABV

PARENT STRAIN
Mexican Lager (OYL-113)

OYL-406

Little DIPA

DKO THIOLIZED

Little but Big
Little DIPA is a Thiolized version of the "Conan" strain widely used for New England IPAs and DIPAs. Little DIPA pairs its signature peach ring and apricot aromas with robust thiols to your hoppy beers a little boost. Expect no diacetyl production.

Expect the same performance you get from DIPA, but with additional thiol aromas.

STRAIN TYPE
Ales

FLOCCULATION
Medium–Low

ATTENUATION
72–80%

TEMPERATURE RANGE
65–72° F (18–22° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
11% ABV

PARENT STRAIN
DIPA Ale (OYL-052)

OYL-408

DayBreak-V

LUMINA

The haze has lifted
Distinctive transparency with hallmark juiciness. We bioengineered the gold standard for hazies, British Ale V, to develop maximum clarity while maintaining all of its fruit-boosting prowess. Your favorite hazy strain is now the clear answer for juicing up your West Coast IPA.

Expect the same performance of British Ale V, but with lager-like clarity

STRAIN TYPE
Ales

FLOCCULATION
High

ATTENUATION
73–80%

TEMPERATURE RANGE
64–74° F (18–23° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
10% ABV

PARENT STRAIN
British Ale V (OYL-011)

OYL-409

Tartango

ZING

Pair clean acidity with a tart, citrusy finish
Tartango leverages Zing technology to produce lactic acid during fermentation. Similar to alcohol production, the starting gravity dictates the resulting acidity level. This streamlined method eliminates the need for Lactobacillus or kettle souring, making it easier to perfect the acidity.

Application
- Re-pitching is possible if yeast is harvested as the beer reaches terminal gravity.
- Desired acidity can be achieved without blending yeast strains.
- Clean fermenting and fast, just like your traditional brewing strains.
- Adding fruit during fermentation boosts tartness.

STRAIN TYPE
Kveiks

FLOCCULATION
Medium

ATTENUATION
75–82%

TEMPERATURE RANGE
68–95° F (20–35° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
7% ABV

PARENT STRAIN
Voss Kveik (OYL-061)

OYL-400

Bananza

POF-

All bananas, no clove
Ripe banana esters with a hint of pear make this new creation a standout for pastry stouts, IPAs, and other modern ales. Unlike its parent Hefeweizen strain, Bananza is versatile because it is non-phenolic and therefore incapable of producing clove flavors that would mask its pure banana profile.

Application
For prime banana esters, pitch at 68°F (20°C) and let free rise to 72–75°F (22–24°C).

Not ready to swear off cloves all together? We blend for free. Some brewers choose a 90/10 blend with the parent strain to add a kiss of phenolics to their traditional hefeweizen.

STRAIN TYPE
Ales

FLOCCULATION
Low

ATTENUATION
73–77%

TEMPERATURE RANGE
64–75° F (18–24° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
10% ABV

PARENT STRAIN
Hefeweizen Ale I (OYL-021)

OYL-401

Sundew

POF-

It was fruity all along
Ripe strawberry, pear, and stone fruit combine to emphasize desirable notes in modern fruity hops. This strain was inspired by its parental strain's fruit esters, which were originally obscured by Belgian phenolic character. Sundew, however, is non-phenolic and incapable of producing the spicy clove flavors that were previously competing with its pure, juicy red fruit bouquet.

Application
You'd be surprised how well this strain plays with citrus, floral hops. Allows varietals like Citra and Mosaic to really pop.

STRAIN TYPE
Ales

FLOCCULATION
High

ATTENUATION
72–85%

TEMPERATURE RANGE
64–78° F (18–26° C)

DIASTATIC
No

PHENOLIC
No

ALCOHOL TOLERANCE
12% ABV

PARENT STRAIN
Belgian Ale A (OYL-024)

Unleashing Tropical Potential

Understand the power of Thiolized strains

Thiols are highly impactful aromatic compounds that can evoke intense tropical and citrus characters reminiscent of juicy passion fruit, dank pink guava, and freshly zested grapefruit peel.

The beautiful thing about Thiolized yeast strains is that they can produce a wide range of distinct beers with a *few changes to your recipe design*. Whether you want to whack people with the thiol hammer or just add a whiff of something unique, here are some recipe ideas to consider to dial in your thiol character.

Hops high in free thiols
Citra, Mosaic, Simcoe, and Nelson Sauvin.

Ingredients high in thiol precursors
Base malt, grape-derived products, and hops, like Citra, Motueka, Saaz, Cascade, Calypso, Hallertau Mittlefruh, and Perle to name a few.

Thiols play well with complementary aromas
Southern hemisphere hops have notes of gooseberry, peach, passionfruit, citrus, white wine and lime, while Pacific Northwest hops have notes of citrus, grapefruit, pineapple, blueberry, dank, mango, and stone fruit.

New Zealand hops in particular are prized in brewing for their high levels of free thiols and thiol precursors, contributing unique tropical and fruity aromas.

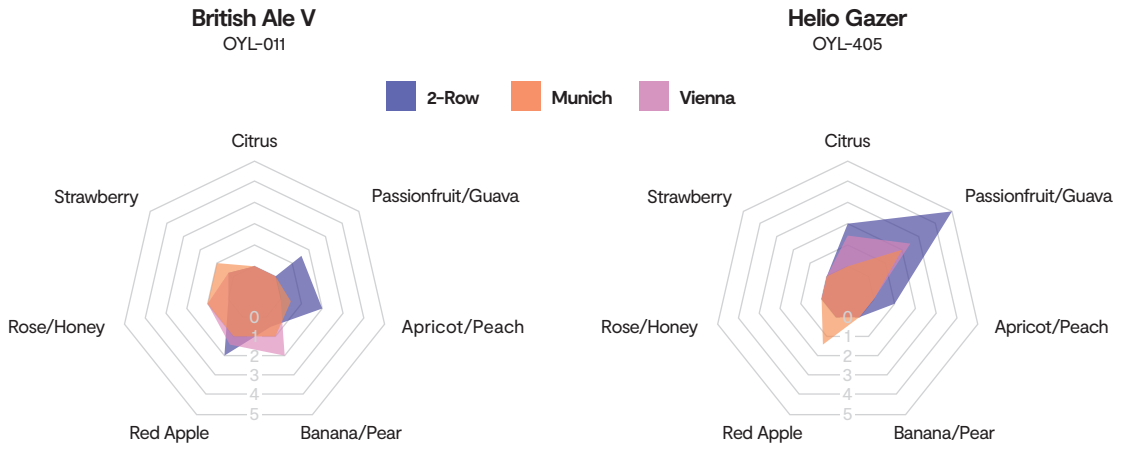
MAKE THIOL-DOMINANT BEER

- To emphasize a passion fruit aroma, pare down your recipe to a simplified grain bill with a majority barley base malt (wheat and oats have little, if any, thiol precursors).
- For a thiol precursor boost, try mash hopping with precursor-rich varieties like Cascade, Saaz, Calypso or Motueka. Adding hops so early in the brewing process may seem counterintuitive, but it turns out that using hops in the mash is an efficient way to add thiol precursors from hops, and get even more tropical aromas from Thiolized yeast.
- To avoid overpowering thiols with intense hop aromas, pull back on hopping rates in the whirlpool and dry hop.

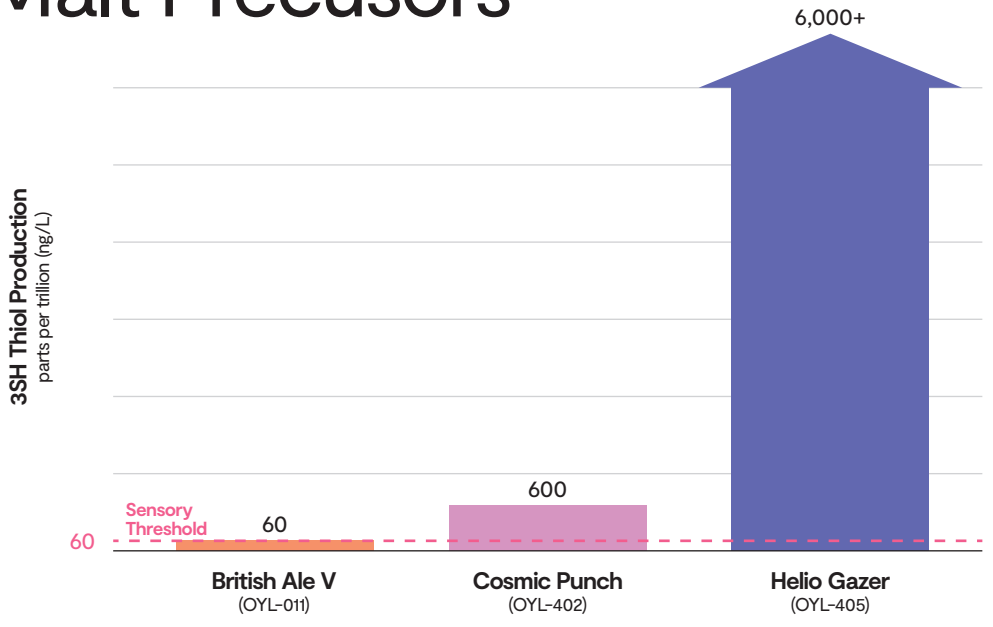
MAKE THIOL-COMPLEMENTARY BEER

- Thiols produced in fermentation can be balanced out with a heavier dry hop dose, leading to an intensely hoppy, thiol forward beer.
- Avoid adding extra thiol precursor via mash hopping or grape-derived products.
- Utilize adjuncts in the mash bill such as oats, wheat and/or rice since they have little, if any, thiol precursor.
- Blending Thiolized strains with the parent strain can be a great method for halving or even quartering thiol levels in the finished beer. This service is free.
- If you're looking for a hazy house strain, Cosmic Punch adds nuanced thiol profile that elevates hop character.

Malt Products and Thiol Sensory



Thiol Production from Malt Precusors



DKO vs Adding ALDC

DKO vs Adding ALDC

Easily avoiding diacetyl

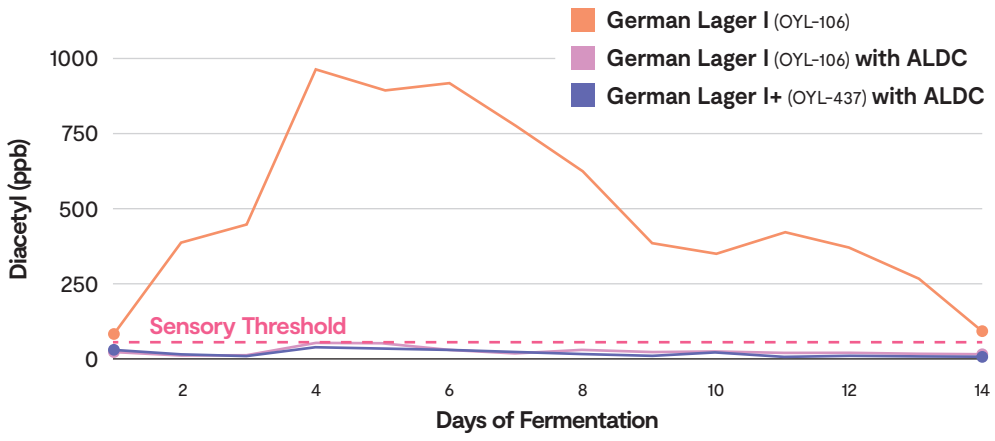
First things, first—what is ALDC?
ALDC (alpha-acetolactate decarboxylase) is an enzyme that breaks down alpha-acetolactate, the precursor for diacetyl. ALDC converts the precursor into a flavorless compound called acetoin. Many brewers use ALDC at the start of fermentation to help avoid the formation of diacetyl, which saves on tank time. However, ALDC is pH-sensitive and can be less effective as the pH level drops during fermentation (typically below 5), meaning that it might not be super helpful in the case of hop creep. ALDC is a proactive, rather than reactive, solution; it won't help you clean up diacetyl once it's already in the beer.

Why use PLUS strains with DKO as opposed to adding the enzyme?
When ALDC is expressed in the cell, it converts alpha-acetolactate to acetoin directly within the cell, therefore preventing alpha-acetolactate from building up and being excreted into the beer where it will turn into diacetyl.

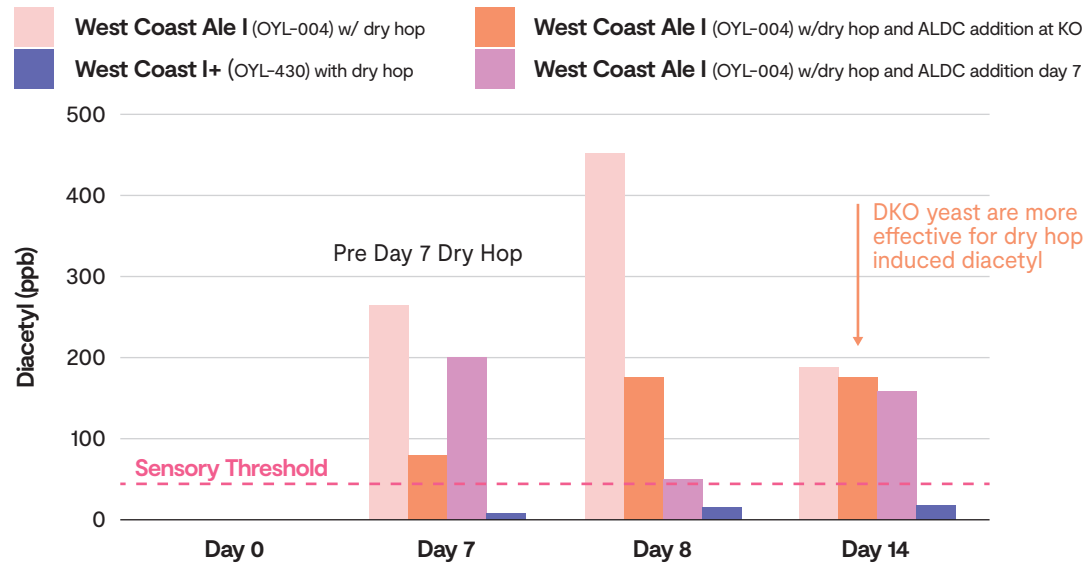
Another bonus to ALDC activity within the cell is that it will continue working even during later stages of fermentation, which can help prevent the diacetyl that forms during hop creep.

We see the DKO technology as an added layer of quality assurance with the bonus of time and cost savings. Even with great yeast management, having ALDC expressed in the cell increases efficiency in the brewery by potentially reducing tank time. By speeding up conditioning time, your beer can be turned around faster with more confidence that diacetyl won't be delaying your production schedule. Plus, breweries can save additional costs by not buying added ALDC enzymes.

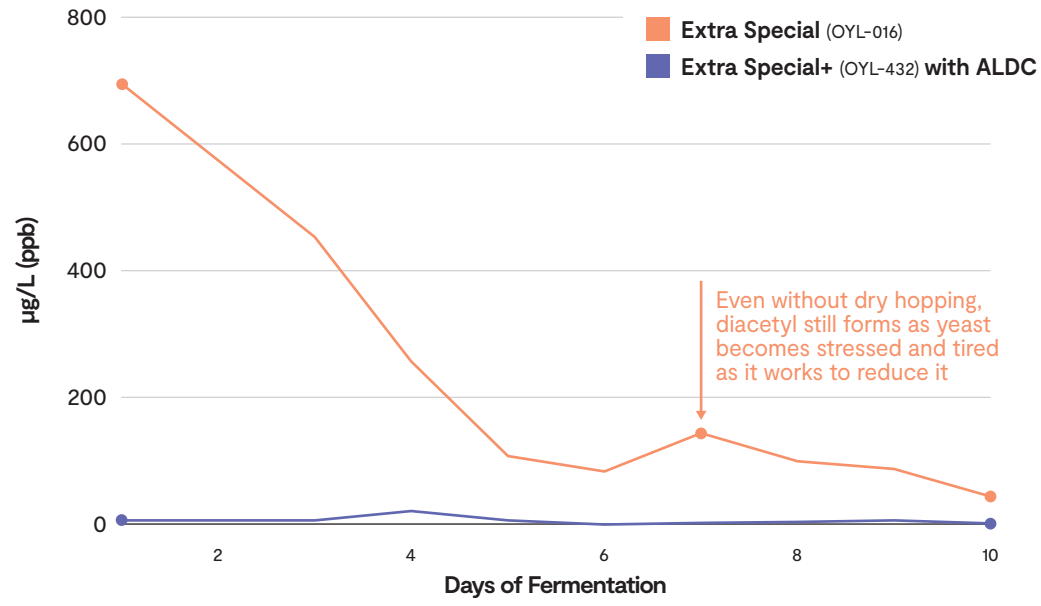
Below is a side-by-side fermentation comparing diacetyl production of a PLUS strain with DKO Technology and its parent strain without.



DKO Strains with Dry Hop



Daily Measurement of Diacetyl



Stay Hazy or Clear the Fog

With time, we gained clarity
During our years of haze research, we discovered a gene responsible for yeast-derived haze, called *HZY1*. With this discovery came Lumina technology, which can minimize yeast-derived haze, and a wealth of knowledge about haze stability. Whether the goal is to dial haze up or down, it's important to understand the factors in play.

What is "stable" haze?
Stable colloidal haze is thought to come from interactions between malt proteins and hop polyphenols when hops are added to the fermentor during fermentation. It's non-biological (not yeast in suspension) and is substantially more hazy than chill haze. A common misconception is that yeast contributes to haze only when it is suspended in beer. However, we have strong evidence that certain yeast strains, independent of flocculation, play an important role in the development of dry hop-dependent colloidal haze.

Troubleshooting haze
Consider dry-hop timing. Did your hazy IPA randomly drop clear? Did your West Coast IPA never clear up? Maybe it was your dry-hopping schedule. In haze experiments, we found that dry-hopping addition timing influences the level of haze.

Early dry-hopping before or during high krausen can reduce the level of haze in the finished beer. In addition, dry-hopping in mid to late fermentation works best for promoting haze. This also increases the potential for biotransformation and may provide an opportunity to harvest yeast before dry-hopping.

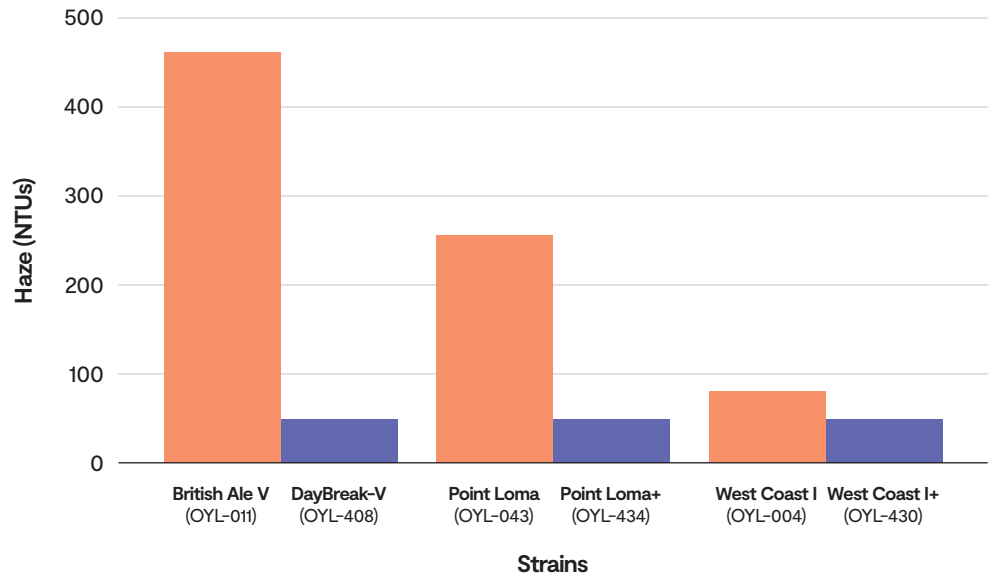
Choose the right yeast strain
We call strains that lead to dramatic increases in haze with late fermentation dry hopping 'haze-positive'. Curious whether a strain is haze-positive? Chances are we have tested it, and can let you know whether or not it can help generating stable haze.

If clarity is the goal, consider a haze-neutral strain. These strains don't contribute significant levels of yeast-driven haze.

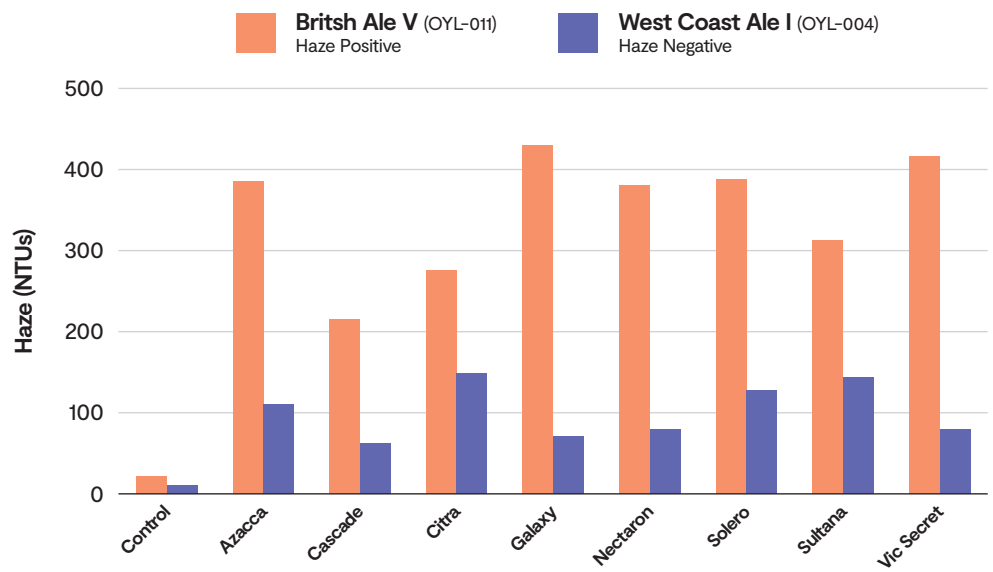
Remember there are many sources of haze
Haze also comes from malt and hops. To achieve crystal clear beers you'll want to tackle these forms of haze with common best practices (e.g., kettle finings, separation of cold break, using enzymes and/or fining agents in the cellar). If you are already taking approaches to minimize haze, West Coast I +, Point Loma +, or DayBreak-V might be able to push even more clarity or reduce hangups in the cellar.

Style	Yeast	Dry Hop
Pilsner	**Haze-neutral** (lager strains)	Consider an early dry hop and keep addition rates low.
West Coast IPA	**Haze-neutral** (West Coast I, Lutra, even a lager strain)	Consider an early dry hop and hop varieties with minimal haze.
Hazy IPA	**Haze-positive** (British Ale V, Voss Kveik, Point Loma)	Only late dry hop and hop varieties with maximum haze.
Hefeweizen	**Haze-positive** (Hefeweizen Ale I)	Small late dry hop to help with haze stability.

Haze vs. Strains



Haze vs. Hop Variety



Wait, What is a POF anyway?

The source of yeast's spice

POF stands for "phenolic off-flavor" which refers to the clove, pepper, or spice character produced by 4-vinyl guaiacol (4VG)—the same compound present in clove spice for baking. 4VG is produced by an enzyme encoded by the *FDC1* gene, which is present in all brewing yeast.

Though all brewers yeast carries this gene, most brewing strains in use today are negative for phenolic off-flavor (POF-) and don't produce a clove, pepper, or spice character during fermentation. Most POF- strains naturally acquired an inactive copy of the *FDC1* gene from a centuries-old mutation that brewers have perpetuated through use.

The vast majority of the brewing strains we use today are from POF- heritages because those POF- strains' flavor profiles were favored by brewers and selected for during the advancement of pure culturing techniques in the late 1800s. One specific historic inactivation that caused POF- in brewing strains is called the *fdc1-C460T* substitution.

Brewing strains that are positive for phenolic off-flavor (POF+) are typically only considered desirable in Belgian styles and German wheat beers. Their spicy phenolics are out of place and unwanted in most other, especially modern, hoppy beers.

But what if other yeasts were POF-?
We got curious: What happens when you remove phenolics from a German or Belgian strain? Think Hefeweizen without clove or Belgian Dubbel without spice. What's possible when esters are allowed to pop now that their phenolic mask has been removed?

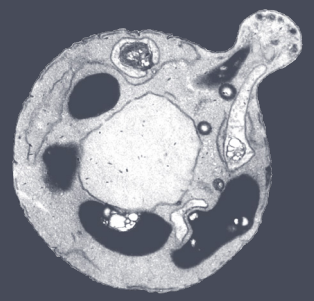
Inspired by the effect of this historic *fdc1-C460T* inactivation in POF- yeast, we selected a group of phenolic strains whose perceivable ester profile and brewing characteristics were already popular and were likely to stand out even more without the phenolic tagalong.

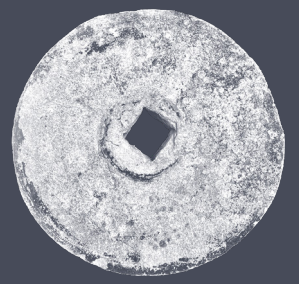
We used the naturally-occurring *FDC1* substitution as a roadmap.

Using CRISPR-Cas9, a modern gene-editing process, we introduced the same inactivation of the *FDC1* gene into these phenolic brewing strains.

Test batches showed new directions for strains that once had very narrow uses. The absence of phenolic character allowed both yeast esters and complementary hop characters to come forward in a new way, and yield beers that were more intensely fruity. This new technology opened a new array of flavor combinations.















OMEGA

YEAST

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