

# Brewing with New Hop Varieties



**Nathan Smith**  
**NHC 2014**



## BNA9 Session IPA

- [BNA9 Session IPA](#): Belma, Legacy, 05256
- 1.048-1.012 4.6% ABV, 60 IBU.
- 75% Rahr 2-row, 13% Durst Vienna, 12% Crystal 15L. Mash at 154F.
- Whirlpool: Belma, Legacy. Dry Hop: 05256
- Safale 04 at 65F





## Introduction

- **Dizzying array of new hops. Last few years: Mosaic, El Dorado, Belma, Azacca..** (And that's just a few that we know of that have names.)
- **In the past, new hops were often variations of classic American or noble varieties.** (different than the "Amarillos, Simcoes and Citras" of the past.)
- **How should we approach these new varieties?**
- **Are they all intended to be IPA hops?**

# Introduction

- **Why? The classic hops should be enough.** Cascade, Goldings, Hallertau, Styrian, Saaz
- **Maybe you want something different.**
- **Intangible complexity. A unique signature hop.**
- **Hops are still one of the most powerful ingredients in brewing to create complexity.**

# Hop Breeding

- **Something changed over the last 10 years.** (and has accelerated over the last 2)
- **First, let's take a step back...** (Not quite back to Cascade.)
  - ***"A decade ago we may have been 100% concerned with alpha breeding or trying to mimic noble aroma types. We have now made a shift. That shift started with YCR-014"***
    - Jason Perrault, Perrault Farms/HBC/Select Botanicals, Hopunion Hops & Brew School 2011.
- **Why mimic noble type hops? 3 letters...**

# Hop Breeding

- **YCR-014 – originally selected mid 90s, expanded acreage late 90s.**
  - ***“YCR-014 was our first unique, strong, distinct, craft aroma type hop. It is a high alpha hop, but we consider it an aroma hop and we selected based upon that. YCR-014 paved the way for similar unique varieties.”***
    - Jason Perrault
- **YCR-014 in 2011 huge success; 2001 almost a failure.**
- **Someone started buying YCR-014 in quantity 2002-2003.**

**Who started using YCR-014/Simcoe in 2002? This guy knows:**



Photo by Jon Weber

# Hop Breeding

- **Things have come a long way since Simcoe.**
- **Contrast: Citra absolute success by 2009. Rel. '08.** (By late 2000s, craft had changed the market.)
- **Citra = HBC 394, Selection & crosses 1990-1992.** (5)
  - *“There’s a lot of good already out there, it needs to be rediscovered”*
    - Peter Darby, Wye Hops LTD. (5)
  - **Citra, almost lost to to the archives, has become the absolute rock star hop of the craft brewing world.**



## Rock star? Like this..?



**More like this..**



**Kelsey McNair, NHC Final Round, Category 14  
2nd place 2013, 1st place 2012, 1st place 2010**

# Hop Breeding

- **In the past expressive hops: discarded.** "stinky", "catty", "american"
- **Breeding programs now have an opportunity to sell unique hops to the specialty/craft market.**
- **Good yield? Agronomically stable? Get it to market.**
  - *"There are 2,000 craft brewers out there with 2,000 opinions. If it fits agronomically, let the baby out."* - Eric Desmaris, El Dorado (5)
- **Breeding takes ~10 years, only ~1 in 40k makes it.**
- **Typical attributes:**
  - 9-12% AA
  - 24-32% cohumulone
  - High total oil. 2-3%+ (5)



## Breeding Programs



- **HBC/Select Botanicals:** Simcoe, Mosaic, Equinox
- **Hopsteiner:** Apollo, 05256, 01217, 06300
- **ADHA:** Summit, Azacca, Jarrylo
- **USDA:** Newport, Santiam, Glacier, Cashmere
- **Huell:** Mandarina Bavaria, Huell Melon, Huell Blanc
- Individual farms, such as **Puterbaugh Farm:** Belma, Legacy



**Bav. State Research Center for Agriculture**

Institute for Crop Science and Plant Breeding  
Hop Research Center Huell



**AMERICAN DWARF HOP ASSOCIATION**

## Hop Breeding – Summary

- **Breeders exploring the broadest expression of hop genetics to satisfy demand for characterful hops.**
- **Increased single-hop complexity & higher oil.** “One stop hops”
- **Growers & breeders want a Citra in their portfolio.**  
(Why? Price per LB, patents, royalties.)
- **U.S. Craft Brewing ~1.2-1.3+ LB/BBL.**
- **A record 2,500+ U.S. Craft breweries plus expansion of the bigger craft players adds up to a huge consumption of new hops** (Sierra Nevada, New Belgium, Lagunitas, Bell's, Stone, etc.)

# New School hops Sensory Descriptors

**Citrus**

**Tropical**

**Berry**

**Pine**

**Melon**

**Resin**

**Spicy**

**Dank**

**Woody/Cedar**

**Onion/Garlic**

**Peppery**

**Apple**

**Stone Fruit**

**Bubblegum**

**Pear**

**Peppermint**

**Vanilla**

**"Fruity"**

**Coconut**

**Tea**

**Licorice**

**Tobacco**

**Cocoa**

- Look for tropical, berry, melon in category 10, 14 of new BJCP guidelines
- Where does this complexity originate? In the alpha acids? Nope.. Not quite.

# Essential oils – hundreds or thousands?

- ~.5-3.5+% volume by weight. Extremely volatile.
- **80% hydrocarbons. Primarily:** <sup>(1,4)</sup>
  - Humulene: Woody, balsamic.
  - Carophyllene: Black-pepper spicy.
  - Myrcene: Geranium-like floral.
  - Farnesene: Gardenia-like floral. (less frequent)
- **Sometimes:**
  - Linalool: Citrus-like bergamot. (least frequent, but high impact)
  - Beta-Pinene: Spicy, piney
  - Geraniol: Floral, rose
  - Limonene: Citrus, fruity
- **4MMP (4-mercapto-4-methylpentan-2-one) Muscat grape/black currant. Occurs naturally in grapes, wine, green tea grapefruit juice. Signature character of New World Hops. Highest levels in Summit, Simcoe, Topaz.** <sup>(5)</sup>
- **Monoterpenoids, Sesquiterpenoids.. We know less about hop oils than we think we do.**

# How do we get these hops?



Photos by Chip Walton



# Evaluation & Recipe Development

- **Short cuts? Statistics? Rub Test? Hop Tea?** (10 years to coddle these hops to mkt, least we can do is give them a try in the brewhouse..)
- ***“You actually have to brew with hops to figure them out.”*** -*Guess Who*
- **Actually brew with them, but first make some guesses before adding them to boiling wort...**
- **Use our time wisely.** (As homebrewers we're not producing 30bbl of wort daily)
- **Start simple – play into the hops' perceived strengths.**
- **Increase recipe complexity as you understand the hop better.**

## Brew Day / Process Approach

- **Any time hops can be used create new options & split.**
- **Hop Back: Split wort into different fermenters with 2-3 different hop back charges.**
  - Requires pump + counterflow/plate chiller.
  - Use quick disconnects (or equivalent).
  - **Be careful! Use gloves & safety goggles. Don't burn yourself.**
  - Don't be afraid of the extended rest. Think whirlpool.
  - Or use hop bags – 2 or more at flame out staged at different times.
- **Fermentation: 2 or more carboys/fermenters/yeast strains.**
- **Dry hop: 2 or more different dry hop approaches.**
- **Post fermentation & extended aging: Oak, brett.**

# Multi Hop Back

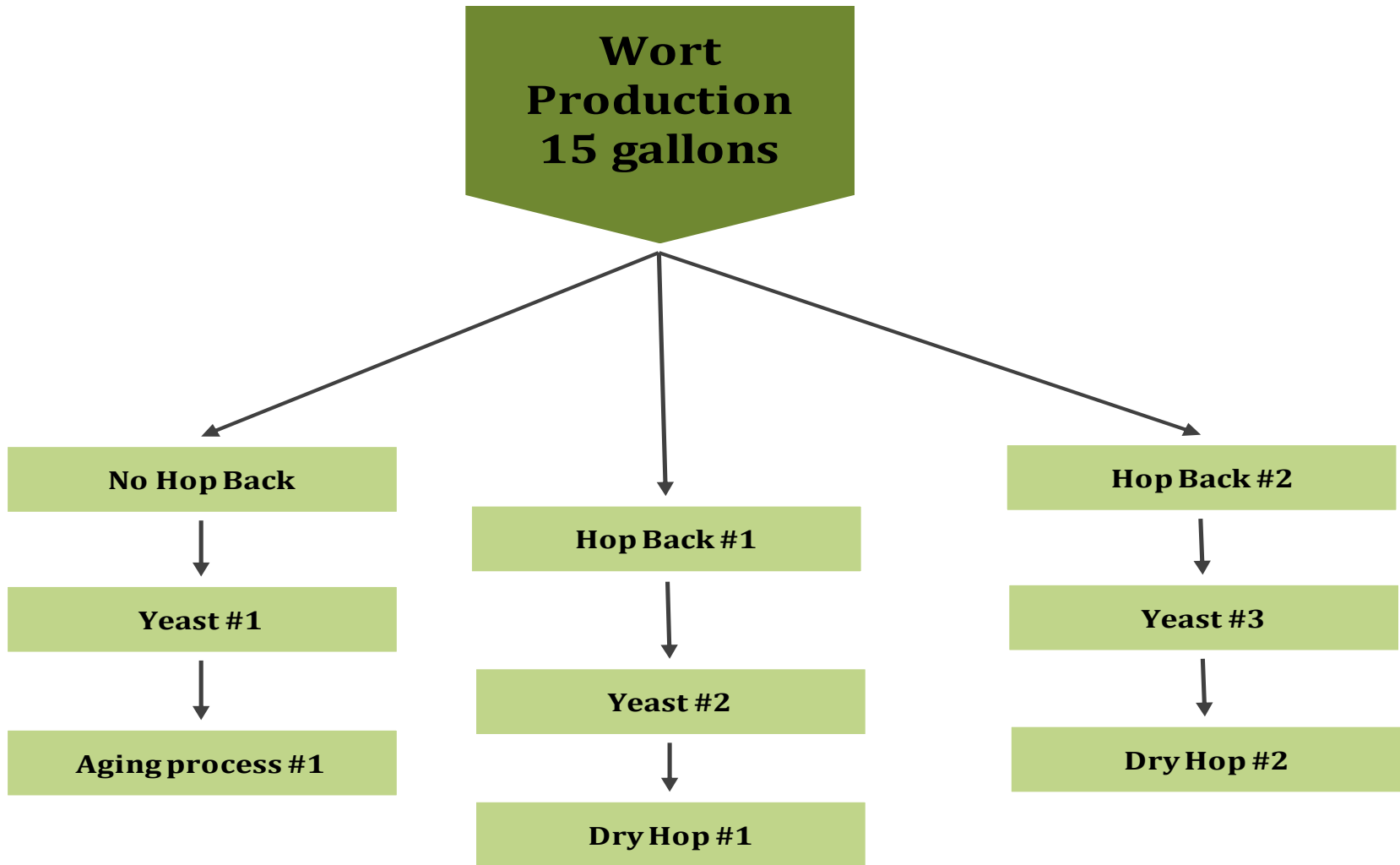
Collect first hop back, prepare for 2<sup>nd</sup> hop back. Safety first! Hot liquid under pressure.



Don't forget to turn off the pump, and close all valves. Quick disconnects in sanitizer.

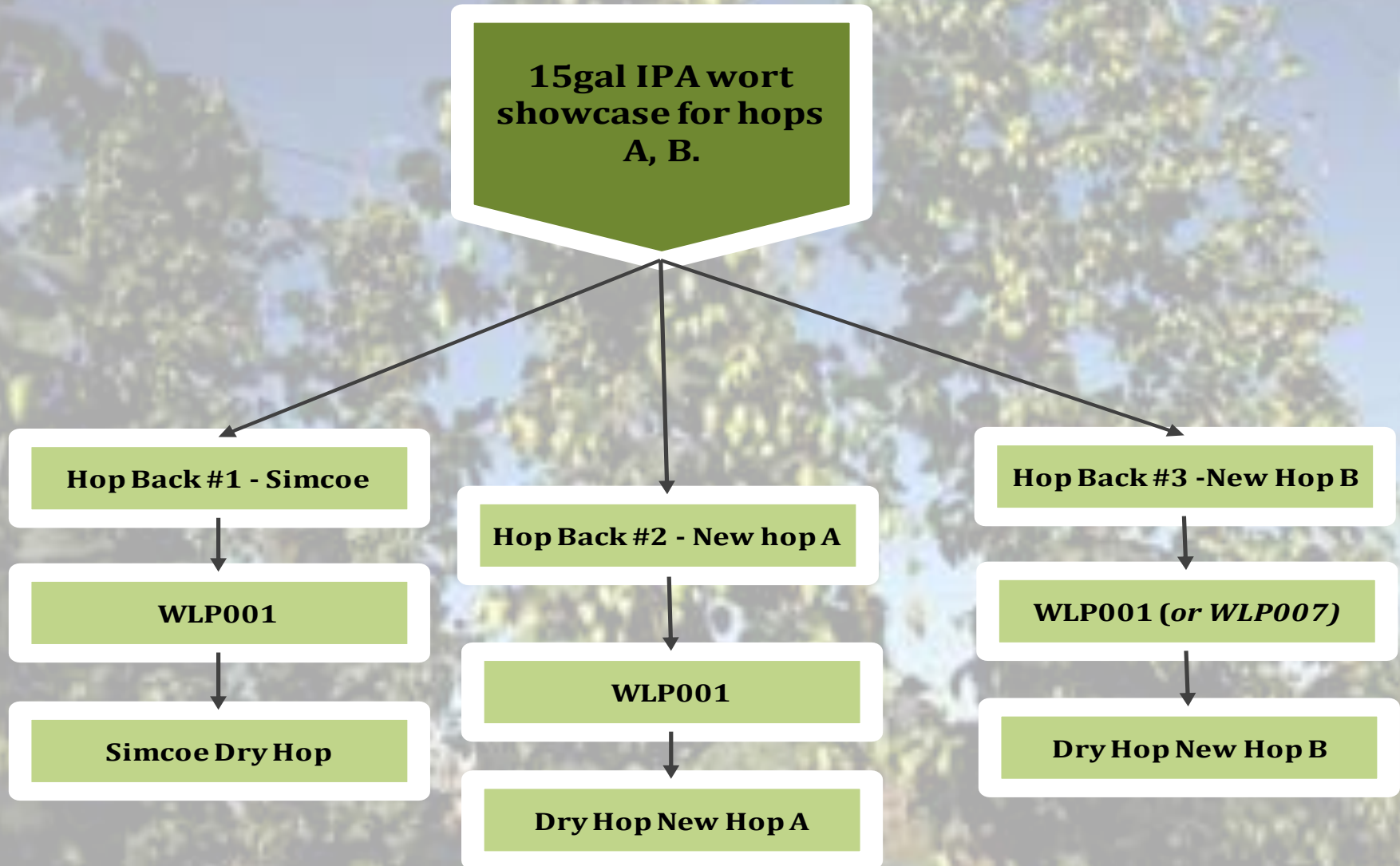


# Brew Day Process



# Style Selection & Process Example #1 – IPA wort

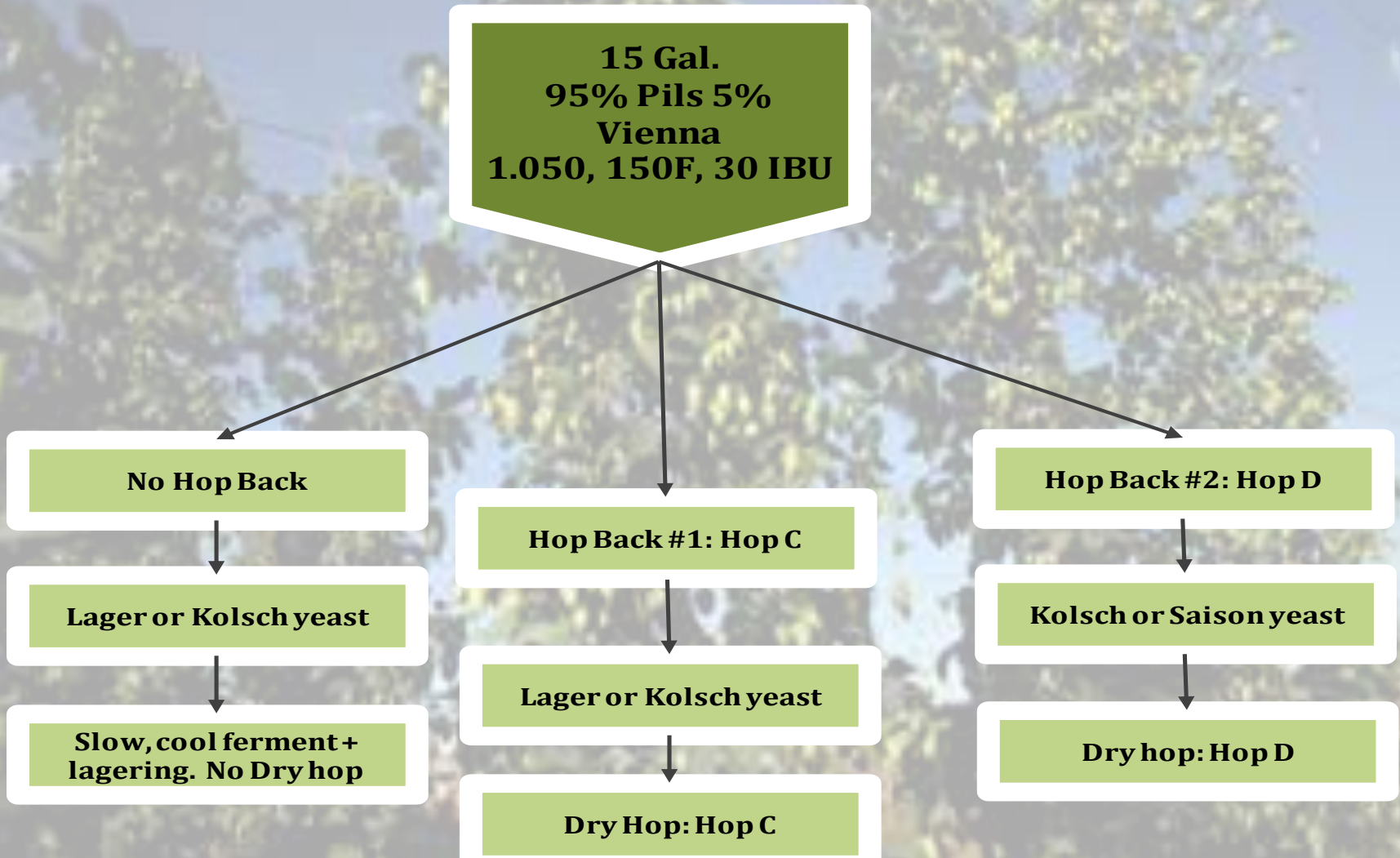
Assertive hops A, B: Citrus, Pine, Dank, high oil %myrcene, linalool, farnesene



**Example #2 Pils wort with Less assertive signature hops C, D.**

**Hop C: Noble Spice, pepper, high humulene, carophyllene low myrcene**














**Hop D: Berry, melon, tropical, mid-alpha, unknown oil %**



**Example #3 Dark, moderate roast wort – Less assertive signature hops E, F.**  
**Hop E: Berry, melon, tropical, mid-alpha, unknown oil %**  
**Hop F: Cedar, coconut , coca, licorice, vanilla?**



# New Varieties

- Belma – Belma Kölsch  
- Belma - Petite Bourgeoisie Saison  
- Steiner 06300 / 05256– Dragon Semen IPA  
- HBC 369/Mosaic – Mosaic Monster IPA  
- Saphir / ADHA 484 – Sacrilege Pils  
- El Dorado / ADHA 871 – Jagoff Justin Schwarzbier  
- Azacca – Azacca Avalanche IPA  
- Legacy – Legacy Blonde Ale  
- HBC 366/Equinox & HBC 344 – Equinox IPA  

All recipes on [Beersmith](http://Beersmith) and [Brewtoad](http://Brewtoad)



# Belma

- [Hopsdirect & Puterbaugh Farms](#), Crosses: unknown

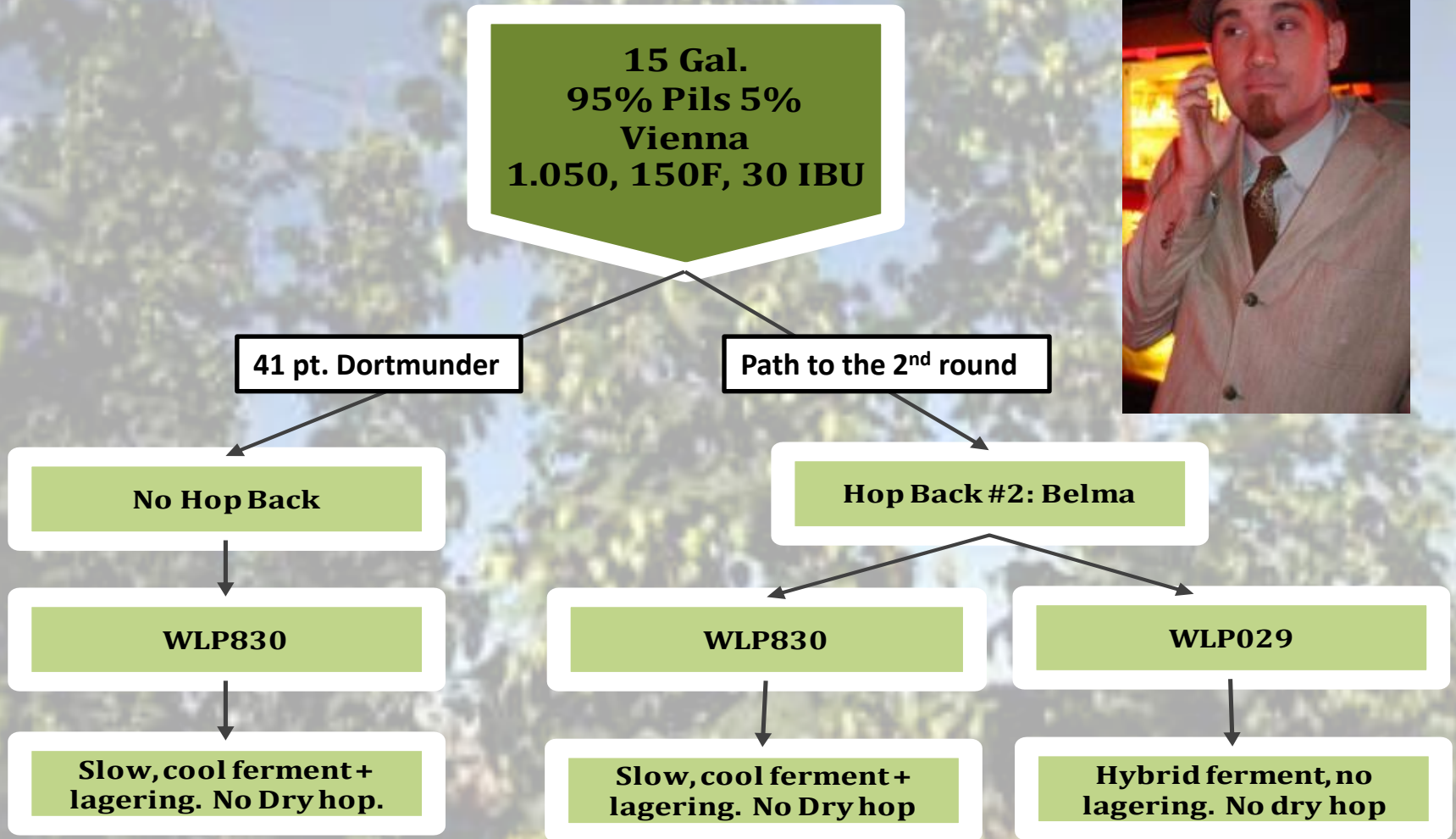
Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
11-12%	4.3%	?	?	66.21%	1.64%	13.77%	-

- $\beta$ -pinene 1.69%, limonene .23%, linalool .11%, geraniol .04%
- Trademark filed 11/10/2011 by “Puterbaugh Farms Partnership”
- Commercial description: *“A very clean hop, with a very orange, slight grapefruit, tropical pineapple, strawberry, and melon aroma.”*
- Style ideas: Kölsch, Saison, Wheat.
- Homebrew recipes:
  - [Belma Kölsch](#) – 1.051-1.010, 5.3%, 20 IBU, WLP029
  - [Petite Bourgeoisie Saison](#) – 1.035-1.010 3.2%, 32 IBU, 3711/565

# Belma Attempt #1



# Belma Attempt #2 – the beginning of Belma Kölsch



# Belma

## Summary

- **Subtle slightly green strawberry and ripe melon**
  - Strawberry starburst with lime skittles.
- **This hop shines with Pilsner malt.**
- **New-school interesting hop that is not an IPA hop.**
- **No citrus, pine, dank.**
- **Spice – Very low neutral noble spice.**
- **Aged Character – Aromatics have low shelf life.**
- **Strength – Interesting, subtle blending component.**
- **Risk – Easily overpowered by other hops.**

# 06300

- Hopsteiner cross between Galena, Eastern Gold, 98005

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
14-15%	5-6%	<b>49%</b>	1.40%	?	?	?	?

- Commercial description: Dill, **Lemon Jolly Rancher**, Passion Fruit, Cocoa, Coconut, Peach, Stone Fruit and Vanilla.
- Complex, but subtle and easily lost. Worth repeating some experiments if this one re-surfaces.
- Style ideas: IPA ok as blending, APA, Saison? Roasted malt?

# 05256

- **Hopsteiner cross between Apollo and Merkur**

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
17%	5-6%	27%	<b>3.1%</b>	?	?	?	?

- **Commercial description:** *Light Grapefruit, Citrus, Pine, and Mint notes. Also has dark fruit and Strong herbal notes.*
- **Aggressive and in-your-face. Familiar complexity.** (Simcoe, Summit)
- **Style ideas:** IPA, APA.

# 06300 and 05256

- Homebrew recipe: [6300 Double IPA](#)
- 1.074-1.013, 8.1% ABV, 80 IBU, 06300, 05256. WLP007

## San Mateo County Fair Homebrew Competition




 [Print This Page](#)

### Thanks To All Who Participated in the San Mateo County Fair Homebrew Competition

There were **207** entries and **132** registered participants, judges, and stewards.

### Best of Show Winners

#### BOS - Beer

Place	Brewer(s)	Entry Name	Style	Club
 1st	Nathan Smith	6300 IPA	14C: Imperial IPA	DOZE
 2nd	Nathan Smith	Best Wishes Saison	16E: Belgian Specialty Ale	DOZE
 3rd	Fraser Grove	Java Man	23A: Specialty Beer	

#### BOS - Cider

No entries are eligible.

#### BOS - Mead

No entries are eligible.

# “06300 IPA” becomes “Dragon Semen” IPA



Photo by Push Eject





# Mosaic / HBC 369

- [HBC 369](#) - Mosaic HBC 369 daughter of Simcoe and Nugget.

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
11.5-13.5%	3.2-3.9%	24-26%	1.0-1.5%	<b>47-53%</b>	5.2-7.8%	13-16%	0.06%

- $\beta$ -pinene 0.95%, linalool: .68%, Geraniol 1.16%
- [Patent filed 2/15/2012](#)
- Commercial Description: unique and complex floral, tropical, fruity
- Style ideas: IPA/APA
- Homebrew recipe: [Mosaic Monster IPA](#) - 1.066-1.010 - 7.4% ABV 80 IBU

# Azacca

- ADHA 483 named Azacca for 2013 harvest. Haitian god of agriculture. First tried this hop at last NHC in Philly.

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
14.86%	5.39%	?	1.8%	<b>48.88%</b>	8.76	?	?

- Trademark filed 5/14/2013 by ADHA.
- Commercial description: *Aroma & Flavor Characteristics: Intense and tropical. Sustained impressions of citrus and very ripe mango, with notes of orchard fruit (pears, apples) and pine needles throughout.*
- Homebrew recipe: [Azacca Avalanche IPA](#) (I haven't learned my Belma lesson!)

# Mosaic and Azacca

15gal IPA Mosaic & Azacca wort,  
80IBU, 1.068-1.012,  
7.4% ABV.



Nicole says passion fruit

Control

Hop Back #1 - Simcoe

WLP001

Simcoe Dry Hop

Not so intense. Not learning my Belma lesson

Hop Back #2 - Azacca

WLP001

Dry Hop Azacca

Hop Back #3 - Mosaic

WLP001

Dry Hop Mosaic

# Azacca

## Summary

- **Fruit & spice - Candied mango, with slight vanilla.**
- Slightly aged - Pink grapefruit, stone-fruit (peach), cantaloupe, slightly bitter over-ripe fruit skin. Slight mint. Aroma drops off quick, flavor still in-tact.
- Unique quality: brings malt flavors forward.
  - Style ideas: APA/American Amber/Brown/Barleywine?
- In Drake's Drakkeller Double IPA as it aged – Generic “fruity”, Vanilla, cupcake/confection/frosting.
- Risks – Fruitiness may highlight esters & acetaldehyde.

## Mosaic / HBC 369

- **Summary: North American Southern Hemisphere.**
- **New school hop with lots of complexity = one stop hop.**
- **Production commercial beers:**
  - Deschutes Fresh Squeezed
  - New Belgium Rampant
- **Fruit – Yes! Lots. Blueberries, Tropical, Grape, Mango**
- **Spice – Yes! Some. But not quite noble.**
- **Aged Character – Canned stone fruit.**
- **Risks – Easily overdone, becomes muddled if blended with too many others. Some diesel/kerosene risks (re: Nelson). So fruity can elevates esters. Nasty with elevated diacetyl. Not familiar to many judges yet – weird scoresheets!**

# Mosaic Monster for the Masses

11	<del>TARQUINEN CREAM ALE</del>	PAUL BROWN	5.0
12	SPRING TRAINING BLACK & ORANGE STOUT	ADAM WYSS	6.3
13	BAXTER BITTER	RYAN MARSHALL	3.5
14	<del>AZACCA No MASI!</del> AVALANCHE IPA	NATHAN SMITH	7.5
15	MOSAIC MONSTER IPA <del>SORRY</del>	NATHAN SMITH	7.1
16	<del>TION</del>	NATHAN SMITH	6.2
17	#BLACKFRIDAY FOREIGN EXTRA STOUT	RANDY JANINDA	7.0
18	PRETTY SIMPLE PALE	JEFF PATTERSON, DAVID ZABARTE	4.2
19	<del>DOZE BOURBON BARREL</del>	<del>DOZE</del>	<del>10.0</del>



TASTING ROOM		
BEER	BREWER	ABV
1 BABY BALTIC	Craig Danielson	4%
2 HONEY TRIPEL	Craig Danielson	10%
3 WINTER IS COMING IPA	Paul Brown	7.2%
4 DANCING DAYS DUNKELWEIZEN	Paul Brown	5.4%
5 American Blonde	Dave Klenon	5.0%
6 Munich Dunkel	Dan Bennet, baby!	5.5%
7 Jalapeno Saison	Dan Bennet	6.0%
8 Double IPA	Jeff Patterson	9.0%
9 IPA	Jeff Sager & Jeff Patterson	6.0%
10 Almond Joy Imperial Stout	Patrick Baxley	10.0%
11 Mosaic Monster IPA	Nate Smith	7.0%
12 Saison Bruxellensis	Nate Smith	6.0%
13 LAWNMOWER LITE	Randall Contreras	4.0%
14 ABBEY ROAD BELGIAN PALE	VITO	4.5%
15 BARRACUDA AMBER/BARLEY BLEND	VITO	7.0%
16 BRITISH BITTER		

# Legacy

- “Legacy has been grown in Washington State for 50 years, but was only registered as Legacy in 2013 by Hops Direct.”

(since 1963?)

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
7.3-10.2%	5.9%	?	?	?	?	?	?

- Style ideas: Blonde Ale w/ WLP029.
- Homebrew recipe: [Legacy Blonde Ale](#)
  - 1.050-1.010, 50% Pils, 50% 2-Row, 150F, 50 IBU, Citra mid-boil, Legacy late, flame-out and hop-back.
- No Citrus, Pine, Dank – Use a little Citra to elevate Legacy?

## Legacy Blonde Ale

**15 Gal.  
50% Pils 50% Rahr  
1.050, 150F, 50 IBU,  
Citra mid-boil**

**Could have been good.**

**I can't say enough  
good things about this  
one!**

**Hop Back #1: Belma**

**WLP029**

~~**Dry Hop: Simcoe &  
Centennial at ~60F**~~

**Hop Back #2: Legacy**

**WLP029**

**No dry hop**



# Legacy

## Summary:

- **4MMP without diesel, kerosene, dank.** Moderate/low classic citrus (orange & grapefruit).
- Mosaic-like fruit when you want to avoid the NZ-like diesel, oily, resin qualities that Mosaic can have.
- Fruit – Black currant, berry.
- Spice – Medium/low.
- Aged character – In Legacy Blonde at medium age, the 4MMP-forward flavor transformed into a key-lime pie like flavor. Even more age: berry & raspberry ice tea.
- Risk – Catty/Boxwood/Ribes character.

# El Dorado

- **Crosses: Unknown. CLS Farms, Released 2010.**

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
14-16%	7-8%	28-33%	<b>2.5-2.8%</b>	<b>55-60%</b>	6-8%	10-15%	.1%

- **No patent app., trademark filed 9/29/2010. CLS Farms, LLC.**
- **Commercial description: “El Dorado® consistently elicits responses of fruity notes, specifically tropical fruit flavors. Other fruit notes offered have been pear, watermelon and stone fruit.” Ref: [a](#),[b](#)**



# ADHA 484

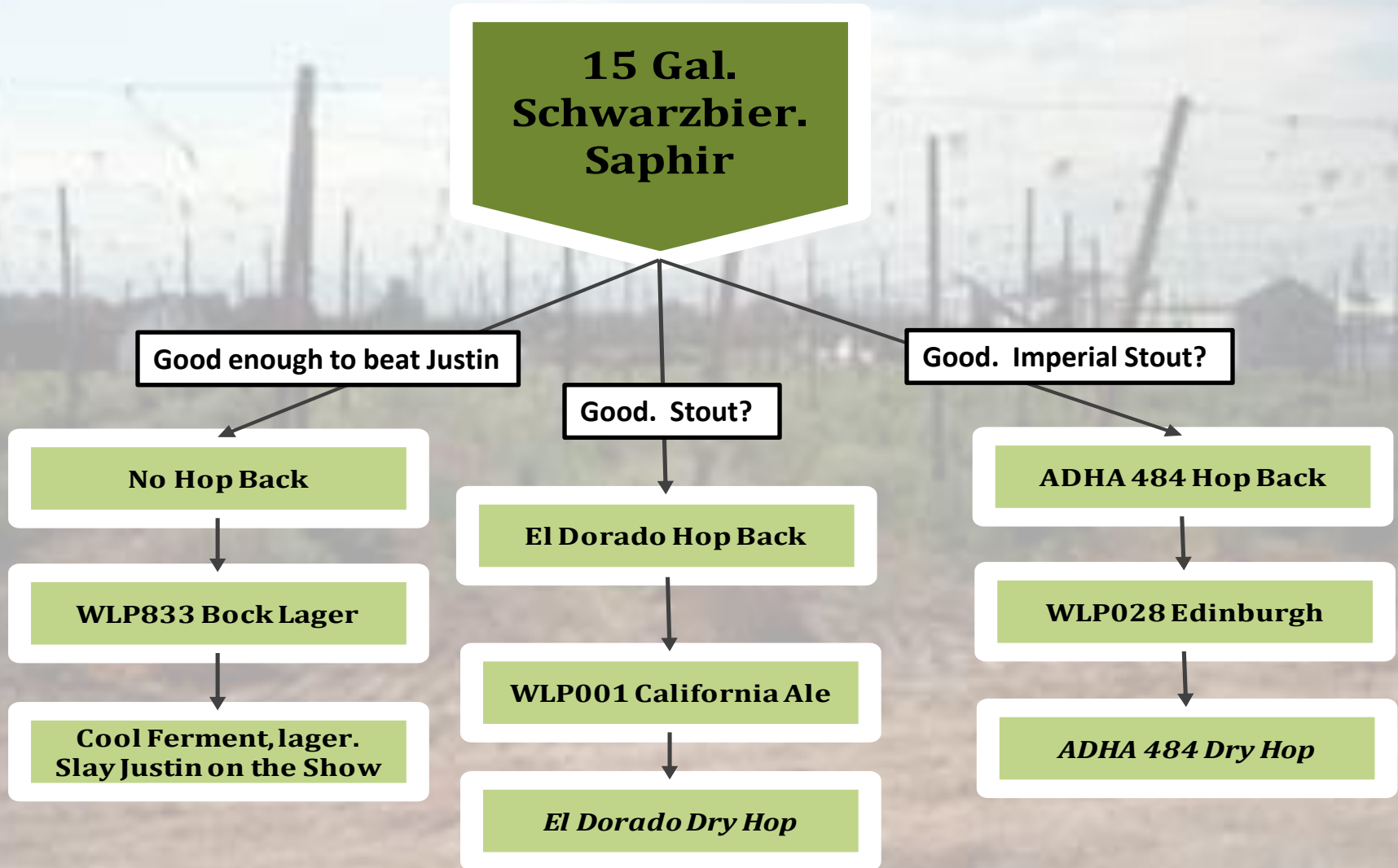
- **Crosses: Unknown**

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
11.65%	3.53%	<b>46.78%</b>	?	?	?	?	?

- **Commercial description:** Cedar, wood, bubblegum, spice.
- **Summary:** cedar, French oak, spice (imperial stout?)
- **Production commercial beers:** None known.
- **Fruit – Low**
- **Spice – Moderate, complex spice.**
- **Risks – Accentuates alcohol?**
- **Style ideas:** Dark lager, stout, porter.

# Brewcaster Challenge Schwarzbier

## El Dorado, ADHA 484



# El Dorado

- **Summary: Complex hop with high oil content.**
- **Citrus zest & berry plus slight wood/mint. Light tropical, not as tropical as Citra. No dank/diesel/kerosene. Strawberry & lemon starburst.**
- **Somewhat familiar/neutral.. in a good way.**
- **Style ideas: Single hop APA/IPA, Dark Lager, Stout.**
- **Homebrew recipe: [Jagoff Justin Black Ale](#) wort with 4oz. El Dorado Hop back and 001.**
- **Production commercial beers: New Double IPA from Stone**
  - **Lost City of Liquid Gold, Stone Liberty Station. Mitch Steele & Kris Ketcham.**
- **Fruit – Lemon, Strawberry, Pear, Cherry**
- **Spice – Slight wood/mint.**
- **Risk – IPA/APA too muddled if combined with other hops.**

# Saphir

- Hüll, Released 2000 Bred for classic noble aroma.

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
2.0-4.5%	4.0-7.0%	12-17%	0.8-1.4%	25-40%	9-14%	20-30%	<1%

- **Commercial description:** *Distinct spicy, fruit and citrus (tangerine) tones, Good aroma variety with a distinct hoppy tang.*
- **Style ideas:** Pils, Kolsch, Belgian styles
- **Production Commercial beers:** Pivo Pils

*“Pivo was formulated with Saphir from the beginning. It was built as a canvas to show off that hop. I fell in love with Saphir the very first time I tried it in a beer. To me it is distinctively different from the old school classic German Nobel hops, yet it fits in with the bunch as a new classic hop that works best in Lager beer.”*

*- Matt Brynildson.*

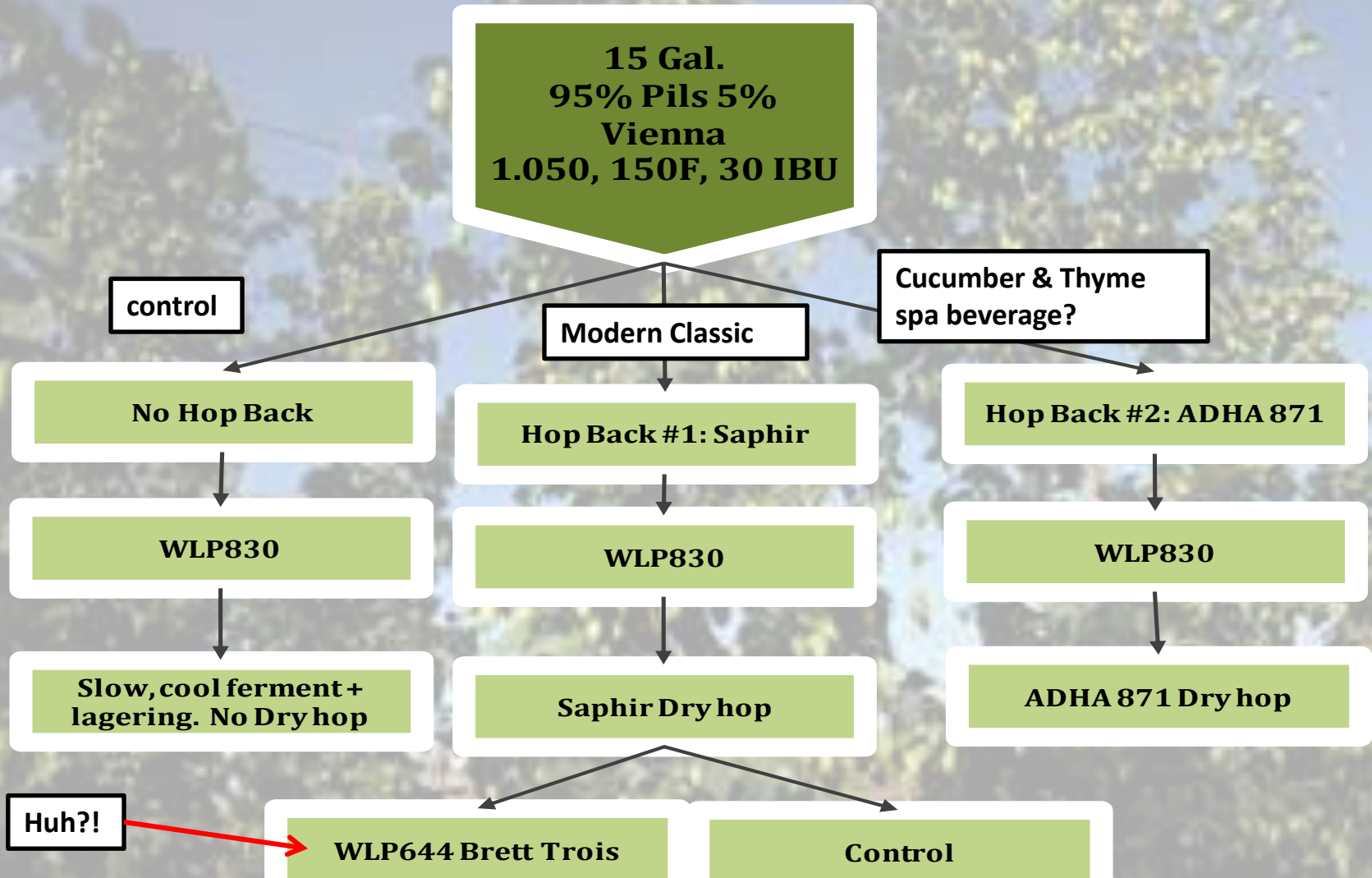
# ADHA 871

- **Crosses: Unknown**

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
13.42%	<b>3.96%</b>	27.43%	?	?	?	?	?

- **Commercial description:** *“clean, pleasant, floral, citrus, huge mint, herbal, mellow spice, **thyme**, saaz like, **cucumber**, **sage**, touch of lemon.”*
- **3:1 Alpha:Beta**, unlike Saaz, similar cohumulone.
- **Style Ideas: Pils**
- **Homebrew recipe:** [Sacrilege Pils](#)

# Sacrilege Pils featuring Saphir and ADHA 871





## Saphir

- **Summary:** Old-school noble roots, slight new-school twist.
- **Homebrew recipe:** [Sacrilege Pils](#)
- **Fruit** – Low, but slight berry and citrus.
- **Spice** – Distinct noble spice, w/ juniper, lemongrass complexity.
- **Risks** – Low oil (tough dry hopping?), higher myrcene than other noble type hops.

## Equinox / HBC 366

- **Crosses: Daughter of YCR-5 (Warrior).**

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
14.5-15.5%	4.5-5.5%	32-38%	2.5-4.5%	31-34%	11-14%	18-20%	?

- [Patent application 12/15/2011](#)
- **Commercial description:** *“marked peaks of citrus, tropical fruit and pine with nearly zero negative attributes... Exceptionally high oil content of 2.3 - 4.3%. Good argonomics and a relatively high alpha acid level.”*
- **Component of Ales for ALS 2013, Revealed as Equinox at CBC 2014.**
- **Tom Nielsen at Sierra Nevada strong advocate for this hop during elite trials & commercialization.**

## HBC 344

- **Crosses:** Daughter of YCR-5 (Warrior).

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
14.5-15.5%	4.5-5%	25-29%	?	?	?	?	?

- **Commercial description:** *“Exceptionally unique green apple / tropical aroma. Its relatively high alpha acid content and unique aroma make it a great choice for hop forward beers.”*
- **Component of Ales for ALS 2013**

# Equinox IPA

**13gal IPA HBC 344  
and HBC 366  
showcase wort**

**One stop hop  
status confirmed.**

**Very good, but needs  
something..**

**Hop Back: HBC 366**

**Hop Back: HBC 344**

**Wyeast 1056**

**Wyeast 1056**

**Dry hop: HBC 366**

**Dry Hop: HBC 344**

# Equinox / HBC 366

## Summary

- Fresh orange juice, grapefruit zest
- Medium Blackberry, strawberry.
- Low melon/ripe cantaloupe.
- Stone fruit in low amounts especially sweet bing cherry.
- No pine, no dank, no spice.
- Big complexity. Fits well into HBC portfolio.
- Aged Character – Straight passion fruit into Grapefruit.
- Risks – Public may not distinguish between other classic C hops as the beer ages, but brewers will get it immediately.
- Production Commercial beer: Russian River Aud Blonde, Dribble Belt. Crooked Stave Extra Brett Pale Ale.

## HBC 344

### Summary:

- **Medium fruity, Apple jolly ranchers.**
- **Low berry/strawberry.**
- **Aged into a more generic “fruit/citrus” over time, still pleasant**
- **Not a “one stop hop” like Simcoe, Citra or what Equinox may become, but would be very useful in a blend.**
- **Aged Character – Oils seem to fade faster than other HBC**
- **Risks – Acetaldehyde**

## Mosaic / HBC 369 – Yeast variations

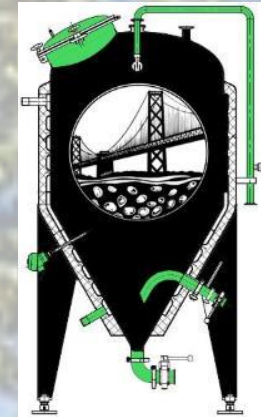
- Repeatedly proven the recipe? Try changing a variable:
- [Uncharted Territory IPA](#) Mosaic Monster wort w/ Yeast Bay:
  - Vermont Ale – I'll let you guess which brewery this might be from.
  - Funk Town Pale - Vermont Ale & Brett blend.
  - Wallonian Farmhouse – complex phenols, muted esters, tart, highly attenuative.
- 77% Rahr 2-row, 10% Belgian Pils, 5% Turbinado Sugar, 4% Carafoam, 3% C15, 2% Acidulated. 148F. 1.066, 80 IBU
- Low/no pine & dank. No classic C hops. Focus on tropical & fruity.

# Uncharted Territory IPA

## Mosaic Monster variant w/ Yeast Bay strains



15gal Mosaic Monster Wort, Mosaic late & flame-out



WTF Nate? Hello Plastic Phenol bomb!?

Hop Back #1 - Mosaic

Vermont Ale Yeast

Dry Hop: Mosaic

Hop Back #2: Legacy & Citra

Funktown Ale Yeast

Dry Hop: Simcoe & Citra

No hop Back

Wallonian Ale Yeast

Dry Hop: Mosaic & Citra



# Mosaic / HBC 369 Yeast variations

## Uncharted Territory IPA

- Vermont: Peach ester, white wine grape, lychee fruit. Light kerosene, diesel. Very good, but dry hop faded fast. Wild swings in sensory peaks as the beer aged. Increase DH and IBU?
- Funk Town: Brett +aromatic character: Sandalwood, peach, pineapple. Very aromatic and unique with the hop character.
- Wallonian Farmhouse: Surprisingly awesome! Very dry, IBU and water minerals pulled forward. Hops popped through well despite esters & phenols. Lower esters than other Saison strains but focused phenols (mild smoke, no offensive band-aid or medicinal) worked surprisingly well with grape & tropical yeast character.
- **Conclusions:**
  - Mosaic + tropical hops + phenols may be an interesting path.
  - Ester & phenol forward yeast with low/no pine & dank re-confirmed.

## Closing comments

- **There are more new, unique hops than ever before.**
- **Look beyond what everyone else is doing with the latest hype hops and create your own story.**
- **Develop your own recipes based on your perceptions of these new hops (but don't forget to involve others' whose palates you trust!).**
- **Brew into the hops' own strength. If the hop isn't working with the style you're focusing on, try another.**

## What's next?

- **HBC 291** – exceptionally low cohumulone.
- **Azacca** – next iteration of experiments with dark wort?
- **Soverign** – English hop with interesting dried fruit character.
- **Steiner** – Lemon Drop from the Calypso program – Geared towards IPA late hop and dry hopping – citrus/lemon/mint/menthol.
- **ADHA** – Jarrylo – specifically marketed as “not an IPA hop” banana/orange/pear.
- **Huell program** – more German hops with a new world American accent?
  - Mandarina Bavaria, Huell Melon
- **USDA program:**
  - Tahoma – Grapefruit/cedar/pine?
  - Cashmere from Brulotte Farms – Cascade lineage, melon/citrus/coconut?
  - Yakima Gold – Lemon zest & grapefruit?
  - Triple Perle – Orange zest and noble leanings?
  - Perle 074
  - Multihead / Medusa – Guava, Citrus, Melon.
- **CLS Farms/Eric Demereh - 8 neo-mexicanus variations**

# Questions?

- **Contact**
  - nathan@thebrewingnetwork.com
  - Twitter: @nathanhomebrew
- **Links**
  - <http://destroy.net/brewing>
- **Special thanks to:**



**The  
Yeast Bay**



## References

1. Oxford Companion to Beer. Edited by Garrett Oliver. Oxford University Press, 2012.
2. The New Brewer Volume 23, Number 6. “The Eternal Quest for the Ultimate Hop Impact” by Matthew R. Brynildson (p. 22-29)
3. “Humulus Lupulus: Hopping for Flavor and Aroma” Matthew R. Brynildson, Michigan Brewers Guild and MBAA District Michigan Winter Conference
4. The Brewers’ Handbook. Ted Goldammer, KVP Publishers, 1999
5. For The Love of Hops. Stan Hieronymus, Brewers Publications, 2013

# Apollo

0151 Bred by Hopsteiner in early 2000s, released 2006.

Zeus (98001 x USDA 19058m)

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
<b>15-19%</b>	5.5-8.0%	24-28%	1.5-2.5%	<b>30-55%</b>	14-20%	20-35%	<1.0%

- Patent filed 1/31/2006
- **Commercial: *Aroma Specification: Lime, Pine, Vanilla, Garlic.***
- **Style ideas: IPA, DIPA, APA**
- **Production commercial beers:**
  - Faction Pale. Dry hop: 47% Mosaic, 33% Apollo, 10% CTZ
  - Heretic Evil Cousin: Apollo, Cascade.

# Apollo

- **Summary:** The definition of dank and aggressive.
- **Homebrew recipe:**
  - [Dankness IPA](#): 1.068-1.011, 7.5% ABV, 80 IBU.
- **Fruit** – Low fruit – Generic citrus
- **Spice** – Intense spice, allspice, cooking spice.
- **Aged Character** – Good shelf life.
- **Risk** – Overpowers. Too much = onion/garlic ([similar to Summit](#))

# Careful when collaborating with Apollo...



Photo by Jon Weber



Photo by Liz Zainasheff





# Citra

- [HBC 394](#) the early 90s, not released until 2008.
- Crosses: 50% Hallertau, 25% **U.S. Tett\*\***, 19% Brewer's Gold, 3% EKG, 3% unknown. (5) "US Tett" = what?

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
11-13%	3.5-4.5%	22-24%	<b>2.2-2.8%</b>	<b>60-65%</b>	6-8%	11-13%	<1.0%

- $\beta$ -pinene .93%, Linalool .70%, Geraniol .48%,
- [Patent filed 1/23/2009](#)
- Citra is the absolute rock-star darling hop of the craft beer world right now.

# Citra

- Starting point for American “Tropical” high-oil hops.
- So complex everyone gets something different. Tomato plant Sensory panel perceptions at SN? To me..
  - Aged Character = Irish spring soap flakes?
- Style ideas: You don’t need my help here.
- Homebrew recipes: APA my first attempt in 2009. Lemon pledge?
  - [Morebeer Citrus Bomb IPA](#) – Citra on the hot side only.
    - 1.068-1.012, 7.4%, 80 IBU.
  - Kelsey McNair and North Park Beer Co. Hop Fu (see Zymurgy!)
- Production commercial beers: Too many to list!
  - Kern River Double Citra.
  - Heretic Evil Twin
- Fruit – Tropical fruit and citrus complexity. Lychee, Gooseberry.
- Spice – Moderate spice.
- Risks – Too over used/too overdone/hard to find/expensive!

# Nelson Sauvign

- RJH Roborgh, New Zealand, Cross between NZ Smoothcone (Cluster, myrcene) & unknown NZ male.

Alpha	Beta	Cohumulone	Total Oils	Myrcene	Caryophyllene	Humulene	Farnesene
12-13%	6-8%	22-26%	1.1%	21-23%	10-12%	<b>35-37%</b>	<1%

- Commercial description: Distinct cool climate and white wine "fruitiness" with fresh crushed gooseberry and grape infused flavors
- Style ideas: Rye Pale Ale, IPA
- Production commercial beers:
  - Alpine Nelson

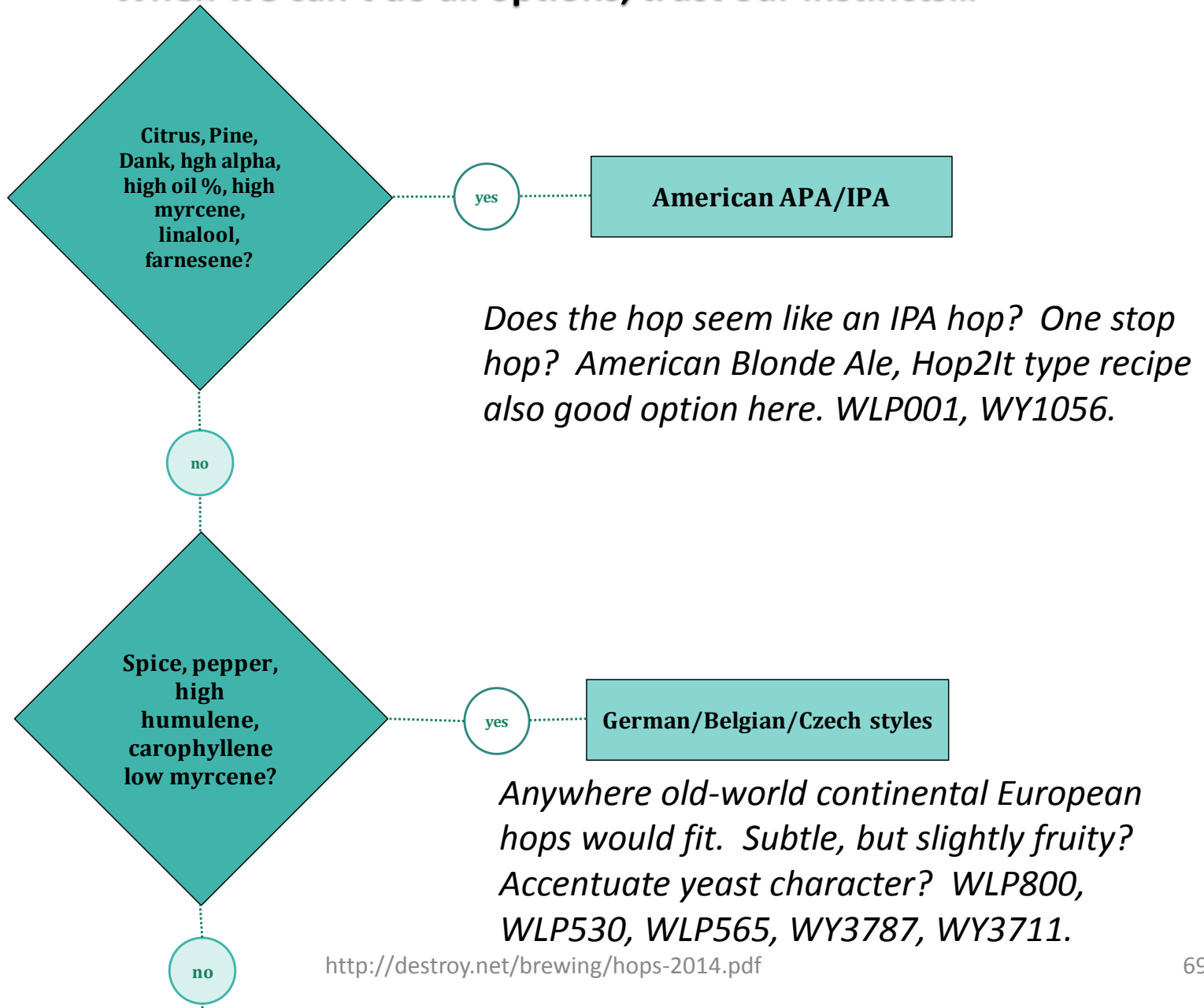
# Nelson Sauvign

- **Summary:** The signature Southern Hemisphere hop.
- **Black currant and 4MMP!**
- **Isobutyric esters 2-methylbutyl isobutyrate. “green-apple/apricot fruity flavor” 2 novel thiols.** <sup>(1)</sup>
- **Interesting w/ contrasting hops, Amarillo & Chinook (highly contrasting hops)**
- **Homebrew recipe: [Molotov Pale](#)**
  - 1.055-1.015, 7% Rye, WLP002.
- **Fruit – Grape, black currant, “tropical”**
- **Spice – Low spice**
- **Aged Character – boxwood/ribes**
- **Risks – Diesel/kerosene/boxwood/ribes?**

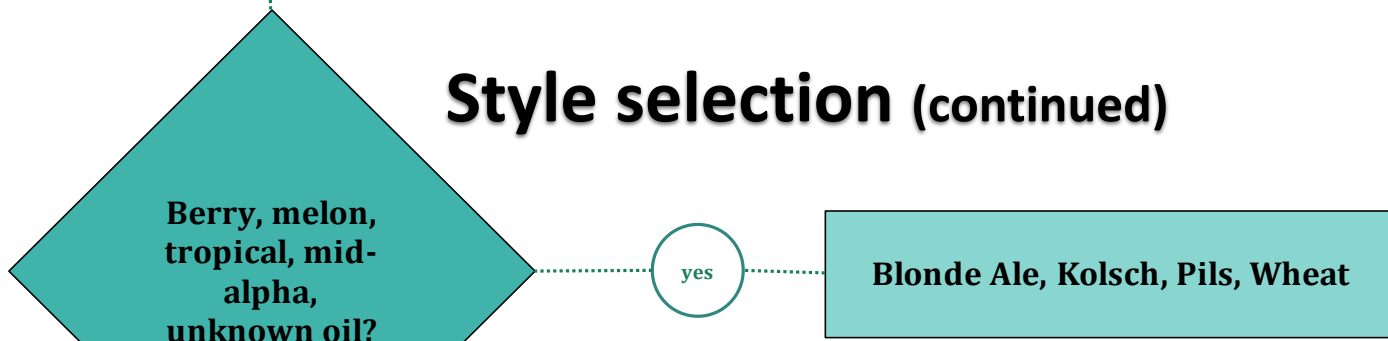


# Style selection

When we can't do all options, trust our instincts...

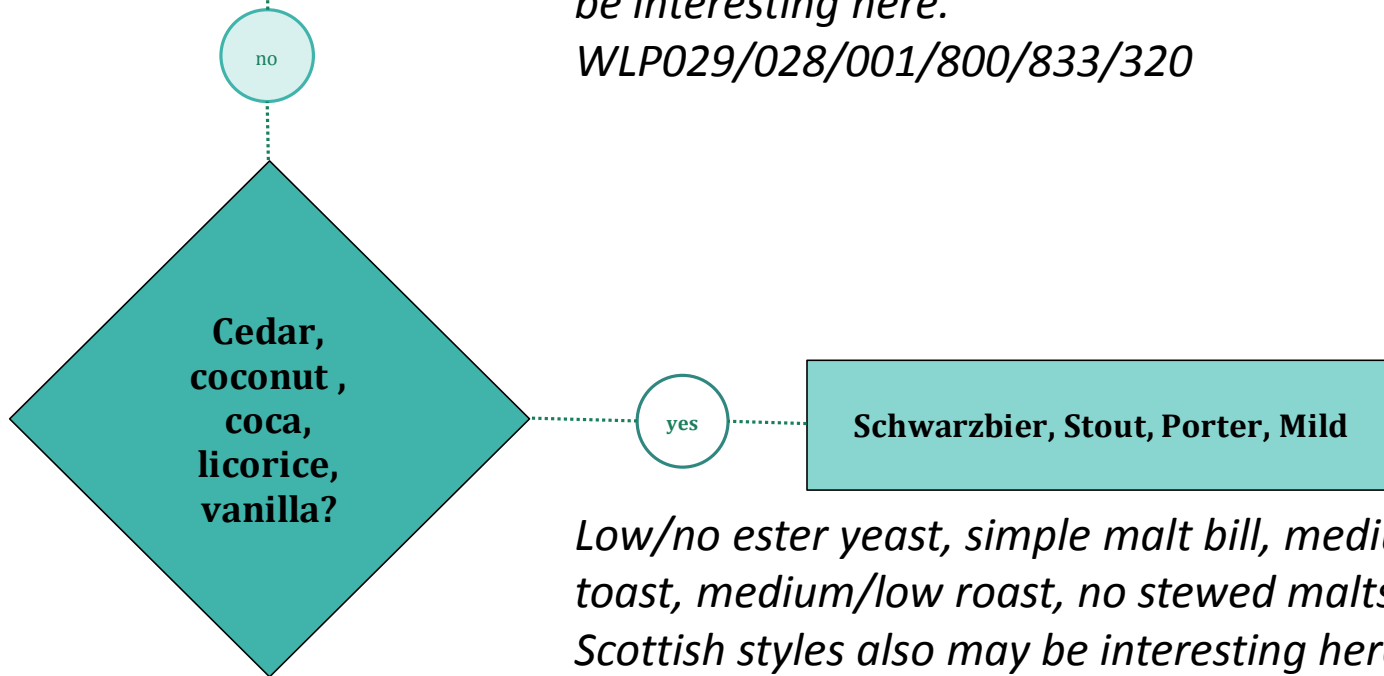


## Style selection (continued)



*Low/no ester yeast, simple malt bill, low toast, pilsner malt, no stewed malts. Subtle, no aggressive citrus or pine? English styles also may be interesting here.*

*WLP029/028/001/800/833/320*



*Low/no ester yeast, simple malt bill, medium toast, medium/low roast, no stewed malts. Scottish styles also may be interesting here..*

*WLP800, 833, 028, 001, 007, WY1098*