



Assessing Hops for Beer Quality

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Seminar Objectives



Hop Quality Overview

Brush up on the key metrics that determine hop quality.



Reference Standards

Train on common hop aromas (and off-notes!).



Hop Assessment

Smell examples of high (and low) quality hops.



Case Studies

Review real world application examples from your colleagues.



Best Practices

Determine best practices for your brewery.



Resources

Discover what resources and tools are readily available to you.



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Hop Quality

Quality at Harvest

- Picking window
- Peak analytes
- Sensory targets
- Dry Matter
- Kilning & Conditioning
 - 8.5-10.5% moisture



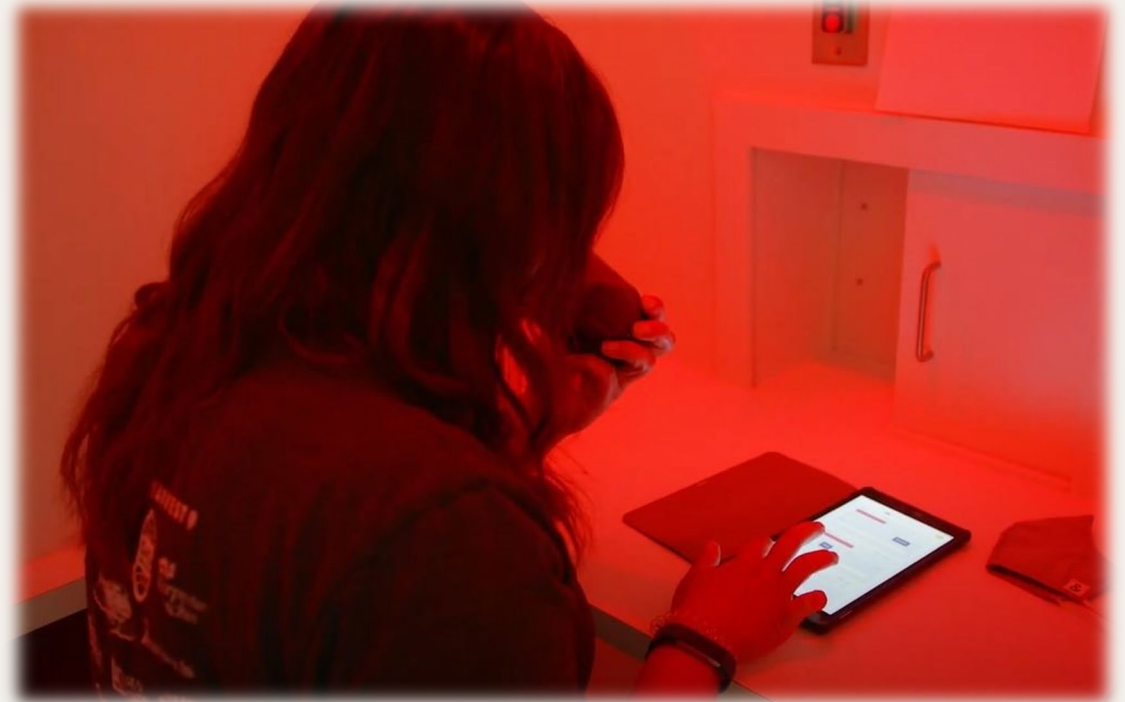
Post-Production Quality

- Pellet density: 32%-35%
- Packaging
 - Foils are checked on every pallet
 - Dunk tank to test seals
- Storage: at 32°F/0°C



Post-Production Quality

- Sensory
 - Each pellet lot assessed by ≥ 7 validated panelists
 - Thresholds for off-notes
 - Take note of pellet integrity
 - Density
 - Moisture
 - Quality in and quality out!



ALPHA ACID
vs Typical Variety Range

14.3
UV Alpha (%)

10

16

BREWING VALUES

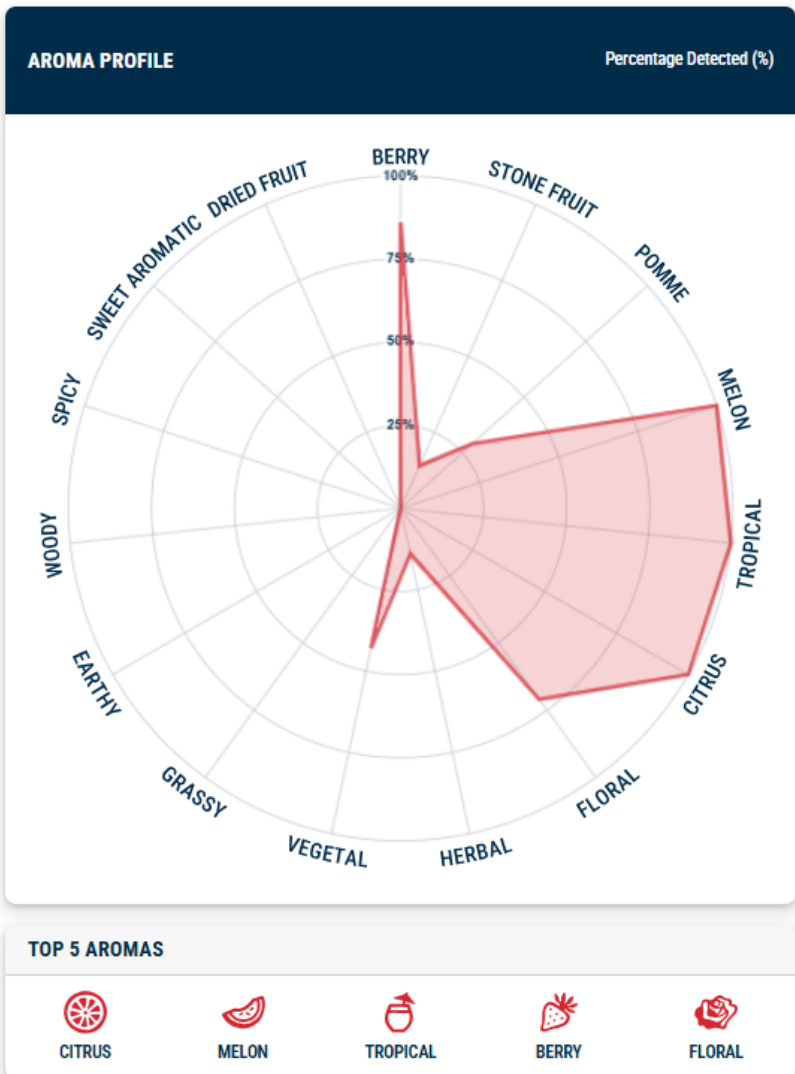
Percentage (%)

UV ALPHA	14.3%	<div></div>
UV BETA	4%	<div></div>
HPLC ALPHA		
HPLC BETA		
MEBAK ALPHA		

SURVIVABLE COMPOUNDS

Parts per Million (ppm)

Survivable compound data for this lot is currently unavailable.
Please email quality@yakimachief.com for more information.



TOTAL OIL
vs Typical Variety Range

2
mL/100g

1

3

OIL COMPONENTS

Percentage (%)

β-PINENE	0.6%	<div></div>
MYRCENE	54.2%	<div></div>
LINALOOL	0.7%	<div></div>
CARYOPHYLLENE	8.5%	<div></div>
FARNESENE	0.1%	<div></div>
HUMULENE	15.1%	<div></div>
GERANIOL	0.4%	<div></div>
OTHER	20.4%	<div></div>

OTHER

HSI	0.251
HPLC COHUMULONE	
HPLC COLUPULONE	
MOISTURE	9.9%
SPRAY RECORD NOTES	Etoxazole was not applied, Bifenazate was not applied

HOP & BEER SENSORY LEXICON



AROMA



DRIED FRUIT

Date • Dried Apricot
Dried Fig • Raisin



BERRY

Black Currant • Blueberry
Grape • Raspberry • Strawberry



STONE FRUIT

Apricot • Cherry
Peach • Plum



POMME

Apple • Pear



MELON

Cantaloupe • Cucumber
Honeydew • Watermelon



TROPICAL

Banana • Coconut • Guava • Lychee
Mango • Passion Fruit • Pineapple



CITRUS

Grapefruit • Lemon
Lemongrass • Lime • Orange



FLORAL

Cherry Blossom • Geranium
Jasmine • Rose • Soapy



HERBAL

Black Tea • Dill • Green Tea
Mint • Rosemary • Thyme



VEGETAL

Cabbage • Celery
Green Pepper • Tomato Plant



GRASSY

Green Grass • Hay



EARTHY

Barnyard • Compost • Geosmin
Leather • Mushroom • Soil



WOODY

Cedar • Pine • Resinous • Sawdust
Tea Tree • Tobacco



SPICY

Anise • Black Pepper
Cinnamon • Clove • Ginger



SWEET AROMATIC

Bubblegum • Caramel • Chocolate
Creamy • Honey • Vanilla



ONION / GARLIC

Garlic • Green Onion • Onion



DANK

Cannabis • Skunky



NUTTY

Almond • Peanut • Walnut



BREADY

Biscuit • Dough
Graham Cracker • Oatmeal • Rye



ROASTED

Coffee • Dark Malt



OFF-NOTES

Burnt Rubber • Cardboard • Catty
Cheesy • Diesel • Musty • Plastic/Waxy
Smoky • Sulfur • Sweaty

* Acetaldehyde • Butyric Acid
Diacetyl • DMS • Lactic Acid
Light Strike • Metallic

**Off notes occurring in beer*

TASTE

BITTER

SALT

SOUR

SWEET

UMAMI

MOUTHFEEL

ALCOHOL

Warming • Boozy

ASTRINGENCY

Drying • Grippy

BODY

Thickness • Fullness

CARBONATION

Bubble Size • Density

REVISED APRIL 2021 - V1

Common Hop Aromas



Orange

Juice / Zest



Coconut

Coconut cream



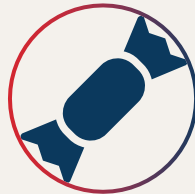
Lemon

Juice / Zest



Black Currant

Juice / Jam



Bubblegum

Hubba Bubba



Cedar

Fresh Cut / Sauna / Home Depot



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Common Hop Off Notes



Catty

Tom Cat Urine



Cheesy

Aged Cheese / Sweaty Socks



Diesel

Gasoline



Musty

Cellar / Moldy / Wet Basement



Onion/Garlic

Raw Onion / Garlic / Scallion



Sweaty

Body Odor



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Assessing Hops in the Brewery

In-Line Sensory Check

Informal and reactive sensory check performed by production staff

- Know the aroma target for standard beer or one—off recipe
- General expectations for hop product
- EX: New Zealand IPA (one-off beer)



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Hop Selection Preparation

Brushing up before making the pilgrimage

- Inventory assessment / Sample library
 - T90 vs. enriched products
 - Products in each beer
- Brand review
 - Beers tasting as expected
- Reference standards
 - Focus on key descriptors used in your brands



Long Term Storage

Assessing degradation throughout storage

- T90 and Cryo have 3-year best by dates (assuming proper storage conditions)
- Oxidation-related aromas
 - Cheesy
 - Cardboard
 - Dried fruit
 - Reduced aroma intensity
- EX: Citra Flagship IPA



Variety/Product Substitution

Evaluating the impact of variety and/or product substitutions in standard recipe

- Brand Profile
 - Substitution for a noticeable difference or some other reason?
- Sensory Tests
 - True to Brand
 - Preference (against Control)
 - Descriptive Analysis
- EX: Pale Ale using Strata



Key Takeaways

- Maintain a library of batches of each brand
- Establish a trained panel
 - In some cases, just a few trusted employees can meet certain needs
 - Utilize different sensory tests to answer different questions
- Develop specific beer profiles
 - Compare beers of similar age
- Cross-departmental communication is crucial!
- Document, document, document!
- Don't just do sensory on the finished product, expand sensory to every aspect of the brewing process! (Like raw materials!)



CENTENNIAL

Sample #284



Key descriptors:
*Floral, Lemon, Orange,
Woody, Herbal*



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CENTENNIAL

Sample #761



Key descriptors:

*Floral, Lemon, Orange,
Woody, Herbal*



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MOSAIC®

Sample #913



Key descriptors:

***Berry, Citrus, Stone
Fruit, Tropical, Woody***



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MOSAIC®

Sample #335



Key descriptors:

***Berry, Citrus, Stone
Fruit, Tropical, Woody***



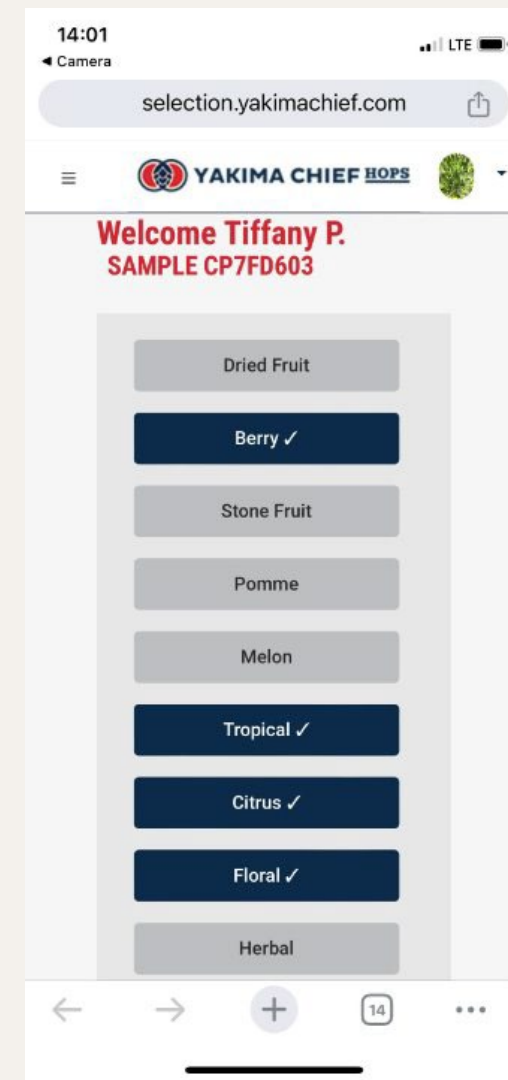
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Best Practices

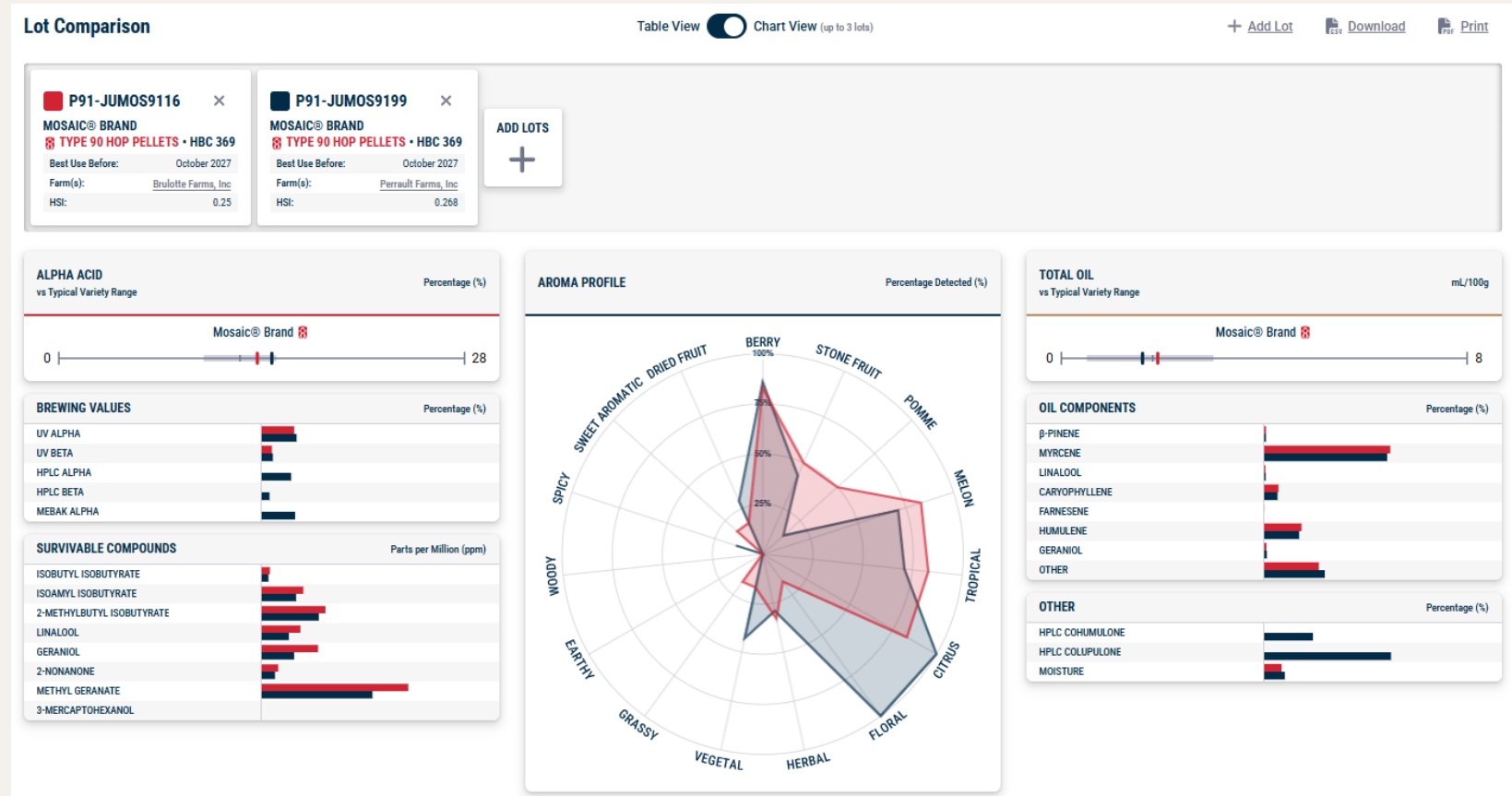
Hop Sensory Evaluation

- **Maintain a sample library**
- **Incorporate (positive & negative) controls into sample sets**
- **Establish Protocols**
 - Blind-code and randomize samples to reduce bias
 - Minimize fatigue and aroma carryover
 - Do your best to control the environment
- **Prepare and distribute sensory ballots to record data**
- **Document, document, document!**
 - Consider variety and usage when reporting results



Resources

- Sensory Lexicon
- Sensory Ballot
- YCH Website (Variety Pages)
- YCH Lot Lookup Tool
- ASBC
- MBAA
- DraughtLab





THANK YOU!

Any questions?

