Brewing With Experimental Hops:
A New Hop Variety Just for Homebrewers

HBC-438

HBC-438

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Development of Novel Hop Varieties

- Basic hop info
  - Botanical
  - Crop development
- Impact of hop variety.
- Variety development
  - Why?
  - How?
  - Results

Hop Basics

- Dioecious (male and female plants).
  - Genetically complex.
  - Male-no commercial value
  - Female-Produces the valued strobiles, “cones”
- Annual above ground.
- Perennial below.
  - Allows for clonal propagation.
- Climbing bine requiring a support system.
- Photoperiod sensitive

Mature Female “Cones”

Male flowers at anthesis

Developmental Physiology of the Hop Plant (or Production Stages)

- The hop plant goes through numerous stages of growth throughout the year.
  - Each stage has its own unique characteristics.
  - Therefore each stage of growth requires its own unique management scheme.
- Main Stages of Growth
  - Dormancy
  - Spring re-growth
  - Vegetative Growth
  - Reproductive Growth
  - Preparation for Dormancy

Comments on Development

- The stages of hop plant growth need to be understood to properly manage the crop.
  - Each stage is unique, thus unique management requirements.
- Yield is already being determined as early as April and May.
- To complicate things further: *Much of this is variety dependant.*

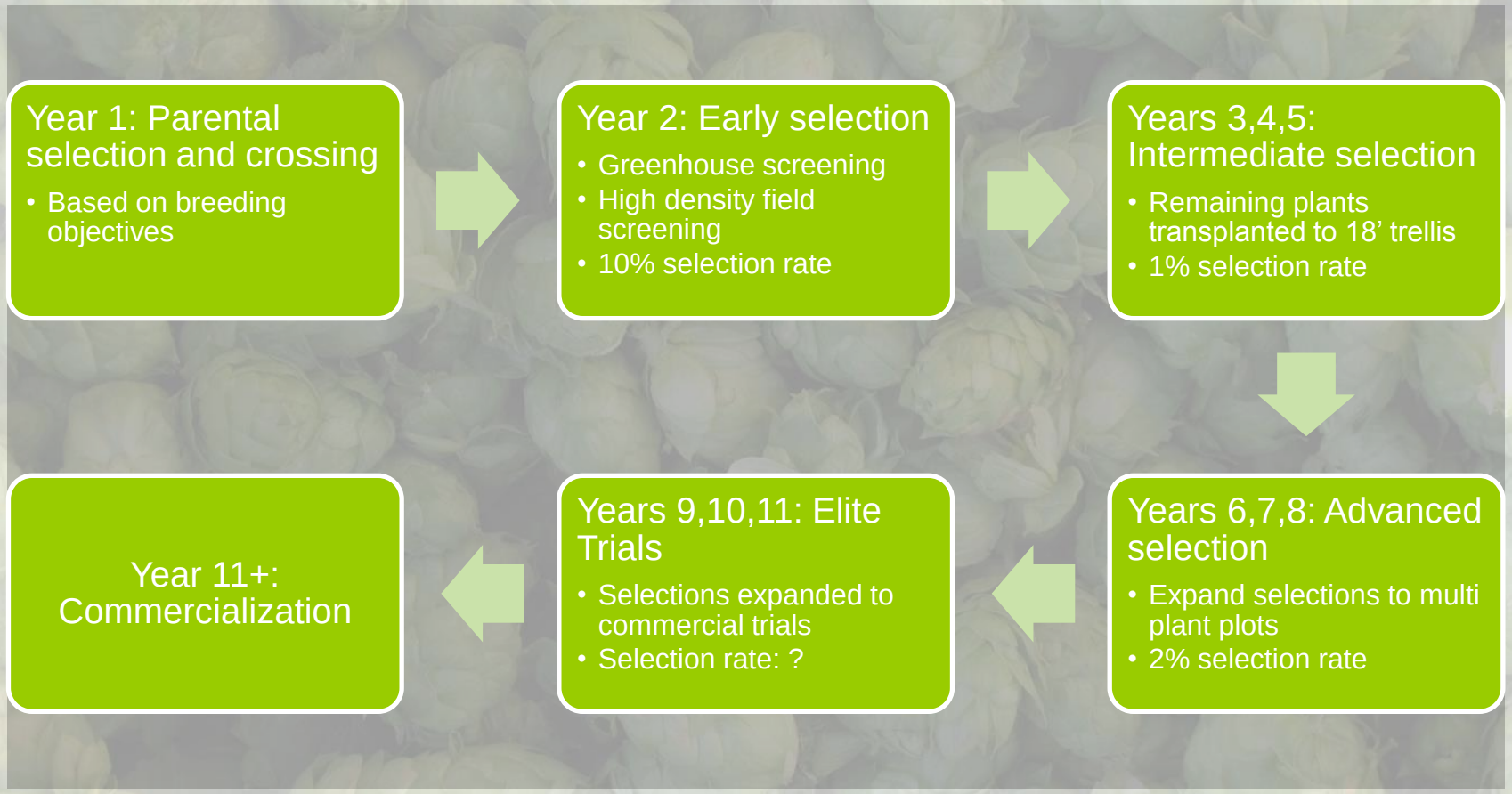
Varietal Impact

- Physiology and development are impacted by variety.
- Crop management is varietal dependant.
- There is a strong genetic x environmental interaction.
- The goal: Realize the maximum genetic potential.
- The problem: Maximum genetic potential cannot be reached in all environments.

The solution: Breeding varieties to match the environment and meet the industry needs.

- Breeding objectives based on the needs of all stakeholders.
  - Objectives meant to provide brewers with hops/hop products which enhance their brews, while being agronomically efficient.
  - Performance of a variety at every level, from the farm to the brewery, adds to the overall health of the industry and our environment.

Hop Breeding Scheme



Population Dynamics

Crossing

Left: Collection of male flowers for isolation of pollen.
Above: Application of pollen to a bagged receptive female.

From Crosses to seedlings

Typically start with 20,000 – 50,000 genotypes in any given year.

Seedlings are screened in the greenhouse for Powdery Mildew, then planted to the field.

Typically eliminate 75 – 90% of the starting population.


HBC EXPERIMENTAL SAMPLE
Sample ID: 1020215086
Location: PFI
Date: 9/21/2014

Cultivar Release: Year 11

- After 8 - 10 years of evaluation, release is considered.
  - Private varieties: PVP begins.
- The work is far from over, success is dependant on:
  - Continued agronomic success.
  - Grower acceptance, usually short term.
  - **Brewer acceptance, long term.**

Brewer Acceptance

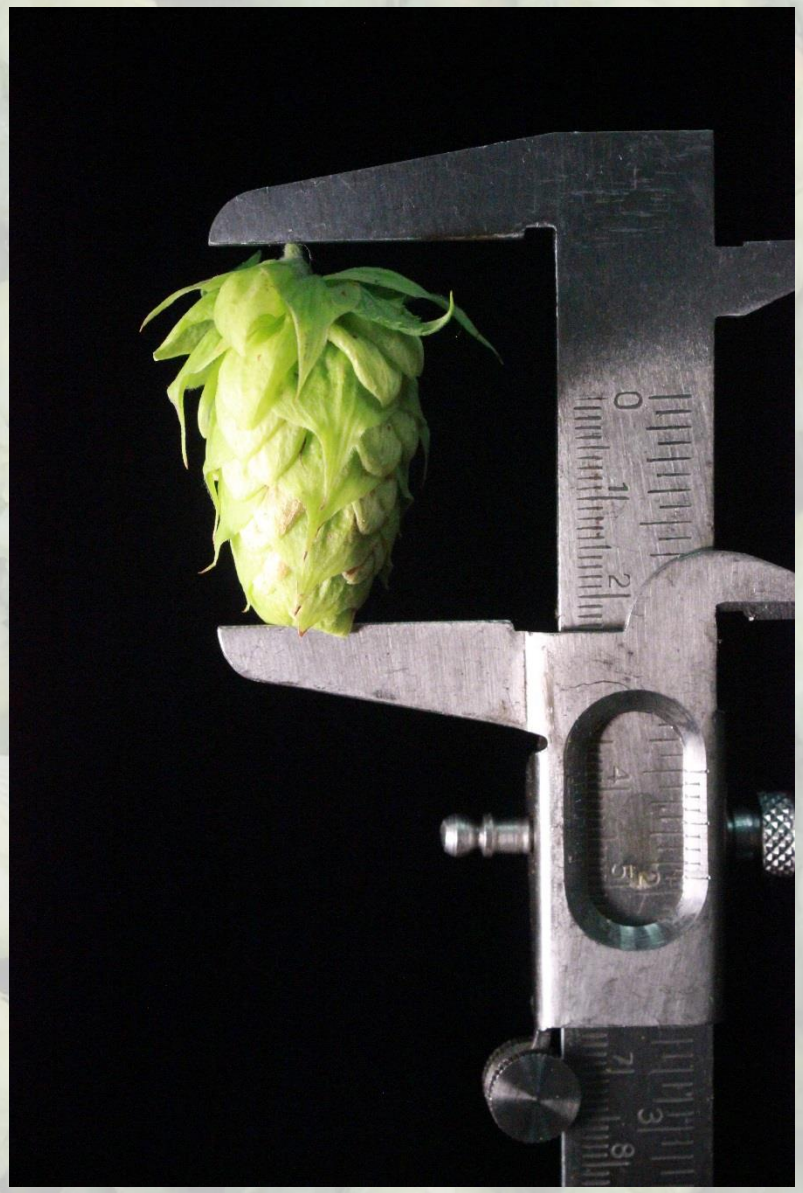
- Normally, commercial brewers for testing new products.
  - Pilot volumes, small scale commercial volumes.
- Occasionally, we homebrew.
  - Small samples, quick results.
- Idea: Why not utilize homebrewers for testing?
  - We need the right hop

Homebrew Hop Testing

- What is the right hop?
- HBC 438:
  - Performs in 1 acre trials
  - Performs in initial brew trials
    - Homebrew: more on this later
  - Exceptionally unique
  - Great story

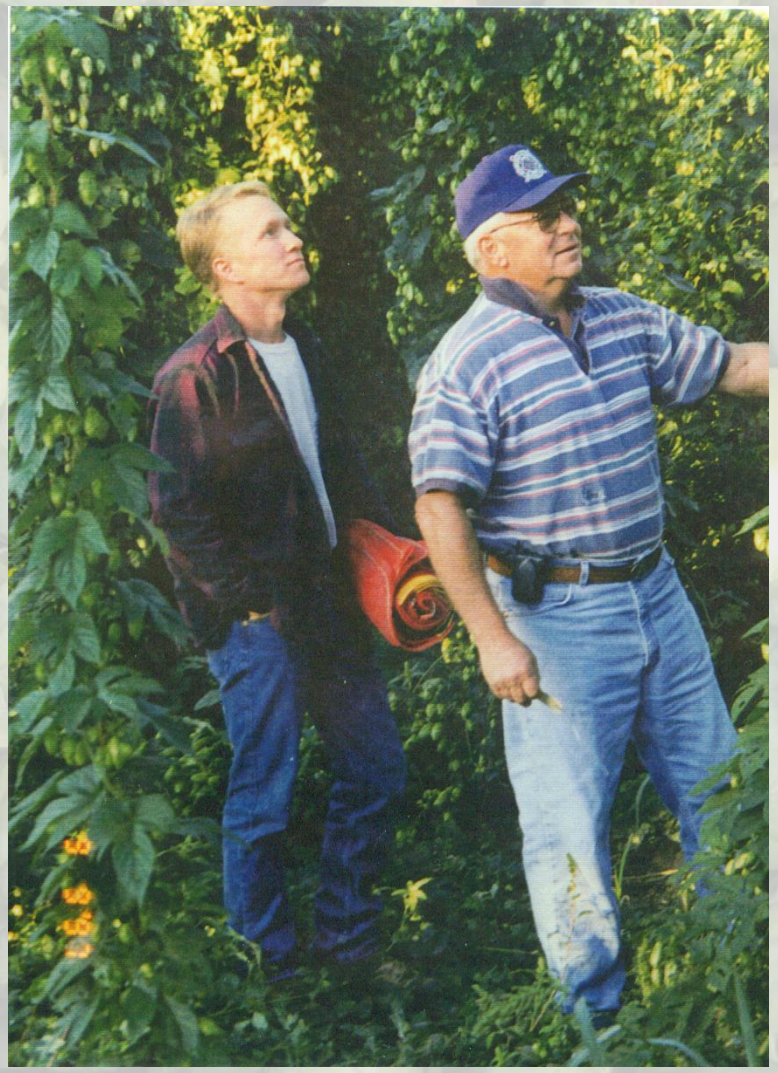
HBC 438 Stats

- Alpha: 14 – 18 %
- Beta: 6 – 7 %
- CoH: 20 – 25 %
- Total Oil: 2.5 – 3.5 ml/100g
- Exceptionally unique aroma:
  - Stone, tropical fruit, orange, minty herbal.



HBC 438 History

- 1997
  - H. lupulus var. neomexicanus from S.W., possibly Mexico.
  - Given to me by Chuck Zimmermann ~1997
  - Rank and wild, but beautiful.
  - Late flowering if at all.
  - Became notorious
  - Nickname: “Chuck’s Mexican”



HBC 438 History

- 2004
  - Assistant breeder and I had left over pollen.
  - The only female still viable: Chuck's Mexican
  - We mixed the pollen and Marco applied it.
  - Allowed the wind to pollinate.
  - Unknown Father
  - Unpredictable outcome

HBC 438 History

- 2007
  - Unique aromas noticed from several plants, particularly selection #0406363074
    - Breeder's notes: "fruity/bananas"
  - Harvested small sample, gave to Karl Vanevenhoven to homebrew
  - He and friend Derry came back for more in 2008
  - Needed a codename – Ron Mexico!

WHO IS RON MEXICO

- HBC-438
- August 2007 – Jason showed samples to Karl & Derry in the single hill plot
- Hand pick and brew!
- A lot of homebrewing with 438 followed
- A lot of positive feedback kept Ronnie alive (at least one of them)

YCHHOPS

2009 GABF PRO-AM

2009 04-10 Ron Mexico Pale

American Pale Ale

Type: Partial Mash	***Date:*** 4/10/2009
Batch Size: 5.00 gal	***Brewer:*** Karl & Derry
Boil Size: 2.50 gal	***Asst Brewer:***
Boil Time: 60 min	***Equipment:*** My Equipment
Taste Rating(out of 50): 50.0	***Brewhouse Efficiency:*** 75.00
Taste Notes:	

Ingredients

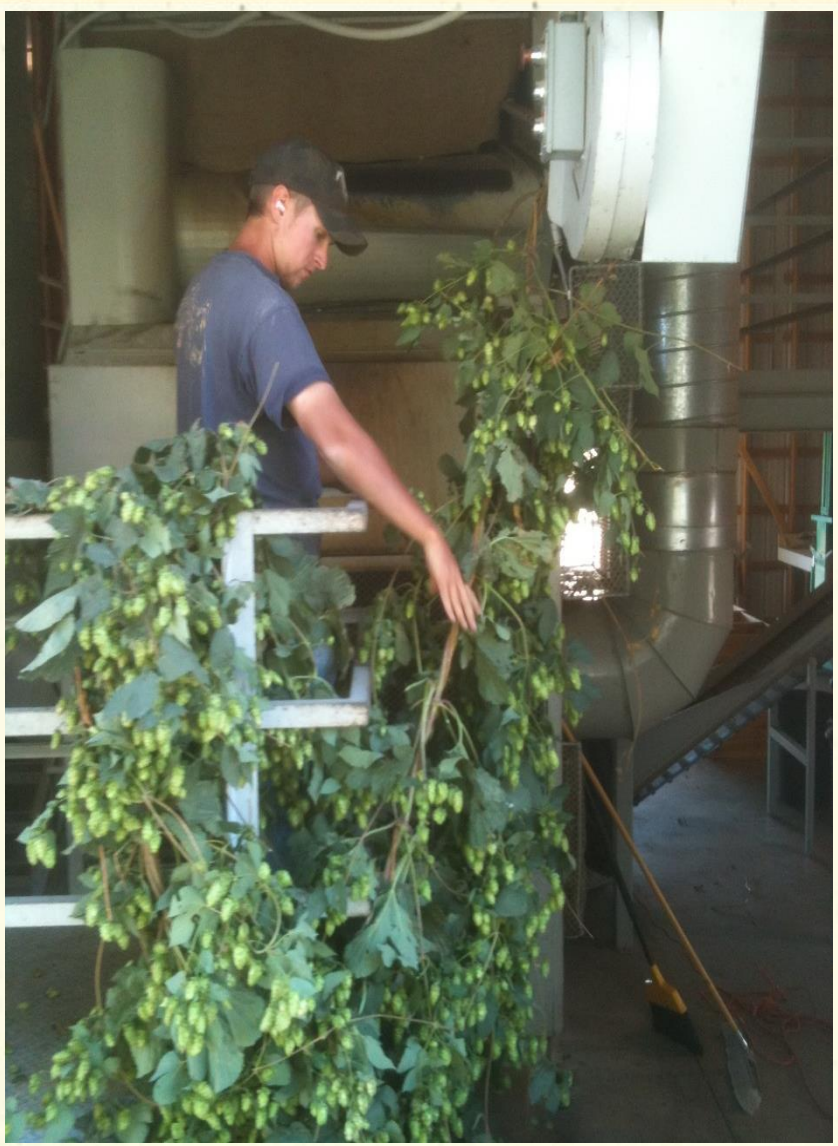
Amount	Item	Type	% or IBU
7.00 lb	Pale Liquid Extract (8.0 SRM)	Extract	93.33 %
0.50 lb	Caramel/Crystal Malt - 10L (10.0 SRM)	Grain	6.67 %
2.00 oz	HBC Mexico [15.50 %] (Dry Hop 10 days)	Hops	-
0.60 oz	HBC Mexico [15.50 %] (60 min)	Hops	19.4 IBU
0.70 oz	HBC Mexico [15.50 %] (20 min)	Hops	13.7 IBU
1.50 oz	HBC Mexico [15.50 %] (2 min)	Hops	4.1 IBU
1 Pkgs	Dry Ale Yeast (Fermentis #US-05)	Yeast-Ale	

Beer Profile

Est Original Gravity: 1.053 SG	***Measured Original Gravity:*** 1.053 SG
Est Final Gravity: 1.015 SG	***Measured Final Gravity:*** 1.015 SG
Estimated Alcohol by Vol: 4.89 %	***Actual Alcohol by Vol:*** 4.95 %
Bitterness: 37.2 IBU	***Calories:*** 237 cal/pint
Est Color: 8.3 SRM	***Color:*** Color

- Single hop recipe
  - Quick and easy
  - Showcase the hops
  - You can brew it on your stove
  - Equipment needs are reasonable

WOLF PICKER AT ZIMMERMANN RESEARCH CENTER



2ND HILL OF HBC 438

HOME GROWN

Grow hops in your back yard (or your friends)

- Train the hops in May
- Pick them when they smell aromatic

HAND PICK

HOME BREW A FRESH HOP ALE

- Brew a Fresh Hop Ale
  - Use your favorite hoppy recipe
  - To account for the water weight of wet hops
    - Use 5 times the hops your normal recipe calls for
    - Divide the alpha by 5
  - Use some pellets for first bittering addition
  - Dry hop with them!!!

5 TIMES THE HOPS IN THE KETTLE AND DRY HOPPING

FRESH HOP HOMEBREW RECIPE

- Buy a brewing software program
- Create your own recipe

2013 Fresh Hop Ale Ron Mexico Session NHC Recipe

American IPA

Type: Partial Mash	***Date:*** 9/13/2013
Batch Size: 5.00 gal	***Brewer:*** Karl
Boil Size: 2.50 gal	***Asst Brewer:*** Derry
Boil Time: 60 min	***Equipment:*** My Equipment
Taste Rating(out of 50): 35.0	***Brewhouse Efficiency:*** 75.00

Taste Notes: Won FH Pale & 1st in basement competition. 48 IBU per YC lab FH Best of Show

Ingredients

Amount	Item	Type	% or IBU
7.00 lb	Alexanders Pale Liquid Extract (8.0 SRM)	Extract	87.50 %
0.50 lb	Caramel/Crystal Malt - 15L (15.0 SRM)	Grain	6.25 %
0.50 lb	Vienna Malt (3.5 SRM)	Grain	6.25 %
1.20 oz	Cascade [6.00 %] (60 min)	Hops	14.3 IBU
3.00 oz	HBC Ron Mexico (WET) [3.50 %] (60 min)	Hops	20.9 IBU
6.00 oz	HBC Ron Mexico (WET) [3.50 %] (20 min)	Hops	25.3 IBU
7.00 oz	HBC Ron Mexico (WET) [3.50 %] (2 min)	Hops	4.1 IBU
0.25 tsp	Yeast Nutrient (Primary 3.0 days)	Misc	
1.00 oz	Malto-Dextrine (Boil 5.0 min)	Misc	
1 Pkgs	Dry Ale Yeast (Fermentis #US-05)	Yeast-Ale	

Beer Profile

Est Original Gravity: 1.056 SG	***Measured Original Gravity:*** 1.063 SG
Est Final Gravity: 1.016 SG	***Measured Final Gravity:*** 1.016 SG
Estimated Alcohol by Vol: 5.15 %	***Actual Alcohol by Vol:*** 6.14 %
Bitterness: 64.6 IBU	***Calories:*** 284 cal/pint
Est Color: 8.7 SRM	***Color:*** Color

2013 FRESH HOP - RONNIE

POST FRESH HOP HOMEBREW COMPETITION

2014 FRESH HOP - BACK YARD STYLE

2013 FIRST ACRE OF HBC 438

WHO IS RON MEXICO? REALLY??

- A beer made by Russian River
- Has taken an unusual path from single hill to becoming commercially available
- Not allowed on an NFL jersey
- Half neomexicanus

HBC 438 HARVEST LAB RESULTS

Crop Year	Date Recd	Alpha	Beta	Oil
2013	9/9/2013	17.7%	6.5%	2.2%
2014	9/6/2014	16.8%	6.4%	1.8%

AUTOMATED HOMEBREW PACKAGING

RONNIE JR. – 22 GALLON RECIPE

Malt Bill
2-Row Malt – 85.7%
Acid Malt – 1.6%
Munich Malt 5.5%
Crystal 10L 2.2%
Crystal 40L 2.7%
Carapils – 2.2%

- OG- 13.88 plato
- TG- 1.68
- Mash Temp- 152
- Fermentation Temp- 68F
- BU's – 71.84

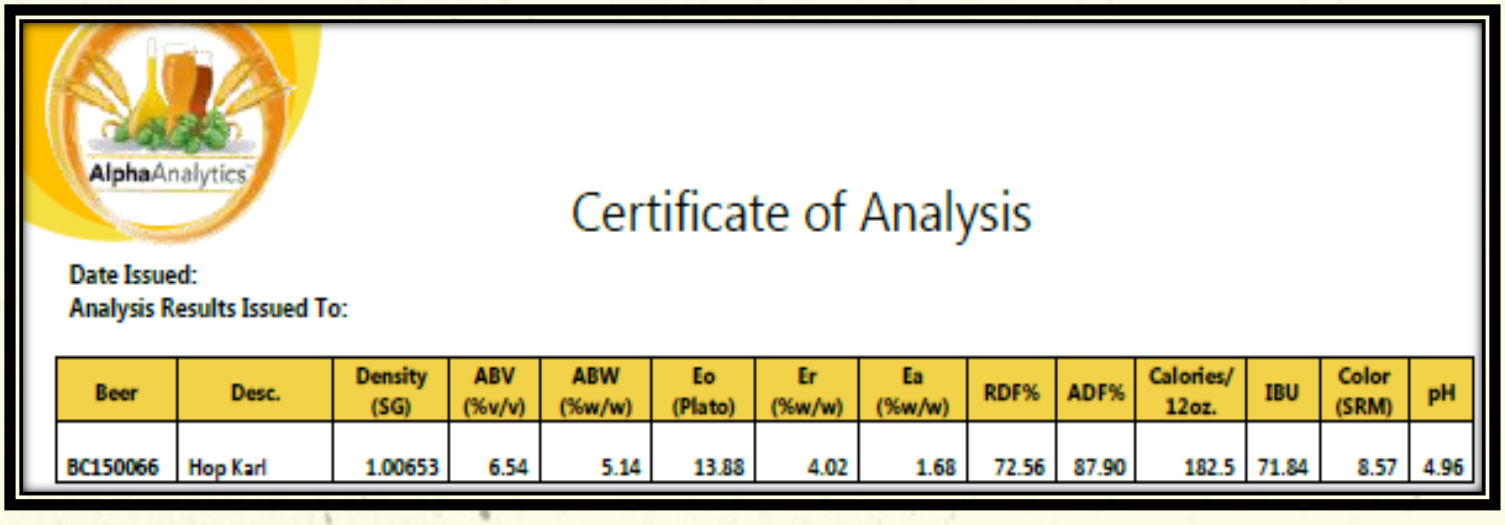
Hop	Alpha	Time	Percentage/Rate
HBC-438	15.7	90 minutes	1 oz
Simcoe®	13.0	90 minutes	1 oz
HBC-438	15.7	45 minutes	0.5 oz
Simcoe®	13.0	45 minutes	0.5 oz
HBC-438	15.7	15 minutes	4 oz
Simcoe®	13.0	15 minutes	1 oz
Cascade	5.8	15 minutes	1 oz
HBC-438	15.7	0 minutes	8 oz
Simcoe®	13.0	0 minutes	2 oz
Cascade	5.8	0 minutes	2 oz
HBC-438	15.7	Dry Hop # 1	8 oz = 0.455 oz/gallon
Simcoe®	13.0	Dry Hop # 1	2 oz = 0.125 oz/gallon
Cascade	5.8	Dry Hop # 1	2 oz = 0.125 oz/gallon

Water – IPA water profile
Yeast – California Ale Yeast

The Process
Day 1 – brew, primary fermentation starts at 68F
Day 8 - drop yeast and dry hop
Day 15 – Crash to 33 degrees F
Day 22 – Kegged and carbonate

RONNIE JR.– THE SPECS

- Original Gravity – 13.88 plato
- Terminal Gravity – 1.68 plato
- Color – 8.57 SRM (ASBC)
- ABV – 6.54
- BU's – 71.84



AlphaAnalytics

Certificate of Analysis

Date Issued:
Analysis Results Issued To:

Beer	Desc.	Density (SG)	ABV (%v/v)	ABW (%w/w)	Eo (Plato)	Er (%w/w)	Ea (%w/w)	RDF%	ADF%	Calories/ 12oz.	IBU	Color (SRM)	pH
BC150066	Hop Karl	1.00653	6.54	5.14	13.88	4.02	1.68	72.56	87.90	182.5	71.84	8.57	4.96

ACKNOWLEDGEMENTS

- Select Botanicals Group / HBC
- Russian River — Vinnie, Natalie, and Eric
- YCHHOPS
- Carol
- Derry

YCHHOPS

ENJOY THE HOP ENJOY THE BEER

Single Hop Beers – Vinnie Cilurzo

- How I got started brewing single hop beers
- Why brew a single hop beer?
  - The benefits
  - The pitfalls
- Ron Mexico by the numbers
  - The specs
  - The recipe

Some Thoughts on Single Hop Beers

- Hop 2 It – RRBC's single hop beer
- Why brew a single hop beer?
  - The benefits
  - The pitfalls

Ron Mexico – The Specs

- Original Gravity – 11.24 plato
- Terminal Gravity – 2.96 plato
- Color – 6.50 (ASBC)
- ABV – 4.50
- BU's - 57

Ron Mexico – The Recipe

Malt Bill
2-Row Malt (Rahr) – 42.25%
Acid Malt (Wyrmn) – 3%
Pale Ale Malt (Rahr) – 51.5%
Crystal Medium, 60L (Simpson) - .75%
Carapils (Briess) – 2.50%

- **OG- 11.24 plato**
- **TG- 2.96 plato**
- **Mash Temp- 156 (yeast viability and cell count)**
- **Mash pH- 5.40**
- **Fermentation Temp- 64F / 68F**

Hop	Alpha	Time	Percentage/Rate	BU's
HBC-438	15.7	90 minutes	.83%	5.00
HBC-438	15.7	15 minutes	16.53%	12.00
HBC-438	15.7	0 minutes	82.64%	40.00
HBC-438	15.7	Dry Hop # 1	.516 oz/gallon	
HBC-438	15.7	Dry Hop # 2	.516 oz/gallon	

Water – IPA water profile
Yeast – California Ale Yeast

The Process
Day one- brew, primary fermentation starts at 64F and ferments to 68F
Day four- cap tank (near end of fermentation)
Day five- 5 psi Co2 top pressure on FV
Day ten- pull yeast / DH # 1 / 68F / 2 psi top pressure
Day fifteen- DH # 2 / 68F / 2 psi top pressure
Day eighteen- drop temp to 32F / 5 psi top pressure
Day twenty one- rack beer to BBT (32F), gelatin, carbonate
Day twenty two- rack beer off gelatin, bottle and keg

Availability of HBC-438

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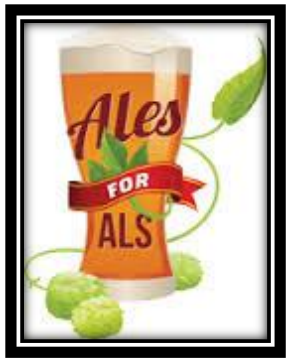


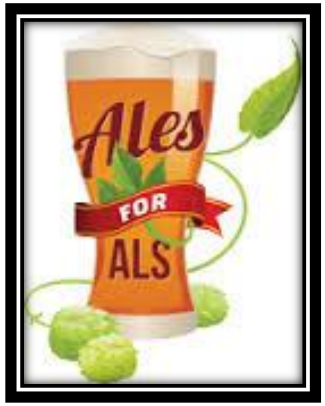
more information:

alesforals.com

Questions

Do you want the Ron Mexico Recipe?

vinnie@rrbeer.com



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