



**YAKIMA
CHIEF
- HOPS -**



C02 HOP EXTRACT & PLANT TOUR

Zoltan Sivo

– Director of Key Accounts (Europe)

Karl Vanevenhoven

– Chief Operations Officer

Art Ortega

– Director of Hop Extract & Regulatory Compliance

AGENDA

- Brief company intro, Growers
- Hop anatomy and Product range
- Co2 and Co2 Hop extraction process
- Extract plant tour – by Art Ortega
- Brewing benefits and pack size



OUR MISSION

To connect family hop farms to the world's finest brewers

OUR VISION

We are the global supplier of choice, focused on sustainably produced, innovative hop products. We are a responsible neighbor and asset to our communities, enriching the products, businesses and lives of everyone we encounter.

OUR VALUES

- **Passion:** For people, product, planet and process
- **Respect:** Teamwork and collective responsibility
- **Integrity:** Transparency and accountability in all we do
- **Dedication:** Quality and Sustainability
- **Excellence:** An emphasis on Innovation and continuous improvement

GROWERS

We are a 100% grower owned hop company. Our grower families have been harvesting hops in the Northwest since the 1800s and have acquired a wealth of knowledge and expertise throughout the decades to create the highest quality hops.

Ownership Farms:

1. 3D Farm/BC Hop Farm - **OR**
2. Black Star Ranches - WA
3. Brulotte Farms - WA
4. B.T. Loftus Ranches - WA
5. Carpenter Ranches - WA
6. C&C Hop Farms - WA
7. Coleman Agriculture - **OR**
8. Double R Ranches - WA
9. Gasseling Ranches - WA
10. Oasis Farms - WA
11. Perrault Farms - WA
12. Sauve & Son Farms - WA
13. Sodbuster Farms - **OR**
14. Van Horn Farms - WA



**CHARLIE
DAVIDSON**

3D & BC HOP FARMS
4th Generation
Woodburn, OR



**ED
ST. MARY**

BLACK STAR RANCHES
5th Generation
Mexico, WA



**REGGIE
BRULOTTE**

BRULOTTE FARMS
8th Generation
Toppenish, WA



**MIKE
SMITH**

B.T. LOFTUS RANCHES
3rd Generation
Yakima, WA



**KEITH
HOUSER**

C & C HOP FARMS
3rd Generation
Mexico, WA



**CRAIG
CARPENTER**

CARPENTER RANCHES
5th Generation
Granger, WA



**JOHN
COLEMAN**

COLEMAN AGRICULTURE
8th Generation
St. Paul, OH



**KEVIN
RIEL**

DOUBLE R HOP RANCHES
5th Generation
Herrish, WA



**PATRICK
GASSELING**

GASSELING RANCHES
4th Generation
Wapato, WA



**BRENTON
ROY**

OASIS FARMS
4th Generation
Prosser, WA



**STEVE
PERRAULT**

PERRAULT FARMS
3rd Generation
Toppenish, WA



**RICK
SAUVE**

SAUVE & SON FARMS
3rd Generation
Milton, WA



**DOUG
WEATHERS**

SODBUSTER FARMS
3rd Generation
Salem, OR



**RICH
VAN HORN**

VAN HORN FARMS
2nd Generation
Mexico, WA

We receive hops from over 50 families throughout the Pacific Northwest.

COMPANY EVOLUTION

Yakima Valley Hop Storage



Yakima Chief Inc. 1997



Extract plant build 1998 ->1999 (Sunnyside, WA)



Yakima Chief Inc.

Yakima Chief, Inc.



Merger with Hopunion in 2014 = 



Rebrand to Yakima Chief Hops Inc. in 2018 =



BREWING ANATOMY OF HOPS

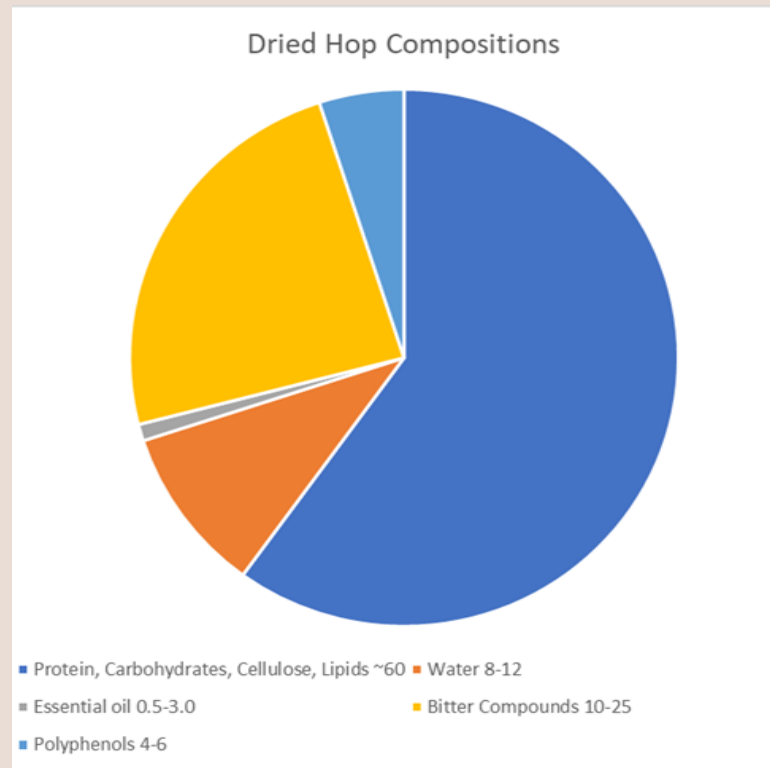
- Mature cones contain yellow granules called lupulin glands.
 - Resins and essential oils.
 - Essential Oils produce “hoppy” character these are the aromatics.
 - Resins are made up of Alpha and Beta acids and have bitter character.
 - Alpha acids isomerize in boiling water, changing shape into a soluble form called iso-alpha-acids



ANATOMY OF A HOP CONE



Strig
Bract
Lupulin Glands



HOP ANATOMY



Lupulin

Alpha Acids	2-20%
Beta Acids	2-20%
Hop Oils	0.5-4%
Lipids	1-5%

Leaf / Bract

Polyphenols & Tannins	3-6%
Terpene-Glycosides	
Cellulose	40-50%
Proteins	15%
Water	8-11%



HOPS USAGE IN THE BREWERY



PRODUCTS



FRESH HOPS

Whole, Wet Hop Cones



WHOLE LEAF HOPS

Whole, Kiln-Dried
Hop Cones



HOP PELLETS

T-90 Pellets &
Pellet Blends



CRYO HOPS®

Concentrated
Lupulin Pellets



AMERICAN NOBLE HOPS™

Hop Pellets



CO₂ HOP EXTRACT



ADVANCED PRODUCTS

IKE, Tetra, Rho,
Hop Oil

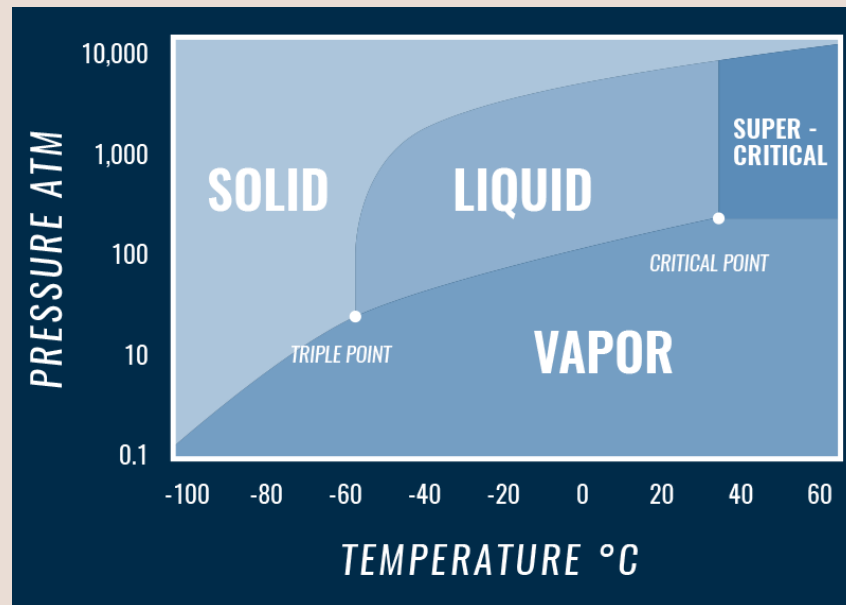
CO₂ HOP EXTRACT

- Contains alpha acids, beta acids and hop oils
- Extraction process filters out solid particles while the CO₂ is recovered and reused
- Primarily used as a kettle ingredient to provide bitterness

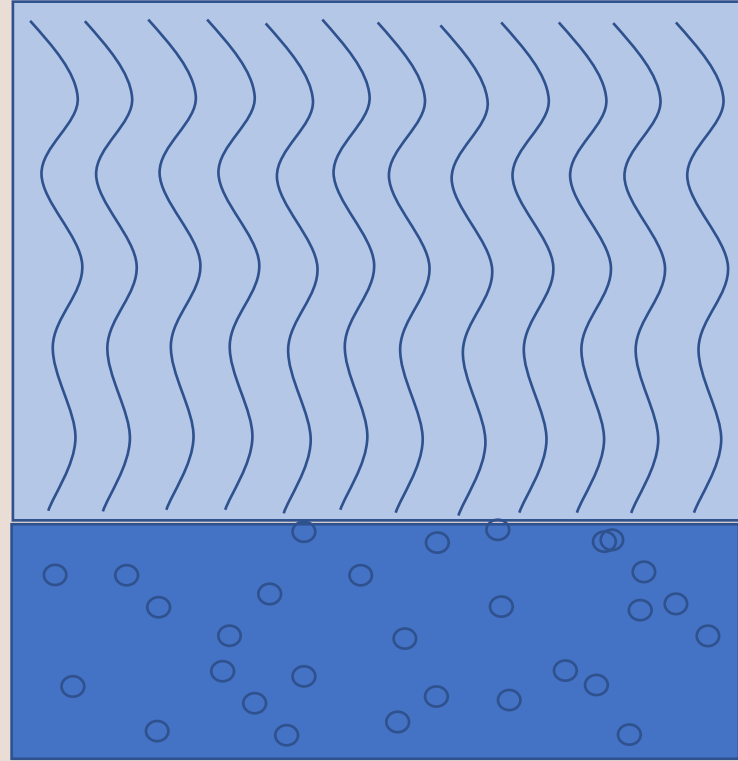
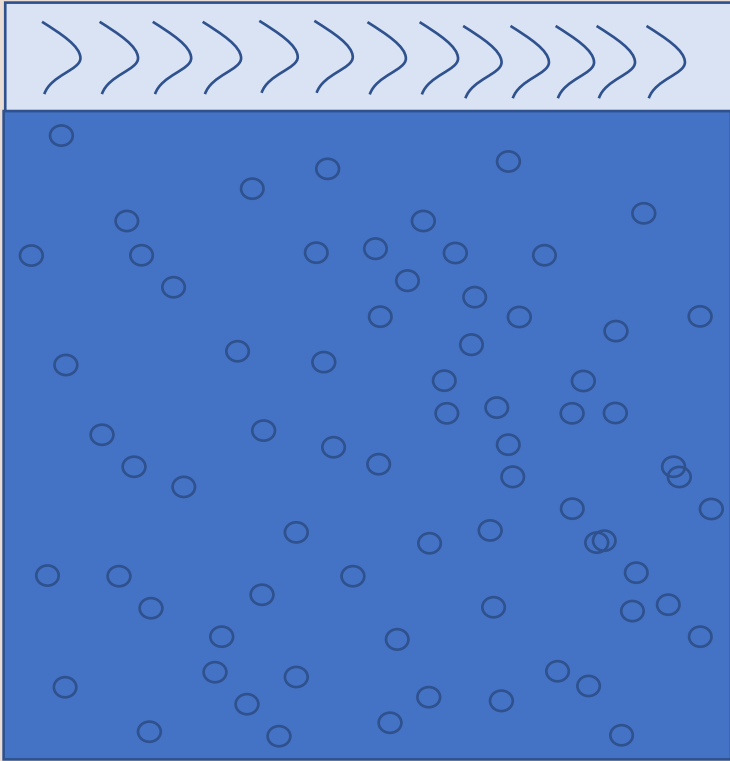


WHY SUPERCRITICAL CO2 AS AN EXTRACTION SOLVENT

- Gentle low temperature treatment of hop pellets during extraction process.
- Absence of O2 reduces opportunity for oxidation and oil/alpha loss.
- CO2 is natural, colorless, odorless, tasteless, non-toxic, non-flammable.
- The Supercritical CO2 extraction process is a sterile process.
CO2 is inert in nature, meaning that CO2 acts as an anti-fungal and anti bacterial during the extraction process.
- Other extraction solvents can leave traces of undesirable residues and are subjected to higher temperature.
- CO2 is naturally occurring in the atmosphere and in beer.



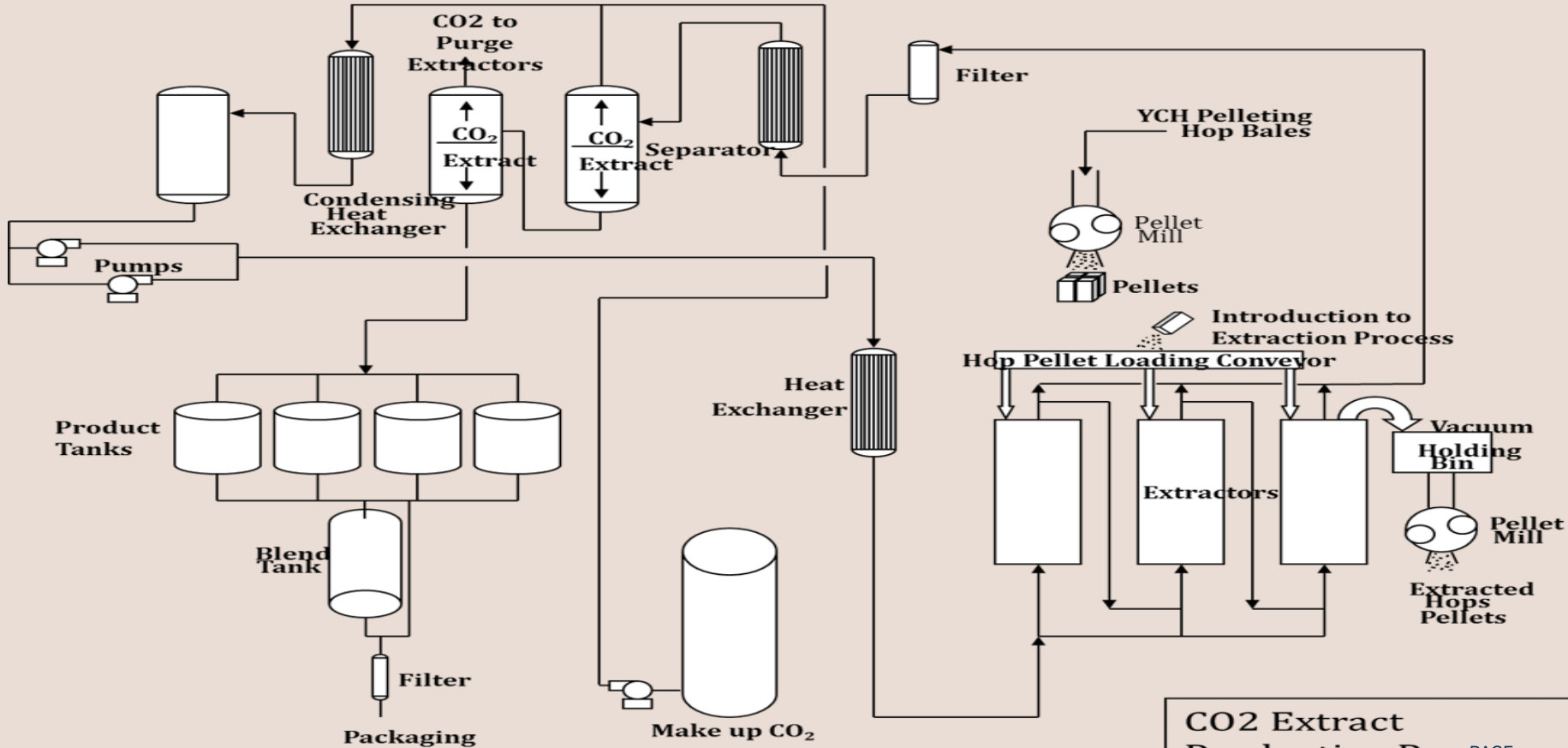
SUPERCRITICAL FLUID



Vapor Density



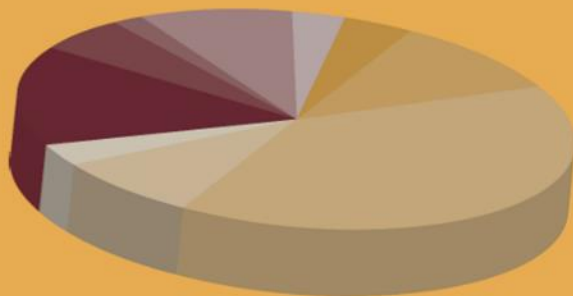
Pressure
Temperature



LEAF / PELLETS VS EXTRACT

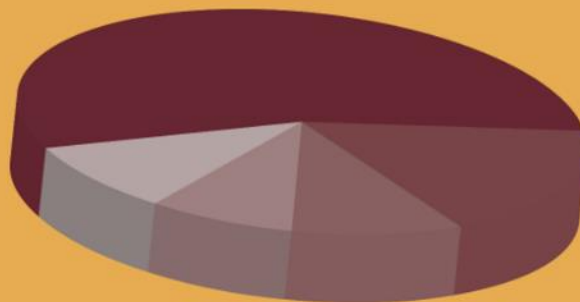
The extraction process filters out all of the hop's solid plant matter and other contaminants leaving behind the purest resin and oil content possible.

LEAF / PELLET COMPOSITION



Alpha Acids	15%
Beta Acids	6%
Oil	2%
Others	3%
<hr/>	
Polyphenols	4%
Proteins	10%
Cellulose	40%
Water	9%
Ash-Salts	8%
Lipids	3%

HOP EXTRACT COMPOSITION



Alpha Acids	55%
Beta Acids	18%
Oil	10%
Waxes	8%
Others	9%

CO2 IS A BEAUTIFUL THING

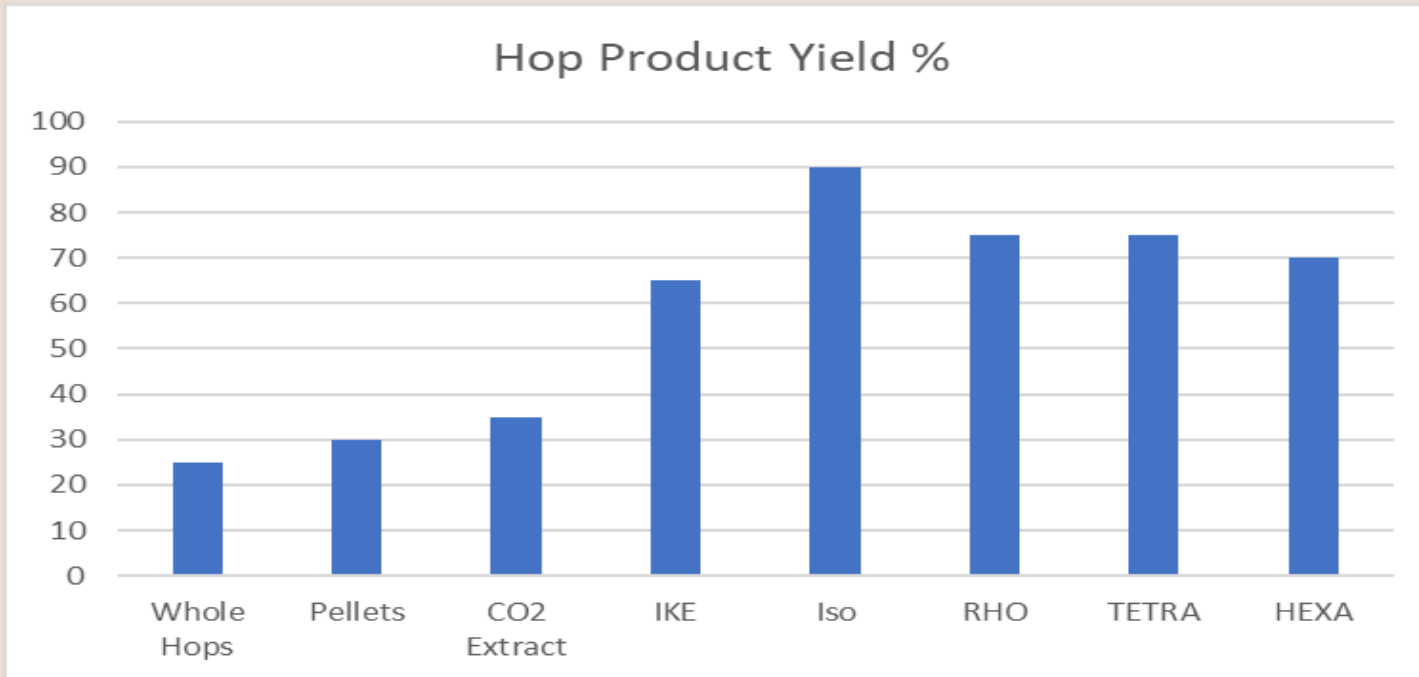
- CO2 is in Beer (fermentation, carbonation)
- CO2 is in the Atmosphere
 - 0.04% naturally occurring in earth's atmosphere
- CO2 blanket in tin – storage stability!!!
- Alpha, Beta & Hop Oils are Soluble in CO2
- Extraction Process has minimal waste while creating a value added hop product
- CO2 Hop Extract makes a brewery more efficient while maintaining varietal character

CO₂ HOP EXTRACT

- Analysis Methods: UV Spectro or HPLC
 - HPLC is roughly 90% of the UV value
 - Must know the required method before packaging by GMA fill
 - Drums are filled to 200Kg, customer doses based on alpha
- Variety characteristics are maintained through extraction process (Same Cohumulone ratio, and oil profile)
- Utilization: 35% (early addition)
- 150 GMA tin will make 10 Barrels of beer at 45 IBU
 - 290 grams of extract at 52% Alpha
 - Would need 1,200 grams of pellets at 15% Alpha



COMPARATIVE BITTERNESS UTILIZATION



BENEFITS OF USING CO2 EXTRACT

- Dosing efficiency
 - Working with $\frac{1}{4}$ of the mass
 - Reduces wort loss by eliminating the sponge effect of pellets and leaf
 - Reduces brew kettle foam formation during the boil
 - Reduces vegetal & polyphenol flavor contribution
 - Consistency
- Shipping, storage handling
 - Working with $\frac{1}{4}$ of the mass significantly cuts down on packaging and shipping costs.
 - Better product stability over time.
 - Ambient storage vs. cold storage.



BENEFITS OF CO₂ HOP EXTRACT

- Extended shelf life and reduced storage requirements
- Increased alpha utilization
- Bitterness, flavor, and aroma via late boil additions
- Ideal for adding IBUs to beer without adding more leaf/pellet mass to the brew kettle.
- **CO₂ Hop Extract has the same varietal characteristics as the leaf hop** preserving the quality and natural ratios of alpha acid, beta acid and hop oil.
- The Supercritical CO₂ extraction process works well for aroma and alpha varieties.
- The alpha utilization and yield benefits in the brewhouse help to achieve a more efficient hopping rate. Therefore, less hops are needed to serve the brewing industry where hops are in high demand. Think Sustainability.



HOW TO USE HOP EXTRACT

- Buy a kitchen grade can opener for tins
- Grant – put the open can in the grant
- Pour in Kettle (warm and pour)
- Use heat resistant Gloves and use tongs
- Freeze and push out of tin
- Wort in bucket, pour in bucket, in Kettle
- Hop Dosing Vessel
- Stainless Steel Cage
- Substitute for % of pellets
- Test IBU in lab and sensory



HOW TO USE HOP EXTRACT

<https://shop.yakimachief.com/brewing-tools/brewing-calculators>

CONVERSION **IBU**

EXTRACT CONVERSION ?

RESET **SAVE**

Measurement System
Metric

From Hop Pellets

Convert from	Utilization	Alpha	Amount
Hop Pellets	% 30	% 15	kg 24

To Extract

Convert to	Utilization
Extract	% 35

Which tins are you using?

150 GMA Tins	300 GMA Tins
No. 0	No. 0

Equivalent Total 3088.5* GMA

*This is an estimated conversion value, your results may differ based on your brewing system

PRODUCT AVAILABILITY

Tin size:

- 0.5 Kg
- 1 Kg
- 2 kg
- 3kg
- 4 Kg

gma: grams of alpha acid

- 150 gma = 0.15 KgA
- 300 gma
- 500 gma
- 1000 gma
- 2000 gma

Varieties

- Generic
- CTZ
- Citra
- Ekuanot
- Herkules
- Nugget
- Pahto
- Mosaic
- Simcoe
- Warrior
- Other!



• AMERICAN HOPS. •
FROM THE
PACIFIC NORTHWEST™
