Sustainability in the Supply Chain

Levi Wyatt – CSR Manager, YCH

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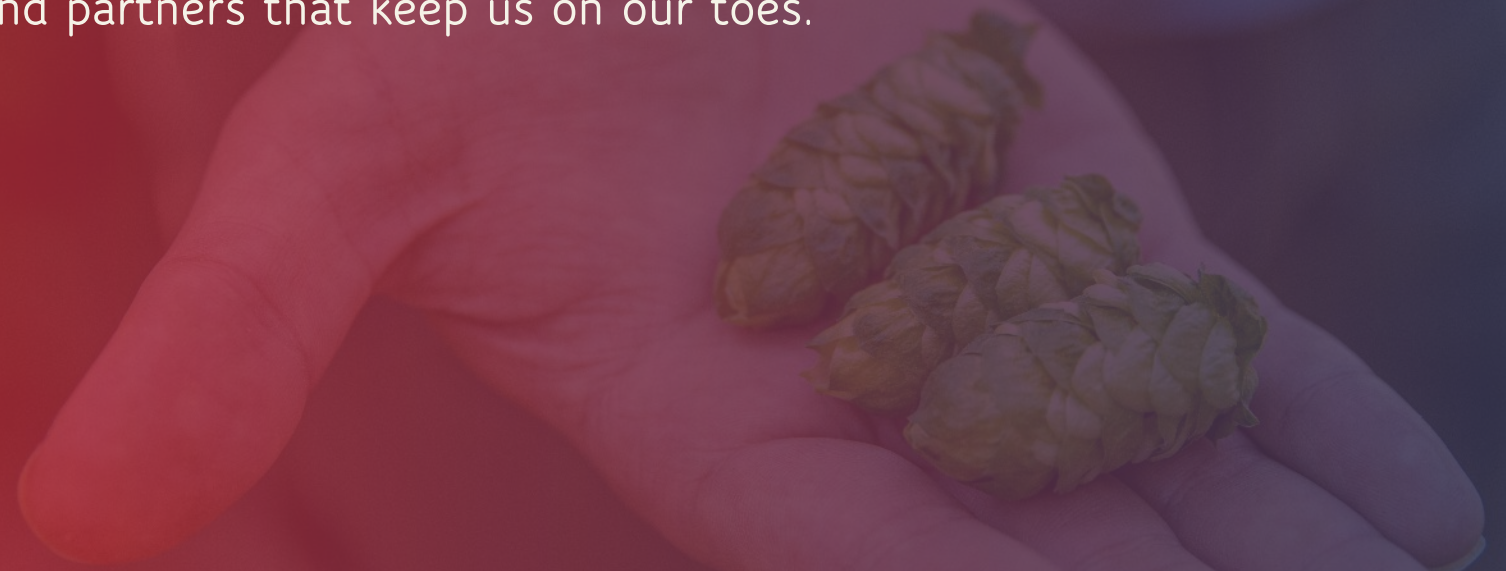
OUR COMMITMENT

We're working to reduce our ecological footprint in everything we do – from the field to our final products. This means that, in our day-to-day work, we're thinking about leaning more into regenerative agricultural practices, less packaging, more planet-friendly transportation, less landfill and partners that keep us on our toes.



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AGENDA

- Agronomics
- Processing
- Product Design
- Sustainability highlights past, present and future

In this age of climate crisis and pandemic-related supply chain shortages, there is growing support for regenerative agriculture and investments in resilient supply chains.

Yakima Chief Hops has made strides toward advancing more sustainable and ethical global agricultural supply chains. But progress is still a moving target.

We believe we must prioritize strategic collaboration–across industry, with cross-sector players, and with local partners–to overcome obstacles to sustainable impact and achieve lasting, meaningful results.

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OUR SUPPLY CHAIN

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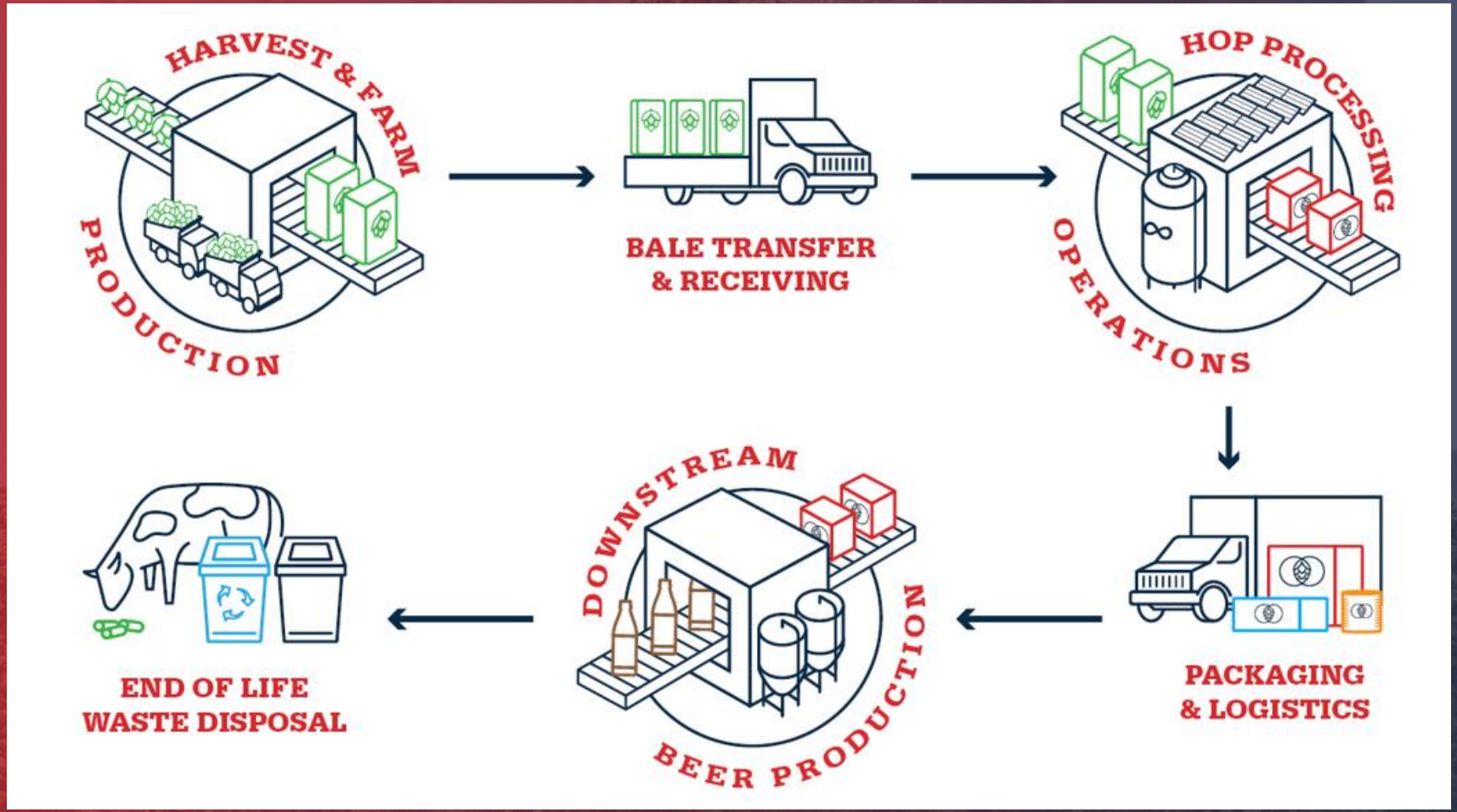

CERTIFIED ISO 9001:2015 COMPANY

CERTIFIED ISO 14001:2015 COMPANY

AGRONOMICS

Environmental benefits of hop breeding

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HOP BREEDING

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YAKIMA CHIEF RANCHES
pnw usa

SUSTAINABLE GROWTH

Pest Control

Reduce pesticide burden.

Mildew

Prevent chronic diseases and provide growers with a more resilient crop.

Heat Resistance

Establishing varieties that are adaptable to rising and inconsistent weather.

Yield

Increasing how much is safely grown on the same amount of land.

Water Efficiency

Developing varieties that conserve water and soil.

Cost Savings

Reduce need for purchasing inputs.

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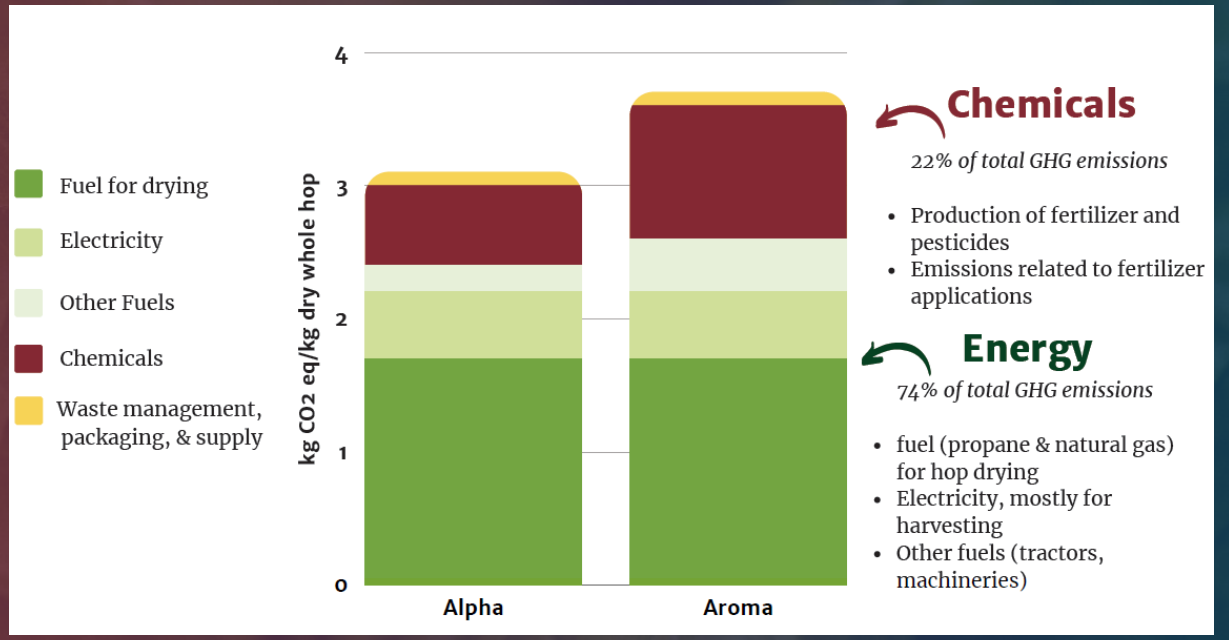
INPUTS

Details

- Insect resistant varieties help reduce carbon inputs and provide much greater economic returns on investment for growers.
- Location focused - Newer varieties are bred for a specific environment, so they are more powdery mildew resistance verses heirloom varieties bred for areas such as Michigan and Germany.
- Composting with hop waste, reducing synthetic inputs,
- Variability in hop varieties.
- Alpha and aroma hop varieties carry different carbon footprints because of the contrast in yield. Alpha varieties generally yield higher, they require less inputs per kg.

Carbon Footprint



*HGA - US Hop Industry LCA, 3.5 kg CO2e - Alpha pellets & 4.1 kg CO2e - Aroma pellets

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CASE STUDY

Cascade vs. Ahtanum

- Yield data (pounds per acre)
  - 2021 Cascade: 1,675
  - 2021 Ahtanum: 2,550
- Inputs data (average rate per acre)
  - Cascade - 32,911 gallons/acre
    - 167,846 kg CO2e
  - Ahtanum - 3,087 gallons/acre
    - 15,744 kg CO2e

Centennial vs. HBC 522

- Yield data (pounds per acre_
  - 2021 Centennial: 1,573
  - 2021 HBC 522: 2,800
- Inputs data (average rate per acre)
  - Centennial - 25,662 gallons/acre
    - 130,907 kg CO2e
  - HBC 522 - 787 gallons/acre
    - 4,013 kg CO2e

* Utilizing CO2e from greenhouse gas protocol

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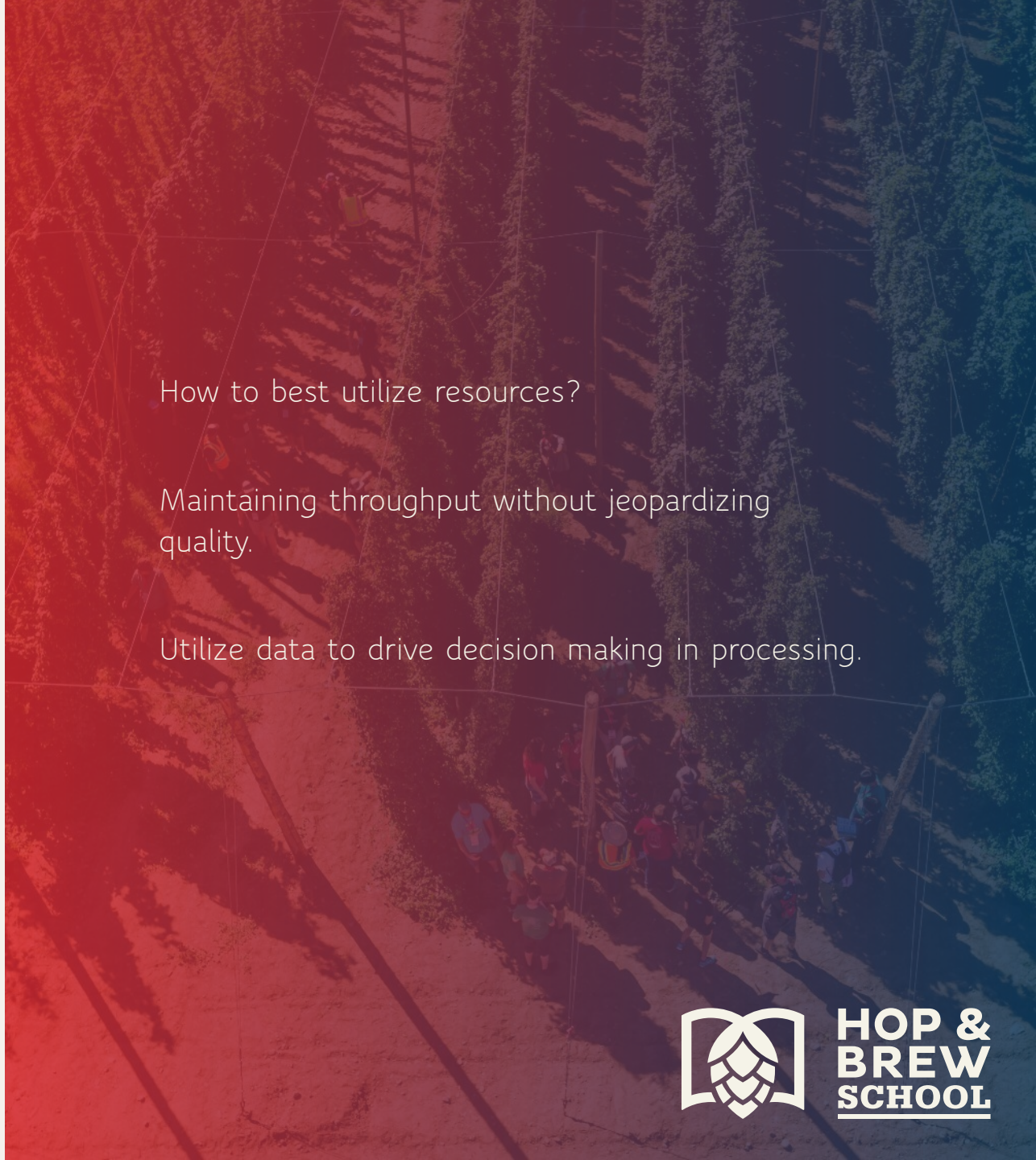
STRAINING THE SUPPLY CHAIN

Timing is everything



How to best utilize resources?

Maintaining throughput without jeopardizing quality.

Utilize data to drive decision making in processing.

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CASE STUDY

CTZ

- Stores poorly
- Requires early processing
- High alpha content 14-16%

HBC 682

- Good storage
- Can be processed later in season
- Super alpha hop cultivar
- High yield and high alpha content 17-20%

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PROCESSING

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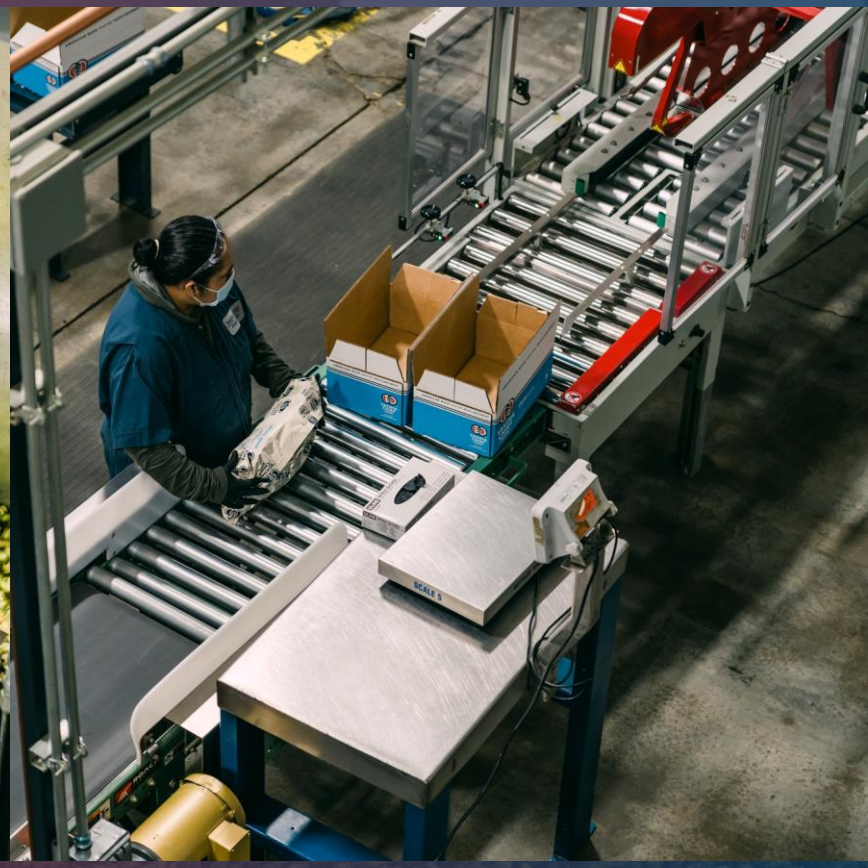

STRAINING THE SUPPLY CHAIN

Storing

- Enemies of hops
  - Heat
  - Light
  - Oxygen
- Utilize Hop Storage Index measurements for processing decisions
  - Better storing varieties can be de-prioritized later in the season to allow poorer storing varieties priority-processing to lessen the strain within supply chain.

Processing

- Maximize use of machinery and human resources needed to process within season
- Smoother flow of processing
- Decrease energy intensities
  - 13,000,000 kwh energy utilized 2020
  - 11,800,000 kwh energy utilized 2021
  - 850 Metric Tons of CO_2e avoided
  - Equivalent to driving cross country 600+ times

Takeaway: Processing windows are important, allowing for efficient use of machinery and buildings, resulting in lower energy intensities and lower environmental imprint.

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SUSTAINABLE DESIGN

YCH Hop Products

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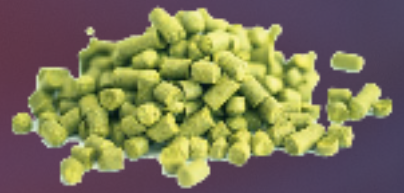
PRODUCT TYPES

Whole Leaf Hops



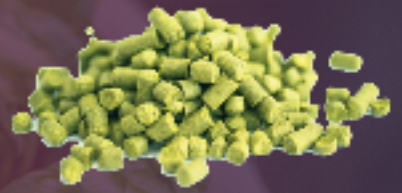
T-90 Hop Pellets

Single Varietal CO2 Hop Extract

YCH 301 Trial

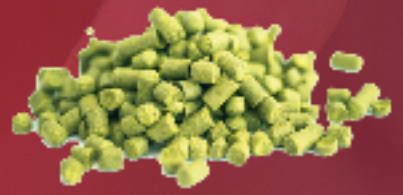
Bract Fraction

Lupulin Fraction

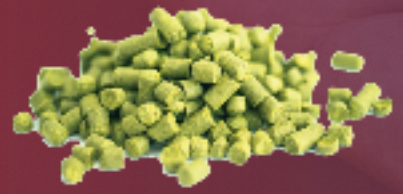


T-90 Hop Pellet Blends

Advanced products



American Noble Hops™



Cryo Hops®

Community Blends: Pink Boots Society® Blend, Veteran's Blend, Falconer's Flight®

Expression Blends: Zythos®, Independence Blend, Pacific Crest Blend

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CRYO HOPS®

Providing brewers and the planet with many sustainability benefits.

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SUSTAINABILITY OF CRYO

Benefits

- 50% less freight due to the concentration lupulin in Cryo
- Reduction in packaging due to dosing rate being 50% of T90
- Storage space requirements reduced at YCH and at the brewery
- Reduction in energy needed for cold storage
- Reduced effluent discharge due to a decrease in hop matter by using Cryo
- Cost savings and net increases per batch
- American Nobel – Nobel varieties in GER and UK down this year, American Nobel provides a nice alternative

AMERICAN NOBLE HOPS
SUBTLE

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SUSTAINABILITY PROJECTS

Past, Present, and Future

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INVESTMENT IN RENEWABLE ENERGY

Largest solar array in Washington State.

3,700 panels, 1,500 MW energy produced.

Belgium facility offsetting 50% of buildings consumption.

1,800 panels, 750 MW energy produced.

80% of YCH energy is derived from renewable energy sources.

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SUSTAINABILITY STARTS IN THE FIELD

Green Chief Program – emphasis on carbon sequestration during growing season.

Focus on water, land management, energy intensities, and soil health.

Measuring carbon and water footprints of all growers.

Leading with regenerative agricultural principals.

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CARBON ACCOUNTING

Merging climate science and technology to record and measure environmental impacts.

Provide brewing customers information to make informed decisions on hop purchasing.

Reduction in YCH footprint, reduces the environmental impact at the brewing level.

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CIRCULARITY IN PACKAGING

Transition away from single use packaging.

Rolling out new recyclable and or compostable packaging design.

Alleviate the burden of brewers to send material to landfill.

Objective of zero waste.

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THANK YOU!

Cheers to a sustainable future!

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