WHAT WE WILL COVER TODAY

• BASIC HOP FERTILITY, PRODUCTION

• HARVESTING, QUALITY, PROCESSING
  – Harvest Timing
  – Common Cultural Practices
  – Pelleting / Packaging Operations

• HOW IS IT OPTIMIZED?
  – Best Practices for Growers / Processors
OUR HOP HISTORY

1855 – Charles Crosby treks across Oregon Trail (CA gold)
1900 - Albert Crosby purchases land and plants first hops
1924 - Edgar Crosby Sr. further expands operations
1944 – Edgar Crosby Jr. takes over installs first picking machine
1987 Kevin Crosby takes over and doubles operations
2008 Blake Crosby begins craft exclusive focus at CHF
BASIC HOP FERTILITY - KEY NUTRIENTS

- Nitrogen (N): +/- 120 - 200 lb. of N / A / Year
- Phosphorus (P): +/- 20-30 lb. of P / A / Year
- Potassium (K): +/- 80 - 150 lb. of K / A / Year
- Custom blend (contact your fertilizer dealer)

16-16-16 can be easy / efficient

Soil pH 6.0 TO 7.0

NPK
Nitrogen (N)
Phosphorus (P)
Potassium (K)
Nitrogen Applications / Timing

Nitrogen: Key to plant growth but also can have diminishing returns

- +/- 120 to 200 units N / acre / season common in PNW
- Timing is critical and somewhat region dependent
- Too much = excessive foliage, shading, potentially reduced yield
- Application methods vary
**HOP FERTILITY - MICRONUTRIENTS**

<table>
<thead>
<tr>
<th>Boron: +/- 1 lb./acre/season (Toxic when accumulated beyond plant need)</th>
<th>Manganese: Also toxic when accumulated beyond plant need</th>
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<tr>
<td>Zinc: Generally not needed in Oregon, if so, +/- 5 lb./acre range</td>
<td>Magnesium: Apply +/- 1 ton dolomite / acre</td>
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**Other Important Micronutrients for Hops:**
Mid Spring (left) Nitrogen requirements are increasingly important. 

Late Summer (pre-harvest) plant is returning carbohydrates to the crown – harvest timing is key to not starving plant of key carbs for subsequent Spring.
WHAT ARE WE HARVESTING ANYWAY?

• ALPHA ACID
  Still important for many brewers and a force in the market

• ANTIOXIDANT PROPERTIES
  Xanthumol - Health / Wellness Trends

• HOP THIOLS - SULFUR COMPOUNDS

• HOP ESSENTIAL OILS
  Geraniol
  Linalool
  Farnesene
  Beta Pinene - list goes on...

https://www.researchgate.net/publication/327704717_Understanding_the_dry_hop_aroma_of_American_hop_varieties
HOP FLAVOR AND AROMA IS WHAT CRAFT CARES ABOUT MOST
GENERAL HARVEST TIMING IMPACT ON AROMA

EARLY – GRASSY

MID

LATE – THIOL RICH
COMMON CULTURAL PRACTICES
(Old School)

• The Calendar (sometimes surprisingly accurate)

• Dry Matter Testing

• Risk Management Harvest Timing

• Farmer Sensory
HARVEST TIMING BEST PRACTICES

- Total Oil
- Brewing Values (esp. HSI)
- Trained Sensory Panel
- Advanced Tools: GCMS, Determining Oil Compounds as Markers for Maturity
- Tracking Customer Preferences / Selection Data to Drive Picking Decisions
DRYING QUALITY HOPS - KILN

Bed Depth, Airspeed, Temperature, Cooling Time
COOLING AND RESTING HOPS

Adequate Equilibrium Period
HANDLING BALED HOPS

- Bale Moisture 8-10% (9-10% is optimum)
- Bale Temperature 70F or ambient
- Chilled bales will manipulate moisture probe
- Grower number / lot code critical for traceability
- Pesticide records and data collection
PELLETING BEST PRACTICES

- Blending Capability
- Cool and managed operating temperature throughout process
- Understanding of die compression ratios
- QC/QA - Homogeneity
- ASBC method lab analysis
PELLET QUALITY

- Food safety / lot coding / traceable to the source process, HACCP
- Foreign material separation / detection (magnets, rock traps)
- Particle size
- Pellet density, operating temps
- Cold storage (immediately in / out)
PACKAGING QUALITY

N2-purged & vacuum-sealed in 5 mil foil barrier bags

Less than 2.5% residual oxygen

We offer 5KG, 10KG, and 20KG foils for Crosby® Type 90 Hop Pellets
ENSURING QUALITY - LABORATORY

- Alpha Acids
- Beta Acids
- Hop Storage Index (HSI)
- Total Oil by Steam Distillation
- Flavor Chemistry (GC / GCMS)
Questions?

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