

Hop Quality

What is it?
Where can I find it?
Can I do it myself?



What is Quality?

- Completely subjective
 - American Society for Quality *“A subjective term for which each person has his or her own definition.”*
 - GVH definition : “Result of painstaking care that has added value to a person over and above the industry norm.”
- Bottom line...learn to recognize quality and the factors that impact quality



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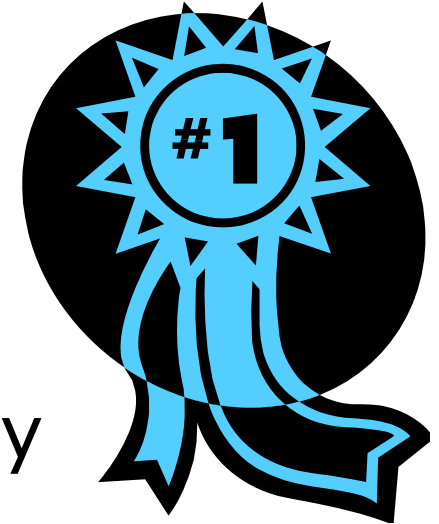
Quality Impacts of Hops on Beer

- Why do we add hops?
 - Spice, bitterness
 - Counterpoint to sweet maltiness
 - Tradition
 - Physical composition impacts (head retention, etc)
 - Recipe told me to
- Beer can only be as good as the ingredients you use



Hop Quality Factors

- Alpha/Beta acid complex
 - Isomerization yields bittering
- Essential oils
 - Primary constituents of aroma
- Both are at risk of deterioration by
 - Oxygen
 - Heat
 - Pathogens
- Processing has the largest impact on hop quality





Accepted Industry Norms

- Hops are dried in deep beds at 140 F
 - This is a result of volume economics
 - Trade-offs between quality and quantity
- Hops are pelletized under liquid nitrogen fog to keep temps below 140 F
 - 140 F is the most economical temperature to maximize throughput with only a moderate impact on lupulin damage
- Most of the essential oils “flash” at temps well below 140 F
 - Oil fraction can dissociate and volatilize at these temps





How to Ruin Hops

- ❑ Dry very fast, at high temperature, in the sunlight
- ❑ Using the wrong air flow speed
- ❑ Pelletizing hops at elevated temperatures (over 100 F)
- ❑ Packaging damp hops
 - Composting begins within minutes
 - Spontaneous combustion is a possibility
- ❑ Packaging hops in improper bags
- ❑ Rushing the processing



Hop Bittering Quality

- Alpha/beta complex is stable up to 140F
- Complex is very prone to oxidation during storage
 - Hop Storage Index measures the degradation of the complex over time
- Improper packaging is the leading cause of hop quality loss during storage
 - Packaging should be gas barrier, non permeable laminations
 - Should not have any clear windows to let in UV light
 - Should be vacuum packed with a nitrogen back flush



Hop Aroma Quality

- It's all about the essential oils
 - Myrcene
 - Humulene
 - Caryophyllene
 - Farnesene
- Most are very delicate and are easily volatilized during processing if care is not taken to preserve them
- In our opinion, the industry has undervalued the oil component in favor of
 - Higher throughput
 - Focus solely on bittering
- **HOPS ARE FLOWERS!!!**



Myrcene, Caryophyllene

□ Myrcene

- is one of the most important chemicals used in the perfumery industry
- Woody, vegetative, citrus, fruity with a tropical mango and slight leafy minty nuances
- Flashpoint 103° F

□ Caryophyllene

- Flashpoint 200°F
- clove oil, the essential oil of hemp, and rosemary
- Caryophyllene is one of the chemical compounds that contributes to the spiciness of black pepper.



Farnesene, Humulene

□ Farnesene

- Floral, green apple aroma
- Flashpoint 79°F

□ Humulene

- Flashpoint 110.2°F
- It is an isomer of β -caryophyllene, and the two are often found together as a mixture in nature
- One of the chemical compounds that contribute to the taste of the spice Vietnamese coriander.
- Contributes to the characteristic aroma of *Cannabis sativa*, where it is present in the essential oil of the plant



Unique Attributes = Identity

- ❑ Combination of oil components and alpha/beta complex lead to each variety's unique aroma profile
- ❑ So which variety is best?
- ❑ Are some varieties more fragile or subject to damage?
- ❑ Can I grow hops successfully at home?



Can I Grow/Process at Home?

- Absolutely
- What you'll need
 - Full sun location with at least 8 hours of direct sunlight
 - Ability to supply additional irrigation besides Mother Nature
 - Install a tall trellis, arbor, lattice, etc
 - Typically 14-20 feet tall
 - Fertilize!
 - Hops need lots of nitrogen to flower
 - 50% or more of the N is located in the flowers
 - Rhizomes of your favorite varieties

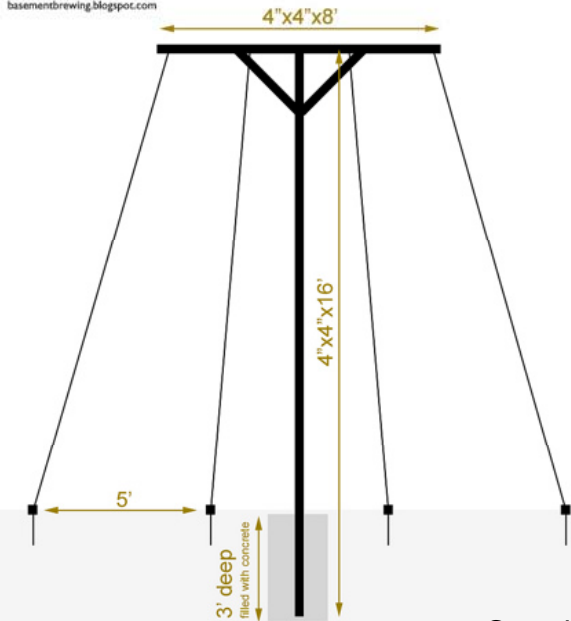




Backyard Trellises



Hop Trellis Design V.1
By Jeff Louella
basementbrewing.blogspot.com



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Now for the Waiting

- ❑ It takes approx. 3 years for the plant to reach maturity
- ❑ Once mature a well cared-for plant can produce up to 2 pounds of dried flowers
 - Variety dependent
- ❑ First year should yield only a few ounces
 - These are usable but may not reflect the true characteristics until year 2



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That's all fine...What about Varieties?



- Sky is the limit...sort of
- Two groups of hop varieties
 - Public Source, *i.e. okay to buy and plant*
 - Private, patent protected source, *i.e. **No Touchy!***
- Many of the most popular varieties are not available to the public for production

Amarillo	Citra
Simcoe	Zeus
Tomahawk	Warrior
Columbus	Ahtanum
Palisade	Sapphire



So What does that Leave Me?

- Divide your needs into 3 main groups

- Purely aroma

Mt. Hood	Hallertaur	Liberty
Willamette	EKG	Crystal
Fuggle	Tettnanger	Ultra

- Dual purpose

Cascade	Centennial	Santiam
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- Strictly bittering

Chinook	Magnum
Nugget	Perle
Newport	Columbia

How to Wreck Your Harvest in 30 Minutes or Less



- ❑ Proper drying is the most crucial aspect of hop production
- ❑ Proper moisture content should fall near 8% by weight
- ❑ For home growers...Mother Nature typically provides the best drying
- ❑ Use a mesh screen and spread the flowers out evenly, 1 cone deep
- ❑ Perform this out of direct sunlight



Other Drying Options

- Home food dehydrators
 - Lay the flowers out evenly and turn the heat all the way down
 - Let it run overnight
 - Measure moisture in the morning
 - See August/September 2009 issue of *All Hopped Up* at www.gorstvalleyhops.com
- Shop-built oasts
 - Airflow is the main issue
 - Too much or too little causes damage



Low Tech Drying



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Skinny on Bags

- Not all bags are gas barrier bags
 - Zip-top polyethylene bags do not seal out moisture and gases
- Foodsaver™ and similar bags are generally gas barrier bags
 - Contain a nylon or polyester laminate
- Aluminized or foil bags are not necessarily barrier bags
 - But they do block 100% UV



The Bag Situation



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The Line-Up



Unacceptable

- No gas barrier
- No gas flush
- No vacuum
- No heat seal
- No light barrier
- No refrigeration



Better

- Gas barrier bag
- Vacuum sealed
- Heat sealed
- No light barrier
- No refrigeration
- Gas flushed



Best

- Gas barrier bag
- Vacuum sealed
- Heat sealed
- Light barrier
- Refrigerated
- Gas flushed



How to Store at Home

- ❑ If you use your hops in less than 1 month, simple zip top poly bags and the freezer will work fine
- ❑ Stored 1-6 months, invest in a kitchen vacuum sealer, then freeze
- ❑ Longer storage requires nitrogen gas flush, aluminized barrier bags
- ❑ Key is to keep oxygen and light out



Questions, Comments, Concerns?



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