

Master Brewers Association of the Americas

Dedicated to the technology of brewing.



Hop Evaluation & Selection Workshop

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Yakima WA

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Objectives of Hop Selection

- Being one with the hops
- Selecting preferred hop lots to fulfill purchase agreement
- Determining sample varietal true-to-type
- Evaluating consistency
- Inspecting for damage and disease
- Ensuring hops have been processed properly
- Gaining confidence in your supplier

Primary Characteristics to Evaluate

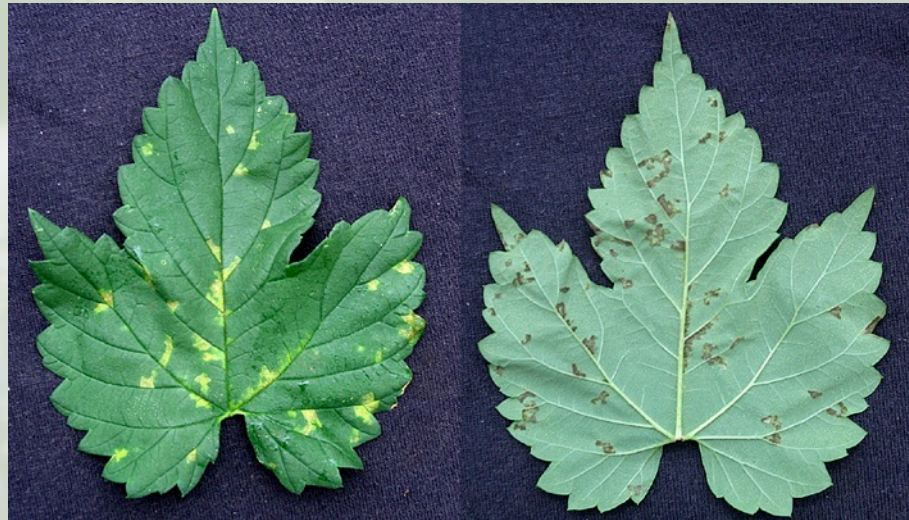
- Color / Brightness
- Tactile Feel – Moisture & Resins
- Consistency
- Aroma
- Flaws



Potential Physical Flaws

- Spider Mites
- Hop Aphids
- Downy & Powdery Mildews
- Windburn & Bruising
- Spray Burn
- Over-drying
- Over-ripe
- Poor Handling

Downy Mildew



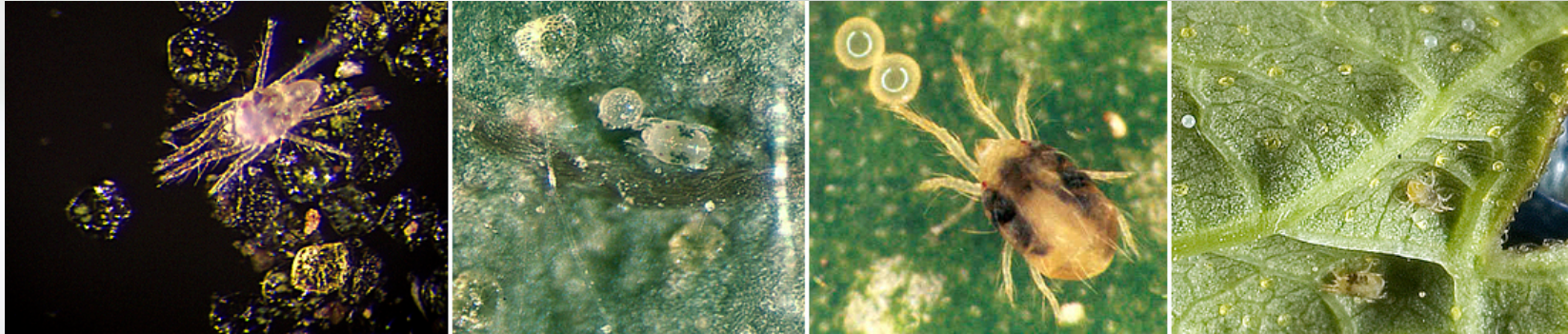
Powdery Mildew



Hop Aphids



Spider Mites



Wind/Spray Damaged



The Brewer's Cut

- Representative sample of hop lot cut from hop bale.
- Evaluating the cut
 - Outward appearance
 - Seeds & stems
 - Discoloration
 - Damage
 - Over-ripe
 - Tactile evaluation
 - Moisture (shatter)
 - Resins, oil, “silkeness”



The Brewer's Cut

- Aroma
 - Consistency
 - True-to-type
 - Off aromas
 - Intensity

Hops don't necessarily need to be pretty to be of the best quality.

Variety sample sequence should be subtle to robust



Aroma Evaluation Techniques

- Hand-rub technique
 - With clean hands, grab ~ 20-30 grams hops
 - Rub vigorously in palms to break lupulin glands and warm the sample
 - Sniff the sample and evaluate aroma



Aroma Evaluation Techniques

- “Dainty” technique
 - Select a single hop cone
 - Peel apart longitudinally
 - Rub two halves together to break lupulin and warm sample
 - Sniff sample and evaluate aroma



Haas Physical Examination

Color: Quality of “green”. Typical for variety.

Tint: Any discoloration within the sample. This includes colors such as red, brown or black.

Mold: Sooty black mold which has developed, generally from aphids.

Cone Breakage: Amount broken cones

Moisture: The storage moisture, determined by firmness of the sample and by touch when grinding hops in your hand.

Cone Size: The degree of abnormally sized cones due to powdery mildew damage.

Haas Physical Examination

Powdery Mildew: the degree of damage to the hops attributed to powdery mildew infection.

Aroma: Is the aroma typical of the variety, if yes, then rating is given based on intensity of aroma.

Uniformity: Indicates how uniform the samples are within one lot thus indicating the uniformity within the lot.

Seed and Leaf-stem content: (by percentage of weight) as determined by U.S. Dept. of Agriculture.

Brewer's Selection Methods

Brewer's generally have their own selection and/or scoring system, from very simple to complex:

- Accept/Reject – Subjective analysis on a go/no-go basis or preference rating.
- Quality score rating system
 - More systematic method often necessary when selecting a large number of lots.
 - Often Involves a weighted quality score
 - Differentiates between hop types, e.g. Aroma/Flavor-type hops and bitter hops

Example: Quality Scoring Aroma Variety

	Weight	Sample	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
	50%	Aroma Characteristics	9	8	9	7	5	8
	30%	Physical/Pest	9	10	9	8	10	8
	5%	Alpha Acids	7	9	6	5	8	9
	15%	Harvest H S I	10	8	8	9	7	10
	<u>Calculated</u>							
		Aroma Characteristics	4.50	4.00	4.50	3.50	2.50	4.00
		Physical/Pest	2.70	3.00	2.70	2.40	3.00	2.40
		Alpha Acids	0.35	0.45	0.30	0.25	0.40	0.45
		Harvest H S I	1.50	1.20	1.20	1.35	1.05	1.50
		Quality Score	9.05	8.65	8.70	7.50	6.95	8.35

Example: Quality Score

Bitter Variety

	Weight	Sample	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
	15%	Aroma Characteristics	9	8	9	7	5	8
	30%	Physical/Pest	9	10	9	8	10	8
	40%	Alpha Acids	7	9	6	5	8	9
	15%	Harvest H S I	10	8	8	9	7	10
<u>Calculated</u>								
		Aroma Characteristics	1.35	1.20	1.35	1.05	0.75	1.20
		Physical/Pest	2.70	3.00	2.70	2.40	3.00	2.40
		Alpha Acids	2.80	3.60	2.40	2.00	3.20	3.60
		Harvest H S I	1.50	1.20	1.20	1.35	1.05	1.50
		Quality Score	8.35	9.00	7.65	6.80	8.00	8.70

Selecting the Hop Selection Team

- Motivation is important; hop selection is messy & challenging.
- Shows little or no sensitivity to hops
- Good hop aroma discrimination
- Objectivity in evaluation
- Personal aroma impact (bouquet) matters
 - No perfumes, colognes, scented soaps, etc.
- Although hop aroma is not generally subtle, team should not eat/drink highly flavored, spicy items within 30 minutes of evaluation

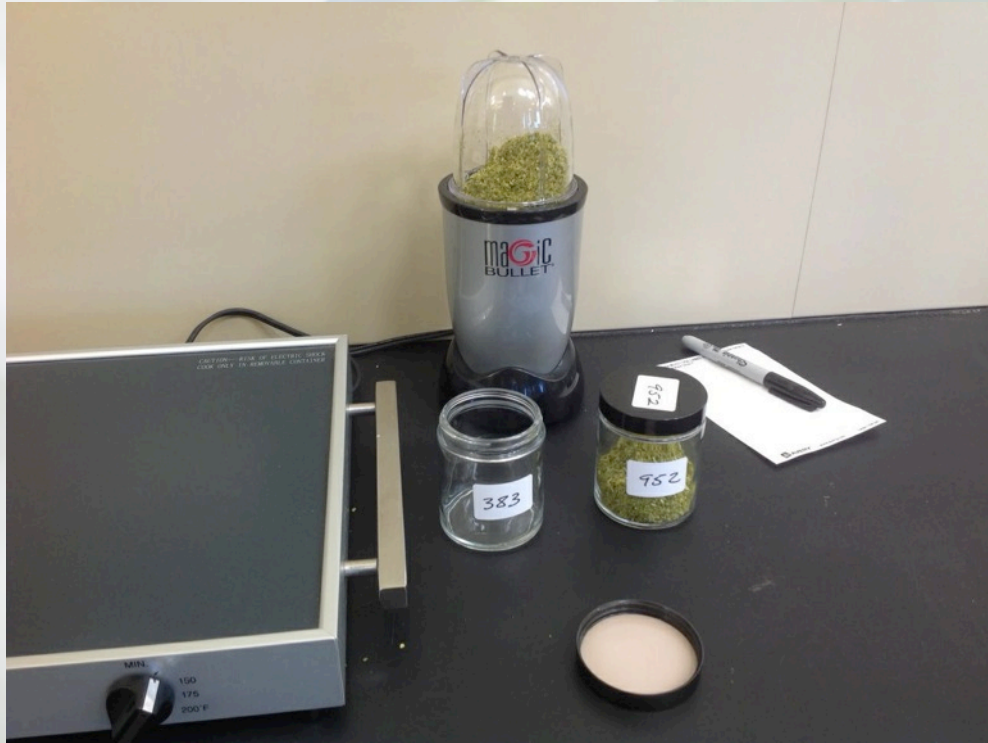
Importance of Hop Storage & Handling

- Having an effective selection and evaluation program is useful only if the brewer takes care of the hops in transit and storage.
- Keeping hop products stored within recommended conditions.
- Care in hop staging and dosage.
- Use of opened packages.

Alternative Method for Hop Aroma Evaluation

- Hand rub evaluation has its limitations
 - Consistency
 - Carryover from residual on hands
 - Best if evaluating many of same variety
- Alternative method Haas uses for aroma profiling
 - Generally with raw hops but can also be used for pellets
 - Uses hop grinder, e.g. coffee grinder, Magic Bullet®
 - Standardize quantity and grind time, e.g. 20 grams/10 sec
 - Warming tray and jars – samples at 120 deg F.
 - Must evaluate within 2 hours of grind/warming
 - Useful if evaluating many different cultivars/varieties

Hop Aroma Profiling



Hop Aroma Profiling

Hop Aroma Evaluation Sheet

Panelist 125 Name Art Jensen

Session K-2 @ Dec 11

Sample →	983	274	104	538	373	276	730	103	349	715
Cedar					3			3	1	
Pine		2		1				2	3	2
Tobacco/Earthy		3		3		2		3	2	2
Grassy	2		2	3		2		2		
Herbal	2						4			
Floral	1		2	4						
Spicy										5

Rate the intensity of each descriptor from 0 to 7 with 7 being most intense

Extra Comments

538
715
349
373

Hop Aroma Evaluation Sheet

Panelist _____ Name Leah Dunn

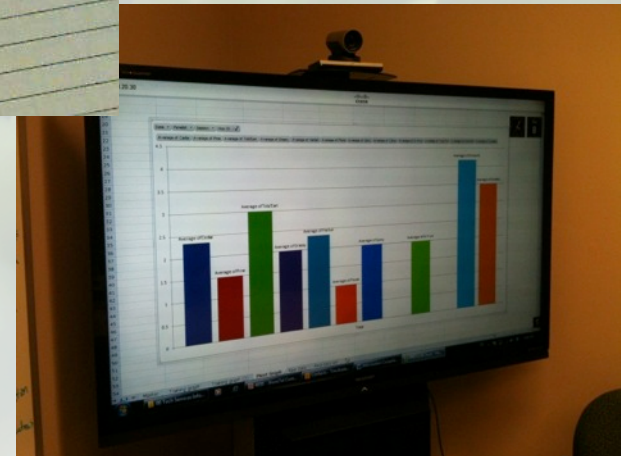
Session K-2 @ Dec 11

Sample →	538	715	349	373	104	276
Cedar				2		3
Pine		3			4	2
Tobacco/Earthy					3	2
Grassy						2
Herbal	4					2
Floral				1		2
Spicy	3				3	2
Citrus	2		5		2	2
Stone Fruit					2	1
Tropical Fruit	2			2		1
Onion/Garlic				1		
Sweaty						

Rate the intensity of each descriptor from 0 to 7 with 7 being most intense

Extra Comments

538
715
349
373



Conclusion

- Hops are a natural product and subject to variations in brewing performance characteristics.
- A very wide range of aroma, even within the same variety can be caused by a number of factors including agronomics, weather, pests, damage, and hop handling.
- Brewers are encouraged to define hop quality and develop their method of selection accordingly to meet their specific demands.
- Brewers are also encouraged to participate in an effective selection/evaluation of the hops they use - and to utilize the services of their hop suppliers in ensuring supply, quality and performance from this valued brewing ingredient.

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