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Blue Lake Hops and Gardens Quarterly Comparison Charts

Date: 03/02/2020

Customer: Blue Lake Hops and Gardens

Contact Person: Jim Schlichting

Description: Characteristic Evaluation of hops from Day 0 to Day 174
Sample ID 1930761(Fresh), 1932362(BLP®), and 1936987(PMH Pellet)

Purpose: To compare and evaluate a new process to the hops industry while using the traditional pelletizing process as a control sample or comparison.

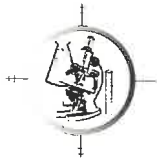
Discussion:

This is an analytical evaluation of two samples of Cascade hops, 1932362 is an IQF (Blue Lake Process®) Wet Cascade Cone, 1930761 is a Wet Cascade Cone and 1936987 is the same, yet pelletized Cascade harvested in 2019. The samples were both prepared and analyzed using ASBC HOPS-14 by HPLC for Alpha and Beta acids, ASBC Hops 4c for moisture, ASBC Hops 13 for total oils and ASBC Hops 17 modified for essential oils. The modification to the ASBC Hops 17 method is strictly the reporting of more essential oils.

Current interpretation and Observations:

As indicated in the below charts there has been some slight deviation from the initial fresh sample (1930761) in all aspects from the observed tests. Moisture having been the biggest deviation noticed at this time and as indicated in the charts (fig. 1). Figure 2 is the comparison of total oils and essential oils. As noticed, Farnesene is showing the greatest deviation from the initial in compared to the BLP® sample along with the pellet sample. Farnesene is decreasing for the BLP® while appearing to increase in the pellet sample. Caryophyllene showed a dramatic increase for both samples in comparison to the fresh hop cone but has since plateaued in terms of deviation from day 90 to day 174. The other major deviation occurred with Myrcene having an increase of 12.85% for the BLP® Sample and a decrease of 8.45% for the Pellet sample. These deviations have not contributed to a correlation of decreased quality in terms of sensory analysis as of current date.





Initial Fresh Sample									
Sample Date	Sample ID	Alpha Acid	10% Moisture Adj. Alpha Acid	Cohumulone	Beta Acid	10% Moisture Adj. Beta Acid	Colupulone	Moisture	
19-Sep	1980761	2.69	6.4	31.4	2.99	7.12	50.8	62.23	
Blue Lake Process® Sample									
Sample Date	Sample ID	Alpha Acid	10% Moisture Adj. Alpha Acid	Cohumulone	Beta Acid	10% Moisture Adj. Beta Acid	Colupulone	Moisture	
25-Oct	Day 52 BLP	2.05	6.87	31.3	2.19	7.92	50.1	73.09	
12-Dec	Day 90 BLP	2.21	7.15	31.8	2.47	7.97	50.6	72.2	
24-Feb	Day 174 BLP	1.91	5.14	33.7	2.05	5.51	46.9	66.6	
Pellet Sample									
Sample Date	Sample ID	Alpha Acid	10% Moisture Adj. Alpha Acid	Cohumulone	Beta Acid	10% Moisture Adj. Beta Acid	Colupulone	Moisture	
25-Oct	Day 52 Pellet	6.69	6.59	30.9	6.49	6.59	50.9	8.59	
12-Dec	Day 90 Pellet	6.99	6.86	31.2	7.21	7.08	51.1	8.37	
24-Feb	Day 174 Pellet	6.98	6.82	33	6.69	6.54	47	7.9	


(Figure 1)

Initial Fresh Sample													
Sample Date	Sample ID	Caryophyllene	Citral	Farnesene	Geraniol	Humulene	Limonene	Linalool	Myrcene	Nerol	Pinene	Terpinolene	Total Oil
18-Nov	Fresh Cone	5.32	NR	0.9	<0.01	6.32	NR	0.39	74.26	NR	NR	NR	0.98 mL/100g
Blue Lake Process® Sample													
Sample Date	Sample ID	Caryophyllene	Citral	Farnesene	Geraniol	Humulene	Limonene	Linalool	Myrcene	Nerol	Pinene	Terpinolene	Total Oil
25-Oct	Day 52 BLP	11.84	0.13	1.3	0.04	14.03	0.26	<0.01	50.32	0.02	0.44	<0.01	0.80 mL/100g
12-Dec	Day 90 BLP	6.14	<0.01	9.01	0.46	14.5	0.23	<0.01	54.35	<0.01	0.74	<0.01	0.45 mL/100g
24-Feb	Day 174 BLP	4.08	0.924	5.89	0.245	9.38	0.281	0.372	67.2	0.101	0.832	<0.01	0.65 mL/100g
Pellet Sample													
Sample Date	Sample ID	Caryophyllene	Citral	Farnesene	Geraniol	Humulene	Limonene	Linalool	Myrcene	Nerol	Pinene	Terpinolene	Total Oil
25-Oct	Day 52 Pellet	11.97	0.25	1.44	0.01	13.04	0.26	<0.01	52.13	<0.01	0.74	<0.01	1.65 mL/100g
12-Dec	Day 90 Pellet	4.84	0.08	6.36	0.41	11.61	0.27	<0.01	63.85	<0.01	0.81	<0.01	1.7 mL/100g
24-Feb	Day 174 Pellet	5.94	1.58	9.16	0.292	13.2	0.234	0.425	55.4	0.166	0.695	<0.01	1.95 mL/100g

(Figure 2)

Color Coding:
 Light Green=Fresh harvest Sample
 Light Blue= BLP Samples
 Dark Green=Pelletized Samples




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