

North Dakota State University - Dickinson Research Extension Center, Dickinson, ND																																				
Columulone as a percent of Beta Acids (%)	Cohumulone as a percent of Alpha Acids (%)	Beta Acid Content (%)	Alpha Acid Content (%)	Columulone as a percent of Beta Acids (%)	Cohumulone as a percent of Alpha Acids (%)	Beta Acid Content (%)	Alpha Acid Content (%)	Columulone as a percent of Beta Acids (%)	Cohumulone as a percent of Alpha Acids (%)	Beta Acid Content (%)	Alpha Acid Content (%)	Columulone as a percent of Beta Acids (%)	Cohumulone as a percent of Alpha Acids (%)	Beta Acid Content (%)	Alpha Acid Content (%)	2016 - 2019 Average Alpha Acids %	Variety of Hops	Yield in air-dried ounces						Number of plants harvested of each variety						Yield per harvested plant in air-dried ounces						2015-2020 average yield per plant in air dried ounces
																		2015	2016	2017	2018	2019	2020	2015	2016	2017	2018	2019	2020	2015	2016	2017	2018	2019	2020	
60.60	35.90	5.28	7.80	63.90	42.40	3.50	3.47	56.30	30.40	4.72	10.00	63.00	35.60	5.49	8.66	7.48	Brewers Gold	16.5	25.5	5.4	12.7	8.1	4.8	3	3	3	3	2	2	5.5	8.5	1.8	4.2	4.1	2.4	4.4
47.90	30.20	2.90	3.46	46.90	31.90	1.42	0.79	45.50	27.60	2.39	2.71	47.00	26.40	1.54	2.04	2.25	Fuggie	4.5	11.3	1.7	3.9	3.2	0.4	3	3	3	3	3	2	1.5	3.8	0.6	1.3	1.1	0.2	1.4
63.10	37.70	10.10	15.10	59.70	36.40	7.43	8.06	60.80	35.00	10.40	15.00	60.90	34.20	9.13	13.71	12.97	Galena	9.0	22.5	2.9	10.7	6.4	2.8	3	3	2	2	3	2	3.0	7.5	1.5	5.4	2.1	1.4	3.5
32.90	12.10	6.96	4.61	-	-	-	-	-	-	-	-	-	-	-	-	4.61	Glacier	1.8	9.2	0.6	0.8	0.5	0.1	1	3	2	1	2	1	1.8	3.1	0.3	0.8	0.3	0.1	1.1
47.60	26.00	2.47	3.45	-	-	-	-	-	-	-	-	-	-	-	-	3.45	Golding	1.9	4.8	0.0	0.1	0.2	0.0	2	3	0	1	2	0	1.0	1.6	0.0	0.1	0.1	0.0	0.5
47.10	30.10	2.77	3.05	-	-	-	-	53.10	30.40	3.71	3.84	45.00	25.50	1.54	2.56	3.15	Hallertau	3.6	3.9	0.2	2.2	1.8	0.3	2	3	1	3	1	1	1.8	1.3	0.2	0.7	1.8	0.3	1.0
37.80	22.40	8.02	14.40	-	-	-	-	45.90	22.50	6.57	12.40	50.70	25.90	5.30	9.31	12.04	Magnum	4.9	6.9	0.6	6.1	6.5	0.8	2	3	1	2	2	2.5	2.3	0.6	3.1	3.3	0.4	2.0	
46.00	35.10	2.19	3.72	-	-	-	-	-	-	-	-	-	-	-	-	2.72	Mt. Hood	1.1	1.5	0.0	0.0	0.1	0.0	2	1	0	0	1	0	0.6	1.5	0.0	0.0	0.1	0.0	0.4
59.50	34.40	8.30	11.00	-	-	-	-	56.40	31.30	4.82	6.54	58.90	31.40	7.57	8.83	8.79	Newport	4.2	15.7	0.5	2.2	3.1	0.2	3	3	2	3	2	1	1.4	5.2	0.3	0.7	1.6	0.2	1.6
																	Averages	5.3	11.3	1.3	4.3	3.3	1.0	2.3	2.8	1.6	2.0	2.0	1.2	2.1	3.9	0.6	1.8	1.6	0.6	2.0
																	ave. lbs per acre	293	625	73	239	185	58	130	154	86	111	111		117	214	32	101	88	31	110
																	max yielder	917	1415	300	706	450	267	167	167	167	167	167	111	306	472	100	297	225	133	245
Alpha acids produce desirable bitterness when boiled in wort before the wort is cooled and fermented into beer.																																				
Beta acids lend a more harsh bitterness during conditioning and storage of beer than the bitterness of alpha acids.																																				
Hops with low cohumulone levels (making up <25% of alpha acids) are thought to attribute a smoother bitterness in the finished beer.																																				
Hops with high cohumulone in beta acid levels are thought to attribute a harsh bitterness produced during the aging of beer.																																				