

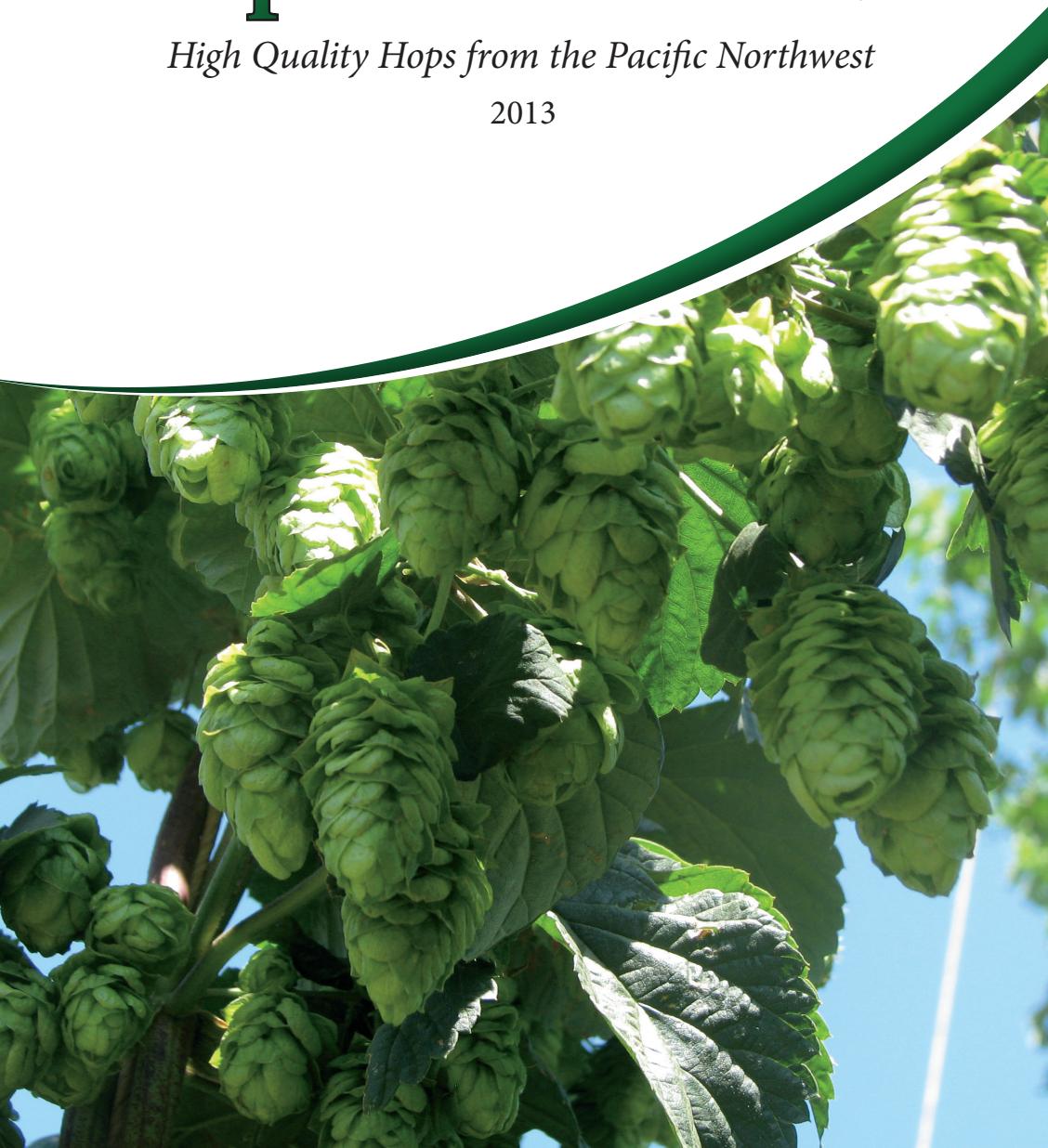


Yakima Chief, Inc.

Hop Varietal Guide

High Quality Hops from the Pacific Northwest

2013





A Sustainable and Quality Hop Supply

Yakima Chief, Inc. was founded by a group of hop growers who joined together to build an organization to market their high quality hop products direct to brewers worldwide.

Yakima Chief's Sustainable Hop Supply

The Yakima Chief GreenChief® Sustainability Program inspires our ownership, grower base, customers and employees toward the common goals of **environmental stewardship, economic sustainability and social responsibility**. In July 2010, Yakima Chief became the first hop company to achieve ISO 14001 Environmental Management Systems certification, giving us the ability to focus on continuous improvement of our processes that positively affect the environment.

Yakima Chief's Quality Hop Supply

Every step of Yakima Chief's processes has complete traceability and stringent quality controls as outlined in our ISO 9001 Quality Management System. The quality control measures we have in place assure that the hop's bitter and aroma components will be preserved during pellet processing and CO₂ extraction. The result is guaranteed hop quality, traceability back to the hop field, and a final product that meets customers' specifications.

Yakima Chief's Mission and Vision:

MISSION

To provide markets with innovative, reliable, value-added products and services for the benefit of our global customers, employees, and growers.

VISION

Yakima Chief brand is recognized around the globe for contributing to our customers' success.





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The data provided are based on the following analytical methods:

- ASBC Hops 6A—Spectrophotometric method for alpha acids and beta acids.
- ASBC Hops 14—HPLC method for alpha acids, beta acids and cohumulone.
- ASBC Hops 13—Steam distillation method for total oil.
- ASBC Hops 17—GC method for hop oil content.



Ahtanum™

Origin/History	Ahtanum™ Brand YCR 1 cv. was bred by Yakima Chief Ranches. The name originates from the area near Yakima where the valleys first hop farm was established in 1869 by Charles Carpenter.
Agronomics	Tolerant to downy mildew, with good pickability of a small, compact cone.
Brewing Quality	Ahtanum™ has floral and citrus aromas and moderate bittering potential.
Maturity	Medium
Yield	2,000–2,200 kgs/ha 1,750–1,950 lbs/acre
Alpha acids	4.2–6.7%
Beta acids	4.6–6.1%
Alpha:Beta Ratio	1.0
Cohumulone	30.0–34.0% (% of alpha acids)
Total Oil	0.5–1.7 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.6–0.9%
Myrcene	45.0–55.0%
Linalool	0.4–0.6%
Caryophyllene	9.0–12.0%
Farnesene	< 1.0%
Humulene	15.0–22.0%
Geraniol	0.4–0.7%
Storage	Fair





Amarillo®

Origin/History	Amarillo® Brand VGXP01 cv. is an aroma-type cultivar of recent origin, discovered and introduced by Virgil Gamache Farms, Inc.
Agronomics	Good resistance to downy mildew and powdery mildew.
Brewing Quality	Amarillo® has distinctive floral, tropical and citrus aromas with a higher alpha for bitterness.
Maturity	Medium
Yield	1,300 – 1,800 kgs/ha 1,200 – 1,600 lbs/acre
Alpha acids	8.1 – 10.5%
Beta acids	5.5 – 7.3%
Alpha:Beta Ratio	1.5
Cohumulone	20.0 – 22.0% (% of alpha acids)
Total Oil	1.0 – 2.3 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.4 – 0.8%
Myrcene	40.0 – 50.0%
Linalool	0.5 – 0.8%
Caryophyllene	7.0 – 10.0%
Farnesene	6.0 – 9.0%
Humulene	19.0 – 24.0%
Geraniol	0.1 – 0.2%
Storage	Good





Cascade

Origin/History	Cascade originated from the USDA-ARS breeding program. It was bred in 1956 and released for cultivation in 1972. Cascade's lineage is an English Fuggle female with a male plant, which originated from the Russian variety Serebrianka.
Agronomics	Tolerant to downy mildew, with good pickability of a medium, compact cone.
Brewing Quality	Cascade is known for its floral, citrus and grapefruit aromatic properties.
Maturity	Medium
Yield	1,800–2,250 kgs/ha 1,600–2,000 lbs/acre
Alpha acids	5.6–8.8%
Beta acids	6.4–7.3%
Alpha:Beta Ratio	1.1
Cohumulone	31.0–34.0% (% of alpha acids)
Total Oil	0.6–1.9 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.5–0.8%
Myrcene	45.0–60.0%
Linalool	0.3–0.6%
Caryophyllene	5.0–9.0 %
Farnesene	6.0–9.0%
Humulene	14.0–20.0%
Geraniol	0.2–0.4%
Storage	Poor





Centennial

Origin/History	Centennial, an aroma-type cultivar, was bred in 1974 and released in 1990. The genetic composition is 3/4 Brewers Gold, 3/32 Fuggle, 1/16 East Kent Golding, 1/32 Bavarian and 1/16 unknown.
Agronomics	Moderately tolerant to downy mildew, with good pickability of a medium, compact cone.
Brewing Quality	Centennial has floral and citrus aromas. Can also be used for bittering.
Maturity	Medium
Yield	1,700–2,000 kgs/ha 1,500–1,750 lbs/acre
Alpha acids	8.2–10.9%
Beta acids	3.5–4.4%
Alpha:Beta Ratio	2.4
Cohumulone	25.0–27.0% (% of alpha acids)
Total Oil	1.0–2.0 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.8–1.0%
Myrcene	52.0–60.0%
Linalool	0.6–0.9%
Caryophyllene	5.0–7.0%
Farnesene	< 1.0%
Humulene	9.0–12.0%
Geraniol	1.2–1.8%
Storage	Good





Chinook

Origin/History	Chinook was developed by the USDA in Washington State, by crossing a Petham Golding with the USDA 63012 male and was released in May 1985. It was selected as a bittering variety with good aroma characteristics.
Agronomics	Tolerant to downy mildew, with fair pickability of a large cone.
Brewing Quality	Chinook is a dual purpose hop, with spicy, and piney aromas and good bittering potential.
Maturity	Medium
Yield	2,100–2,400 kgs/ha 1,900–2,100 lbs/acre
Alpha acids	12.2–15.3%
Beta acids	3.4–3.7%
Alpha:Beta Ratio	3.9
Cohumulone	28.0–30.0% (% of alpha acids)
Total Oil	1.0–2.5 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.3–0.5%
Myrcene	20.0–30.0%
Linalool	0.3–0.5%
Caryophyllene	9.0–11.0%
Farnesene	< 1.0%
Humulene	18.0–24.0%
Geraniol	0.7–1.0%
Storage	Fair



Citra®



Origin/History	Citra® brand HBC 394 cv. hop variety originated from a cross between Hallertau mittelfrueh and a father derived from U.S. Tettnang. It was released in 2008 by Hop Breeding Company, a joint venture between John I Haas and Select Botanicals Group, LLC.
Agronomics	Tolerant to downy mildew, powdery mildew. Dense, medium sized cones with good pickability.
Brewing Quality	Citra® is a truly versatile hop with grapefruit, lime, lychee fruit, and gooseberry aromas, and a relatively high alpha acid level.
Maturity	Medium
Yield	1,600–1,800 kgs/ha 1,400–1,600 lbs/acre
Alpha acids	11.3–14.0%
Beta acids	3.6–3.9%
Alpha:Beta Ratio	3.4
Cohumulone	21.0–24.0% (% of alpha acids)
Total Oil	1.5–3.0 (mls. of oil per 100g)
Oil Components	<u>Expressed as % of total oils</u>
B-Pinene	0.7–1.0%
Myrcene	60.0–70.0%
Linalool	0.6–0.9%
Caryophyllene	5.0–8.0%
Farnesene	< 1.0%
Humulene	7.0–12.0%
Geraniol	0.3–0.5%
Storage	Fair





Cluster

Origin/History	Cluster originated from mass selection of the Cluster hop, which is an old American cultivar. It is suggested that they arose from hybridization of varieties, imported by Dutch and English settlers and indigenous male hops.
Agronomics	Susceptible to downy and powdery mildew. Good pickability with some shatter due to large, open cones.
Brewing Quality	Cluster is a nice balanced hop with spicy, piney aromas and good bittering properties.
Maturity	Medium
Yield	2,100–2,400 kgs/ha 1,900–2,100 lbs/acre
Alpha acids	7.6–8.9%
Beta acids	4.9–5.6%
Alpha:Beta Ratio	1.6
Cohumulone	37.0–40.0% (% of alpha acids)
Total Oil	0.5–0.8 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.5–0.7%
Myrcene	38.0–46.0%
Linalool	0.4–0.8%
Caryophyllene	8.0–10.0%
Farnesene	< 1.0%
Humulene	15.0–20.0%
Geraniol	0.6–0.9%
Storage	Good





Crystal

Origin/History	Crystal is a triploid aroma-type cultivar, released for commercial production in 1993. It originates from a selection made at USDA in 1983 between USDA 21397 and USDA 21381M, a downy mildew resistant male hop. Crystal is a sibling of Mt. Hood and Liberty.
Agronomics	Tolerant to downy mildew, with good pickability of a small cone.
Brewing Quality	Crystal is known for its mild, floral and spicy aromatic properties.
Maturity	Medium
Yield	1,300 – 1,700 kgs/ha 1,200 – 1,500 lbs/acre
Alpha acids	2.4 – 5.0%
Beta acids	5.9 – 7.6%
Alpha:Beta Ratio	0.6
Cohumulone	20.0 – 22.0% (% of alpha acids)
Total Oil	0.8 – 2.1 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.1 – 0.2%
Myrcene	6.0 – 14.0%
Linalool	0.3 – 0.6%
Caryophyllene	12.0 – 14.0%
Farnesene	< 1.0%
Humulene	40.0 – 45.0%
Geraniol	0.4 – 0.7%
Storage	Poor



Fuggle

Origin/History	Fuggle is an aroma-type cultivar selected in England in 1875. It's migrated to the USA and grown successfully in Oregon and Washington.
Agronomics	Tolerant to downy mildew, with good pickability of a small, seedless cone.
Brewing Quality	Fuggle is used for its mild herbal, woody, and fruity aromatic properties.
Maturity	Early
Yield	1,200 – 1,500 kgs/ha 1,100 – 1,300 lbs/acre
Alpha acids	3.6 – 5.6%
Beta acids	1.7 – 2.9%
Alpha:Beta Ratio	2.0
Cohumulone	25.0 – 32.0% (% of alpha acids)
Total Oil	0.7 – 1.2 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.3 – 0.6%
Myrcene	35.0 – 45.0%
Linalool	0.5 – 0.6%
Caryophyllene	11.0 – 14.0%
Farnesene	5.0 – 7.0%
Humulene	25.0 – 30%
Geraniol	0.1 – 0.3%
Storage	Fair





Galena

Origin/History	Galena was bred in 1968 from Brewers Gold and with open pollination. It was released for cultivation in 1978 from the Idaho State breeding program.
Agronomics	Moderate tolerance to downy mildew and susceptible to powdery mildew.
Brewing Quality	Galena has citrus, stone fruit aromas and is used primarily as a bittering hop.
Maturity	Medium
Yield	2,000 – 2,200 kgs/ha 1,800 – 2,000 lbs/acre
Alpha acids	13.0 – 14.6%
Beta acids	7.9 – 8.6%
Alpha:Beta Ratio	1.7
Cohumulone	34.0 – 38.0% (% of alpha acids)
Total Oil	1.3 – 2.1 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.4 – 0.7%
Myrcene	40.0 – 50.0%
Linalool	0.1 – 0.3%
Caryophyllene	5.0 – 9.0%
Farnesene	< 1.0%
Humulene	11.0 – 17.0
Geraniol	0.5 – 0.8%
Storage	Good





Glacier

Origin/History	Glacier was released in 2000 from the Washington State University breeding program. It was selected for its low cohumulone and good yield potential.
Agronomics	Susceptible to powdery mildew and downy mildew. Good pickability of a medium compact cone.
Brewing Quality	Glacier is a dual purpose pleasant hop with fruity aromas.
Maturity	Medium
Yield	2,750–2,900 kgs/ha 2,400–2,600 lbs/acre
Alpha acids	4.9–7.1%
Beta acids	7.3–9.2%
Alpha:Beta Ratio	0.7
Cohumulone	13.0 -14.0% (% of alpha acids)
Total Oil	0.8–1.0 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.2–0.6%
Myrcene	35.0–45.0%
Linalool	0.8–1.1%
Caryophyllene	8.0–13.0%
Farnesene	< 1.0%
Humulene	25.0–35.0%
Geraniol	0.2–0.3%
Storage	Good





Golding

Origin/History	Golding cultivars originated in England and are named after villages in East Kent, (Petham, Rotherham, Canterbury, Eastwell). The cultivar grown in the USA is a Canterbury Golding.
Agronomics	Susceptible to downy mildew. Good pickability of a small, moderately compact cone.
Brewing Quality	Golding is used for its mild, delicate, English-type aromatic properties.
Maturity	Medium
Yield	1,100 – 1,600 kgs/ha 1,000 – 1,450 lbs/acre
Alpha acids	3.2 – 5.2%
Beta acids	1.4 – 2.5%
Alpha:Beta Ratio	2.1
Cohumulone	24.0 – 27.0% (% of alpha acids)
Total Oil	0.4 – 1.0 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.3 – 0.5%
Myrcene	25.0 – 35.0%
Linalool	0.6 – 0.9%
Caryophyllene	10.0 – 15.0%
Farnesene	< 1.0%
Humulene	35.0 – 45.0%
Geraniol	0.1 – 0.3%
Storage	Fair





Liberty

Origin/History	Liberty is a triploid aroma-type cultivar, bred in 1983 from a female cultivar from Hallertau mf and a downy mildew resistant male, USDA 64035M. It is a half-sister to Ultra, Mt. Hood and Crystal.
Agronomics	Some tolerance to downy mildew, susceptible to powdery mildew. Small, open cone is difficult to harvest.
Brewing Quality	Liberty has mild, slightly spicy aromatic properties similar to Hallertau mf.
Maturity	Medium
Yield	1,100 – 1,700 kgs/ha 1,000 – 1,550 lbs/acre
Alpha acids	4.0 – 5.4%
Beta acids	3.0 – 3.8%
Alpha:Beta Ratio	1.4
Cohumulone	21.0 – 24.0% (% of alpha acids)
Total Oil	1.0 – 1.8 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.1 – 0.3%
Myrcene	15.0 – 25.0%
Linalool	0.6 – 1.0%
Caryophyllene	10.0 – 15.0%
Farnesene	< 1.0%
Humulene	35.0 – 45.0%
Geraniol	0.1 – 0.3%
Storage	Fair





Magnum

Origin/History	Magnum was bred in 1980 at Huell, the German Hop Research Institute, from the American variety Galena and the German male 75/5/3.
Agronomics	Tolerant to downy mildew, susceptible to powdery mildew. Poor pickability of a large, compact cone.
Brewing Quality	Magnum is used for its bittering value and quality.
Maturity	Medium
Yield	2,000–2,200 kgs/ha 1,800–2,000 lbs/acre
Alpha acids	10.9–15.6%
Beta acids	6.0–6.7%
Alpha:Beta Ratio	2.1
Cohumulone	20.0–22.0% (% of alpha acids)
Total Oil	2.0–3.0 (mls. of oil per 100g)
Oil Components	<u>Expressed as % of total oils</u>
B-Pinene	0.4–0.8%
Myrcene	30.0–40.0%
Linalool	0.4–0.7%
Caryophyllene	7.0–12.0%
Farnesene	< 1.0%
Humulene	25.0–30.0%
Geraniol	0.3–0.6%
Storage	Good





Millennium

Origin/History	Millennium is a high alpha descendent of Nugget bred by the John I. Haas, Inc. breeding program. It was released in the year 2000 and is grown in Oregon and Washington.
Agronomics	Tolerant to downy mildew and powdery mildew. Good pickability of a medium size cone.
Brewing Quality	Millennium is used mainly for its bitterness potential, but it also has mild, herbal aromas.
Maturity	Late
Yield	2,450 – 2,900 kgs/ha 2,200 – 2,600 lbs/acre
Alpha acids	15.9 – 18.5%
Beta acids	4.8 – 6.0%
Alpha:Beta Ratio	3.2
Cohumulone	29.0 – 32.0% (% of alpha acids)
Total Oil	2.0 – 3.7 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.4 – 0.5%
Myrcene	38.0 – 45.0%
Linalool	0.3 – 0.6%
Caryophyllene	8.0 – 10.0%
Farnesene	< 1.0%
Humulene	20.0 – 24.0%
Geraniol	0.1 – 0.2%
Storage	Good





Mosaic™

Origin/History	Mosaic™ brand HBC 369 cv. hop variety is the result of a cross between Simcoe® brand YCR 14 cv. and a Nugget derived male. It was released in 2012 by Hop Breeding Company, a joint venture between John I Haas, Inc. and Select Botanicals Group, LLC.
Agronomics	Tolerant to powdery mildew, susceptible to downy mildew, with good pickability of medium sized cones.
Brewing Quality	Mosaic™ is a versatile hop with high alpha and tropical, blueberry, tangerine, floral, and earthy aromas.
Maturity	Medium-Late
Yield	1,900 – 2,250 kgs/ha 1,700 – 2,000 lbs/acre
Alpha acids	10.0 – 12.0%
Beta acids	3.0 – 3.6%
Alpha:Beta Ratio	3.3
Cohumulone	21.0 – 24.0% (% of alpha acids)
Total Oil	0.6 – 1.5 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.6 – 0.8%
Myrcene	48.0 – 55.0%
Linalool	0.4 – 0.6%
Caryophyllene	4.0 – 6.0%
Farnesene	< 1.0%
Humulene	11.0 – 15.0%
Geraniol	0.7 – 0.9%
Storage	Fair





Mt. Hood

Origin/History	Mt. Hood is a triploid aroma-type cultivar, bred in 1983 from a female cultivar from Hallertau mf and a downy mildew resistant male, USDA 64035M. It is a half-sister to Ultra, Liberty and Crystal.
Agronomics	Tolerant to downy mildew, with good pickability of a medium, compact cone.
Brewing Quality	Mt. Hood is used for its aromatic properties, citrus and berry, similar to the Hallertau mf cultivar.
Maturity	Medium
Yield	1,700 – 2,000 kgs/ha 1,500 – 1,800 lbs/acre
Alpha acids	3.7 – 6.6%
Beta acids	4.4 – 7.2%
Alpha:Beta Ratio	0.9
Cohumulone	21.0 – 24.0% (% of alpha acids)
Total Oil	1.0 – 1.5 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.3 – 0.5%
Myrcene	25.0 – 35.0%
Linalool	0.5 – 0.9%
Caryophyllene	13.0 – 16.0%
Farnesene	< 1.0%
Humulene	30.0 – 40.0%
Geraniol	0.3 – 0.5%
Storage	Poor





Northern Brewer

Origin/History	Northern Brewer was bred in 1934 in England from a Canterbury Golding female plant and the male plant OB21. This cultivar is grown in England, Germany, and the USA.
Agronomics	Moderate tolerance to downy mildew, with good pickability of medium, dense cone.
Brewing Quality	Northern Brewer has good bitterness value similar to Nugget with evergreen, woody aromas.
Maturity	Medium
Yield	1,800 – 2,000 kgs/ha 1,600 – 1,800 lbs/acre
Alpha acids	7.4 – 9.9%
Beta acids	4.6 – 5.6%
Alpha:Beta Ratio	1.7
Cohumulone	25.0 – 30.0 (% of alpha acids)
Total Oil	1.1 – 2.0 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.4 – 0.7%
Myrcene	35.0 – 45.0%
Linalool	0.4 – 0.7%
Caryophyllene	11.0 – 15.0%
Farnesene	< 1.0%
Humulene	27.0 – 31.0%
Geraniol	0.1 – 0.2%
Storage	Good



Nugget



Origin/History	Nugget was released in 1983 from the USDA breeding program in Oregon. It was bred in 1970 from the USDA 65009 female plant and USDA 63015M. Its lineage includes Brewers Gold and Canterbury Golding.
Agronomics	Tolerant to downy mildew and powdery mildew, with good pickability of a medium, compact cone.
Brewing Quality	Nugget has good bittering quality, with pleasantly mild, herbal and floral aromas.
Maturity	Medium
Yield	2,100 – 2,400 kgs/ha 1,900 – 2,100 lbs/acre
Alpha acids	13.5 – 15.5%
Beta acids	4.4 – 4.8%
Alpha:Beta Ratio	3.1
Cohumulone	23.0 – 25.0% (% of alpha acids)
Total Oil	1.4 – 3.0 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.4 – 0.6%
Myrcene	40.0 – 50.0%
Linalool	0.8 – 1.0%
Caryophyllene	9.0 – 11.0%
Farnesene	< 1.0%
Humulene	18.0 – 22.0%
Geraniol	0.1 – 0.2%
Storage	Good





Palisade®

Origin/History	Palisade® Brand YCR 4 cv. was bred by Yakima Chief Ranches as a dual purpose hop with moderate bitterness potential and unique aromas. The parentage includes the Tettnang variety.
Agronomics	Low susceptibility to powdery mildew, with good pickability of medium to large cone.
Brewing Quality	Palisade® has floral, fruity and earthy aromas with moderate bitterness potential.
Maturity	Medium
Yield	2,400 – 3,400 kgs/ha 2,200 – 3,000 lbs/acre
Alpha acids	6.6 – 9.5%
Beta acids	6.2 – 8.3%
Alpha:Beta Ratio	1.1
Cohumulone	27.0 – 29.0% (% of alpha acids)
Total Oil	1.0 – 2.6 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.6 – 0.8%
Myrcene	45.0 – 52.0%
Linalool	0.4 – 0.6%
Caryophyllene	11.0 – 14.0%
Farnesene	< 1.0%
Humulene	14.0 – 16.0%
Geraniol	0.1 – 0.2
Storage	Good





Perle

Origin/History	Perle is an aroma-type cultivar bred from Northern Brewer in 1978 at Huell, the German Hop Research Institute. It's grown in Germany and in Oregon and Washington.
Agronomics	Moderate tolerance to downy mildew, with good pickability of a small, compact cone.
Brewing Quality	Perle is used for its slightly spicy, floral aromas, and bittering qualities.
Maturity	Early
Yield	1,300 – 1,700 kgs/ha 1,150 – 1,550 lbs/acre
Alpha acids	5.9 – 8.0%
Beta acids	3.1 – 3.6%
Alpha:Beta Ratio	2.1
Cohumulone	28.0 – 31.0% (% of alpha acids)
Total Oil	0.7 – 0.9 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.2 – 0.5%
Myrcene	25.0 – 35.0%
Linalool	0.2 – 0.4%
Caryophyllene	12.0 – 16.0%
Farnesene	< 1.0%
Humulene	28.0 – 34.0%
Geraniol	0.2 – 0.4%
Storage	Good





Simcoe®

Origin/History	Simcoe® Brand YCR 14 cv. was bred by Yakima Chief Ranches and released in 2000. This multipurpose hop has a relatively high alpha content with low cohumulone and very unique aromas.
Agronomics	Moderate tolerance to powdery mildew with good pickability of a medium size cone.
Brewing Quality	Simcoe® has pine, berry aromas and good bittering properties due to its low cohumulone content.
Maturity	Medium
Yield	2,000 – 2,200 kgs/ha 1,800 – 2,000 lbs/acre
Alpha acids	11.5 – 15.2%
Beta acids	3.5 – 4.4%
Alpha:Beta Ratio	3.4
Cohumulone	17.0 – 19.0% (% of alpha acids)
Total Oil	1.0 – 2.5 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.5 – 0.8%
Myrcene	40.0 – 50.0%
Linalool	0.5 – 0.8%
Caryophyllene	8.0 – 12.0%
Farnesene	< 1.0%
Humulene	15.0 – 20.0%
Geraniol	0.8 – 1.2%
Storage	Good





Sorachi Ace

Origin/History	Sorachi Ace was a seedling selection made in Japan in 1984 and is now grown in Washington. It's a cross between Brewer's Gold, Saazer-OP, and Beikei No 2 Male.
Agronomics	Tolerant to downy mildew, powdery mildew and wilt.
Brewing Quality	Sorachi Ace has unique lemon lime and slight dill aromas; along with good bittering potential.
Maturity	Medium to Late
Yield	1,150 – 1,600 kgs/ha 1,000 – 1,400 lbs/acre
Alpha acids	11.7 – 15.0%
Beta acids	6.4 – 7.3%
Alpha:Beta Ratio	1.9
Cohumulone	23.0 – 26.0% (% of alpha acids)
Total Oil	2.0 – 2.7 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.5 – 0.8%
Myrcene	45.0 – 55.0%
Linalool	0.3 – 0.5%
Caryophyllene	7.0 – 9.0%
Farnesene	3.0 – 6.0%
Humulene	20.0 – 26.0%
Geraniol	0.1 – 0.3%
Storage	Good





Sterling

Origin/History	Sterling is an aroma hop, bred in 1990 and released in 1998. Its lineage includes Saazer, Cascade, 64035M (unknown German aroma X open pollination), and Brewers Gold.
Agronomics	Moderate tolerance to powdery mildew with good pickability of a compact cone.
Brewing Quality	Sterling has herbal, spicy aromas, with a hint of citrus and floral.
Maturity	Early
Yield	1,600 – 1,800 kgs/ha 1,400 – 1,600 lbs/acre
Alpha acids	5.3 – 8.4%
Beta acids	4.4 – 6.0%
Alpha:Beta Ratio	1.3
Cohumulone	24.0 – 27.0% (% of alpha acids)
Total Oil	1.8 – 2.7 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.5 – 0.6%
Myrcene	42.0 – 50.0%
Linalool	0.5 – 0.9%
Caryophyllene	5.0 – 8.0%
Farnesene	15.0 – 19.0%
Humulene	16.0 – 18.0%
Geraniol	0.2 – 0.4%
Storage	Good





Summit™

Origin/History	Summit™ was released in 2003 from the American Dwarf Hop Association in the U.S. It's derived from Zeus, Nugget and males from the USDA breeding program. It can be grown on both low and high trellis systems.
Agronomics	Shows good powdery mildew resistance.
Brewing Quality	Summit is mainly used as a bittering hop. It's has spicy, earthy, onion/garlic, and citrus aromas.
Maturity	Medium to Late
Yield	2,500 – 3,100 kgs/ha 2,200 – 2,700 lbs/acre
Alpha acids	16.9 – 18.5%
Beta acids	5.5 – 6.6%
Alpha:Beta Ratio	2.9
Cohumulone	27.0 – 29.0% (% of alpha acids)
Total Oil	1.6 – 2.9 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.3 – 0.6%
Myrcene	30.0 – 40.0%
Linalool	0.2 – 0.4%
Caryophyllene	12.0 – 16.0%
Farnesene	< 1.0%
Humulene	18.0 – 22.0%
Geraniol	0.1 – 0.2%
Storage	Fair





Tettnang

Origin/History	Tettnang is an aroma-type cultivar, which originated in the Tettnanger hop growing area of Germany as a land-race hop. It is grown in the USA in Oregon and Washington.
Agronomics	Moderate tolerance to downy mildew and fair pickability of a small, open cone.
Brewing Quality	Tettnang is used for its slightly spicy, floral aromatic properties.
Maturity	Early
Yield	1,000 – 1,500 kgs/ha 900 – 1,340 lbs/acre
Alpha acids	3.9 – 6.3%
Beta acids	2.0 – 3.6%
Alpha:Beta Ratio	1.8
Cohumulone	26.0 – 29.0% (% of alpha acids)
Total Oil	0.4 – 0.8 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.3 – 0.5%
Myrcene	30.0 – 40.0%
Linalool	0.6 – 0.8%
Caryophyllene	10.0 – 14.0%
Farnesene	5.0 – 8.0%
Humulene	25.0 – 30.0%
Geraniol	0.2 – 0.4%
Storage	Fair





Tomahawk®

Origin/History	Tomahawk® Brand F10 cv. is a bittering hop bred by Charles Zimmermann. It was selected for high alpha content, high oil content, and good yield potential. Tomahawk® was the first commercially grown "Super Alpha" variety.
Agronomics	Tolerant to downy mildew, susceptible to powdery mildew. Good pickability of a large compact cone.
Brewing Quality	Tomahawk® is used primarily as a bittering hop either in pellet or extract form.
Maturity	Late
Yield	2,800–3,000 kgs/ha 2,500–2,700 lbs/acre
Alpha acids	15.0–17.8%
Beta acids	4.9–5.7%
Alpha:Beta Ratio	3.1
Cohumulone	26.0–28.0% (% of alpha acids)
Total Oil	1.6–4.6 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.6–0.9%
Myrcene	45.0–55.0%
Linalool	0.3–0.7%
Caryophyllene	7.0–9.0%
Farnesene	< 1.0%
Humulene	11.0–15.0%
Geraniol	0.2–0.4%
Storage	Poor





Vanguard

Origin/History	Vanguard is a diploid cultivar bred in 1982 between USDA 21285, which has Hallertau mf parentage and USDA 64037m. It was released for cultivation in 1997.
Agronomics	Tolerant to downy mildew, with good pickability of a compact cone.
Brewing Quality	Vanguard is used for its aromatic properties, citrus and berry, similar to the Hallertau mf cultivar.
Maturity	Early
Yield	1,500 – 1,900 kgs/ha 1,300 – 1,700 lbs/acre
Alpha acids	4.7 – 6.3%
Beta acids	5.7 – 7.5%
Alpha:Beta Ratio	0.8
Cohumulone	12.0 – 13.0% (% of alpha acids)
Total Oil	0.7 – 1.2% (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.1 – 0.2%
Myrcene	5.0 – 10.0%
Linalool	0.2 – 0.4%
Caryophyllene	13.0 – 17.0%
Farnesene	< 1.0%
Humulene	49.0 – 55.0%
Geraniol	0.1 – 0.2%
Storage	Good





Warrior®

Origin/History	Warrior® Brand YCR 5 cv. was bred by Yakima Chief Ranches. It was selected for it's high alpha content, low cohumulone, good storage ability, and tolerance to powdery mildew.
Agronomics	Moderate tolerance to powdery mildew, with good pickability of a medium size cone.
Brewing Quality	Warrior® has good bittering qualities and herbal, citrus aromas.
Maturity	Medium
Yield	2,700–2,900 kgs/ha 2,400–2,600 lbs/acre
Alpha acids	15.8 – 18.2%
Beta acids	4.4 – 5.4%
Alpha:Beta Ratio	3.5
Cohumulone	25.0 – 27.0% (% of alpha acids)
Total Oil	1.3 – 3.2 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.5 – 0.7%
Myrcene	40.0 – 50.0%
Linalool	0.4 – 0.7%
Caryophyllene	11.0 – 14.0%
Farnesene	< 1.0%
Humulene	15.0 – 18.0%
Geraniol	0.4 – 0.8%
Storage	Good





Willamette

Origin/History	Willamette is a triploid aroma-type hop, which was released by the USDA in 1976. It originates from a seedling of Fuggle. The triploid breeding gives this hop the desirable characteristic of being seedless.
Agronomics	Tolerant to downy mildew, with fair pickability of a medium size open cone.
Brewing Quality	Willamette is known for its mild, slightly spicy and citrus aromas.
Maturity	Early
Yield	1,600 – 1,800 kgs/ha 1,400 – 1,600 lbs/acre
Alpha acids	4.6 – 6.0%
Beta acids	3.6 – 4.2%
Alpha:Beta Ratio	1.4
Cohumulone	29.0 – 32.0% (% of alpha acids)
Total Oil	0.6 – 1.6 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.3 – 0.5%
Myrcene	22.0 – 32.0%
Linalool	0.4 – 0.7%
Caryophyllene	12.0 – 14.0%
Farnesene	7.0 – 10.0%
Humulene	31.0 – 35.0%
Geraniol	0.1 – 0.3%
Storage	Fair





Zeus

Origin/History	Zeus is a super high alpha variety developed in the Yakima Valley. It was selected for the high alpha content and high yield potential.
Agronomics	Tolerant to downy mildew, susceptible to powdery mildew. Good pickability of a large compact cone.
Brewing Quality	Zeus is mainly used as a bittering hop in pellet or extract form.
Maturity	Late
Yield	2,800–3,000 kgs/ha 2,500–2,700 lbs/acre
Alpha acids	14.6–18.3%
Beta acids	4.8–5.5%
Alpha:Beta Ratio	3.2
Cohumulone	28.0–31.0% (% of alpha acids)
Total Oil	1.5–4.0 (mls. of oil per 100g)
<u>Oil Components</u>	<u>Expressed as % of total oils</u>
B-Pinene	0.5–0.9%
Myrcene	45.0–55.0%
Linalool	0.3–0.6%
Caryophyllene	7.0–12.0%
Farnesene	< 1.0%
Humulene	12.0–16.0%
Geraniol	0.2–0.4%
Storage	Poor



VARIETY	% ALPHA ACIDS	% BETA ACIDS	ALPHA/BETA	CoH	% TOTAL OILS	STORAGE
AHTANUM™	4.2-6.7	4.6-6.1	1.0	30-34	0.5-1.7	FAIR
AMARILLO®	8.1-10.5	5.5-7.3	1.5	20-22	1.0-2.3	GOOD
CASCADE	5.6-8.8	6.4-7.3	1.1	31-34	0.6-1.9	POOR
CENTENNIAL	8.2-10.9	3.5-4.4	2.4	25-27	1.0-2.0	POOR
CHINOOK	12.2-15.3	3.4-3.7	3.9	28-30	1.0-2.5	FAIR
CITRA®	11.3-14.0	3.6-3.9	3.4	21-24	1.5-3.0	FAIR
CLUSTER	7.6-8.9	4.9-5.6	1.6	37-40	0.5-0.8	GOOD
CRYSTAL	2.4-5.0	5.9-7.6	0.6	20-22	0.8-2.1	POOR
FUGGLE	3.6-5.6	1.7-2.9	2.0	25-32	0.7-1.2	FAIR
GALENA	13.0-14.6	7.9-8.6	1.7	34-38	1.3-2.1	GOOD
GLACIER	4.9-7.1	7.3-9.2	0.7	13-14	0.8-1.0	GOOD
GOLDING	3.2-5.2	1.4-2.5	2.1	24-27	0.4-1.0	FAIR
LIBERTY	4.0-5.4	3.0-3.8	1.4	21-24	1.0-1.8	FAIR
MAGNUM	10.9-15.6	6.0-6.7	2.1	20-22	2.0-3.0	GOOD
MILLENNIUM	15.9-18.5	4.8-6.0	3.2	29-32	2.0-3.7	GOOD
MOSAIC™	10.0-12.0	3.0-3.6	3.3	21-24	0.6-1.5	FAIR
MT HOOD	3.7-6.6	4.4-7.2	0.9	21-24	1.0-1.5	POOR
N. BREWER	7.4-9.9	4.6-5.6	1.7	25-30	1.1-2.0	GOOD
NUGGET	13.5-15.5	4.4-4.8	3.1	23-25	1.4-3.0	GOOD
PALISADE®	6.6-9.5	6.2-8.3	1.1	27-29	1.0-2.6	GOOD
PERLE	5.9-8.0	3.1-3.6	2.1	28-31	0.7-0.9	GOOD
SIMCOE®	11.5-15.2	3.5-4.4	3.4	17-19	1.0-2.5	GOOD
SORACHI ACE	11.7-15.0	6.4-7.3	1.9	23-26	2.0-2.7	GOOD
SPALT	2.4-4.4	5.2-7.1	0.6	20-25	0.8-1.2	GOOD
STERLING	5.3-8.4	4.4-6.0	1.3	24-27	1.8-2.7	GOOD
SUMMIT™	16.9-18.5	5.5-6.6	2.9	27-29	1.6-2.9	FAIR
TETTNANG	3.9-6.3	2.0-3.6	1.8	26-29	0.4-0.8	FAIR
TOMAHAWK®	15.0-17.8	4.9-5.7	3.1	26-28	1.6-4.6	POOR
VANGUARD	4.7-6.3	5.7-7.5	0.8	12-13	0.7-1.2	GOOD
WARRIOR®	15.8-18.2	4.4-5.4	3.5	25-27	1.3-3.2	GOOD
WILLAMETTE	4.6-6.0	3.6-4.2	1.4	29-32	0.6-1.6	FAIR
ZEUS	14.6-18.3	4.8-5.5	3.2	28-31	1.5-4.0	POOR

Yakima Chief's Values

P.R.I.D.E. Statement

Passion with a Strong Competitive Spirit.
Reputation for Teamwork and Respect.
Integrity in All That We Say and Do.
Dedicated to Sustainability.
Emphasis on Continuous Improvement.



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