



HOPS 101

Hops are the cone-like flowers of a climbing vine that is native to the temperate regions of North America, Europe and Asia. The species has separate male and female plants and only the female vines produce the cones. The vines will climb 20 ft or more up any available support and are commonly trained onto strings or wires when grown commercially. The leaves resemble grape leaves and the cones vaguely resemble pine cones in shape but are light green, thin and papery. At the base of the petals are the yellow lupulin glands which contain the essential oils and resins that are so prized by brewers

Hops are a natural preservative and part of the early use of hops in beer was to preserve it. Hops were added directly to the cask after fermentation to keep it fresh while it was transported. This is how one particular style of beer, India Pale Ale, was developed.

Beer wouldn't be beer without hops - hops provide the balance, and are the signature in many styles. The bitterness contributed by hops balances the sweetness of the malt sugars and provides a refreshing finish. The main bittering agent is the alpha acid resin which is insoluble in water until isomerized by boiling. The longer the boil, the greater the percentage of isomerization and the more bitter the beer gets. However, the oils that contribute characteristic flavors and aromas are volatile and are lost to a large degree during the long boil. There are many varieties of hops, but they are usually divided into two general categories: Bittering and Aroma. Bittering hops are high in alpha acids, at about 10 percent by weight. Aroma hops are usually lower, around 5 percent and contribute a more desirable aroma and flavor to the beer. Several hop varieties are in-between and are used for both purposes. Bittering hops, also known as kettle hops, are added at the start of the boil and boiled for about an hour. Aroma hops are added towards the end of the boil and are typically boiled for 15 minutes or less. Aroma hops are also referred to as finishing hops. By adding different varieties of hops at different times during the boil, a more complex hop profile can be established that gives the beer a balance of hop bitterness, taste and aroma. Descriptions of the five main types of hop additions and their attributes follow.

Form	Advantages	Disadvantages
Whole	They float, and are easy to strain from wort. Best aroma character, if fresh. Good form for dry hopping.	They soak up wort, resulting in some wort loss after the boil. Bulk makes them harder to weigh.
Plug	Retain freshness longer than whole form. Convenient half ounce units. Behave like whole hops in the boil. Good form for dry hopping.	Difficult to use in other than half ounce increments. They soak up wort like whole hops.
Pellets	Easy to weigh. Small increase in isomerization due to shredding. Don't soak up wort. Best storability.	Forms hop sludge in boil kettle. Difficult to dry hop with. Aroma content tends to be less than other forms due to amount of processing.

Hop Variety Chart

BITTERING HOPS

Name	Area Grown	Profile	Usage	Example	Alpha Acid	Substitute
Brewer's Gold	UK, US	Poor aroma Sharp bittering	Bittering for ales		8-9%	Bullion, Northern Brewer, Galena
Bullion	UK, US	Poor aroma; sharp bittering and black-currant-like flavor when used in the boil	Bittering for British ales, perhaps some finishing		8-11%	Brewer's Gold, Northern Brewer
Centennial	US	Spicy, floral, citrus aroma, often referred to as Super Cascade because of the similarity; A clean bittering hop.	General purpose bittering, aroma, some dry hopping	Sierra Nevada Celebration Ale, Sierra Nevada Bigfoot Ale	9-11.5%	Cascade, Columbus
Challenger	UK	Strong, fine spicy aroma widely used for English Bitters; A clean bittering hop.	Excellent bittering hop, also used for flavoring and aroma.	Full Sail IPA, Butterknowle Bitter	6 - 8%	Progress
Chinook	US	Heavy spicy aroma; Strong versatile bittering hop, cloying in large quantities	Bittering	Sierra Nevada Celebration Ale, Sierra Nevada Stout	12 - 14%	Galena, Eroica, Brewer's Gold, Nugget, Bullion
Cluster	US, Australia	Small, spicy aroma; Sharp, clean bittering hop	General purpose bittering (Aussie version has a better aroma and is used as finishing hop)	Winterhook Christmas Ale	5.5 - 8.5%	Galena, Eroica, Cascade
Columbus	US	Strong fine herbal flavor and aroma; Solid, clean bittering hop	Excellent general purpose bittering, flavoring and aroma hop.	Anderson Valley IPA, Full Sail Old Boardhead Barleywine	13-16%	Centennial, Chinook, Galena, Nugget
Eroica	US	Good bittering hop	Good general purpose bittering	Ballard Bitter, Blackhook Porter, Anderson Valley Boont Amber	12-14%	Northern Brewer, Galena
Galena	US	Strong, clean bittering hop	General purpose bittering	The most widely used commercial bittering hop in the US.	12 - 14%	Cluster, Northern Brewer, Nugget

Horizon	US	A low co-humulone half-sister to Nugget. Very smooth bittering characteristics with a pleasant aroma.	Suitable for use in both ale and lager styles.		11-13%	Nugget
Magnum	US	Spicy, citrusy, super-high alpha bittering hop from the Pacific Northwest	Known for bittering value and quality. Used in all styles.		13-15%	Northern Brewer
Northern Brewer	UK	A clean bittering hop.	General purpose bittering, flavor and aroma for heavier ales.	Fuller's ESB	7 - 8%	Target
Nugget	US	Heavy, spicy, herbal aroma; Strong bittering hop	Strong bittering, some aroma uses	Sierra Nevada Porter & Bigfoot Ale, Anderson Valley ESB	12 - 14%	Galena, Chinook, Cluster
Perle	Germany, US	Pleasant aroma; Slightly spicy, almost minty, bittering hop	General purpose bittering for all lagers	Sierra Nevada Summerfest	7 - 9.5%	Northern Brewer, Cluster, Tettnanger
Pride of Ringwood	Australia	Poor, citric aroma; Clean bittering hop	General purpose bittering	Most Australian beers.	9 - 11%	Cluster
Simcoe	US	Smooth, clean bitterness, low cohumulone. Has a unique mahogany/walnut wood aroma, with some resinous/candy-like character and some citrus.	A bittering and aromatic hop.		12-14%	Pride of Ringwood with a touch of Goldings and Cascade.
Summit	US	Super-high alpha hop with a low cohumulone content and a strong orange/tangerine citrus character.	A bittering and aromatic hop.		17-19%	Simcoe
Target	UK	Strong herbal aroma can be too strong for lagers; A clean bittering hop.	Widely used bittering and flavoring hop for strong ales.	Fuller's Hock, Morrells Strong Country Bitter	8 - 10%	Northdown
Tomahawk	US		Primarily a bittering hop.		15-17%	Columbus, Zeus
Warrior	US	Super-high alpha bittering hop, but with its citrus-and-spice character.	A bittering and aroma hop.		15-17%	Nugget, Columbus

Zeus	US	Aromatic and pleasant.	Primarily a bittering hop.		13-17%	Columbus, Zeus
AROMA HOPS						
Ahtanum	US	Citrus, floral, pine, and earthy notes. More grapefruit forward than Cascade.	American-style Bitters, Pale Ales, and IPAs.		4.5%	Cascade or Amarillo
Amarillo	US	American flavor/aroma hop with a sweet citrus character; flowery	Used for bittering, finishing, and dry hopping. Often used in pale ales and IPAs		8-9%	Ahtanum , Cascade, or Centennial
British Columbia (BC) Goldings	Canada	Earthy, rounded, mild aroma; Spicy flavor	Bittering, finishing, dry hopping for British style ales. Used as a domestic substitute for East Kent Goldings. Not quite as good as EK.		4.5 - 7%	EK Goldings
Cascade	US	Strong spicy, floral, citrus (i.e. grapefruit) aroma.	The defining aroma for American style Pale ales. Used for bittering, finishing, and especially dry hopping.	Anchor Liberty Ale & Old Foghorn Barleywine, Sierra Nevada Pale Ale	4.5 - 8%	Centennial, Amarillo
Crystal	US	Mild, pleasant, slightly spicy. One of three hops bred as domestic replacements for Hallertauer Mittelfrüh.	Aroma/finishing/flavoring		2 - 5%	Hallertauer Mittelfrüh, Hallertauer Hersbrucker, Mount Hood, Liberty, Ultra
East Kent Goldings (EKG)	UK	Spicy/floral, earthy, rounded, mild aroma	Bittering, finishing, dry hopping for British style ales	Young's Special London Ale, Samuel Smith's Pale Ale, Fuller's ESB	4.5 - 7%	BC Goldings, Whitbread Goldings Variety

Fuggles	UK, US	Mild, soft, grassy, floral aroma	Finishing / dry hopping for all ales, dark lagers	Samuel Smith's Pale Ale, Old Peculiar, Thomas Hardy's Ale	3.5 - 5.5%	East Kent Goldings, Willamette, Styrian Goldings
Hallertauer Hersbrucker	Germany	Pleasant, spicy/mild, noble, earthy aroma	Finishing for German style lagers	Wheathook Wheaten Ale	2.5 - 5%	Hallertauer Mittelfrüh, Mt. Hood, Liberty, Crystal, Ultra
Hallertauer Mittelfrüh (Noble Hop)	Germany	Pleasant, spicy, noble, mild herbal aroma	Finishing for German style lagers	Sam Adam's Boston Lager, Sam Adam's Boston Lightship	3 - 5%	Hallertauer Hersbrucker, Mt. Hood, Liberty, Crystal, Ultra
Liberty	US	Fine, very mild aroma. One of three hops bred as domestic replacements for Hallertauer Mittelfrüh.	Finishing for German style lagers	Pete's Wicked Lager	2.5 - 5%	Hallertauer Hersbrucker, Hallertauer Mittelfrüh, Mt. Hood, Crystal, Ultra
Mt. Hood	US	Mild, clean aroma. One of three hops bred as domestic replacements for Hallertauer Mittelfrüh.	Finishing for German style lagers	Anderson Valley High Rollers Wheat Beer	3.5 - 8%	Hallertauer Hersbruck, Hallertauer Mittelfrüh, Liberty, Tettnang, Ultra
Palisade	US	Soft, clean finish with characteristics some find similar to Willamette.	Aroma hop with moderate bittering quality. Appropriate for a variety of American and English Ales.		6.9%	
Progress	UK	Assertive fruity aroma	Widely used for real cask ales.	Hobson's Best Bitter, Mansfield Bitter	5 - 6%	Fuggles, Whitbread Goldings Variety

Saaz (Noble Hop)	Czechoslovakia	Delicate, mild, floral aroma	Finishing for Bohemian style lagers	Pilsener Urquell	2 - 5%	Tettnang, Spalt, Ultra (some would claim there is <i>no</i> substitute)
Spalt (Noble Hop)	Germany, US	Mild, pleasant, slightly spicy	Aroma/finishing/flavoring, some bittering		3 - 6%	Saaz, Tettnang, Ultra
Styrian Goldings	Yugoslavia	Similar to Fuggles	Bittering/finishing/dry hopping for a wide variety of beers, popular in Europe	Ind Coope's Burton Ale, Timothy Taylor's Landlord	4.5 – 7%	Fuggles, Willamette
Tettnang (Noble Hop)	Germany, US	Fine, spicy aroma	Finishing for German style beers	Gulpener Pilsener, Sam Adam's Oktoberfest, Anderson Valley ESB, Redhook ESB	3 - 6%	Saaz, Spalt, Ultra
Willamette	US	Mild, spicy, grassy, floral aroma	Finishing / dry hopping for American / British style ales	Sierra Nevada Porter, Ballard Bitter, Anderson Valley Boont Amber, Redhook ESB	4 - 7%	Fuggles
Whitbread Goldings Variety (WGV)	UK	Flowery, fruity, a cross between Goldings and a Fuggle.	Often combined with other varieties in Bitters	Whitbread Best Bitter	4 - 5%	Progress, Fuggles, EKG
Ultra	US	Very fine, mild, spicy with floral notes	Excellent finishing hop for Pilsner and German style lagers.		2-5%	Any Noble hop, Crystal, Liberty, Mt. Hood