Hops!

Kunming Craft Beer Society November/December 2015

Hops are the flowers (also called seed cones or strobiles) of the female hop plant Humulus lupulus. They are used primarily as a flavouring and stability agent in beer, to which they impart a bitter, tangy flavour, though they are also used for various purposes in other drinks and herbal medicine. Hops have been traditionally used to treat anxiety, restlessness, and insomnia.

History

The first documented hop cultivation was in 736 in the Hallertau region in Bavaria, Germany. The first recorded use of hops in beer is in the 9th century, although they were grown before that (Charlegmagne's father had a hop garden!) for medicinal purposes. Before that, the sweetness was offset by other bitter herbs and flowers. Hops weren't grown in the UK until 1524 after hopped beer was imported from Holland. They were planted in America in 1629. They were used in beer for their antiseptic properties rather than bittering capability - the alcohol percentage could be lowered instead so the brewers could use less malts and therefore make more money.

Hop Facts

- There are more than 75 varieties of hops.
- Hop bines can grow up to one foot a day.
- Hops are antibacterial and prevent beer spoilage.
- Germany produces the most hops, followed by the USA, then Ethiopia and China. North Korea produces more than the UK.
- The term "noble hops" traditionally refers to varieties of hops which are low in bitterness and high in aroma. e.g. Hallertau, Tettnanger, Spalt, Saaz.
- As with grapes, the location where hops are grown affects the hops' characteristics.
- Latitudes of between 35-55 are perfect for hop growing.
- Hops are toxic to dogs and cats, causing hyperthermia.
- Hops are from the hemp family, as is cannabis.
- German hops are generally considered to be herbal, English hops spicy, earthy and fruity, and American hops – while widely variable – are generally more citrus, piney, tropical fruity, and resiny.
- There is a limit to IBUs related to the solubility of iso-acids in the beer
- Essential hops oils are easily lost to oxidation. One USDA study found losses of 28% to 90% after six months of storage at room temperature, depending on the hop varietal.
- Hop resins are insoluble in water. It takes the application of heat during brewing to isomerise (change the chemical structure of) alpha acids so their flavours can dissolve into the wort.

Hops in Beer

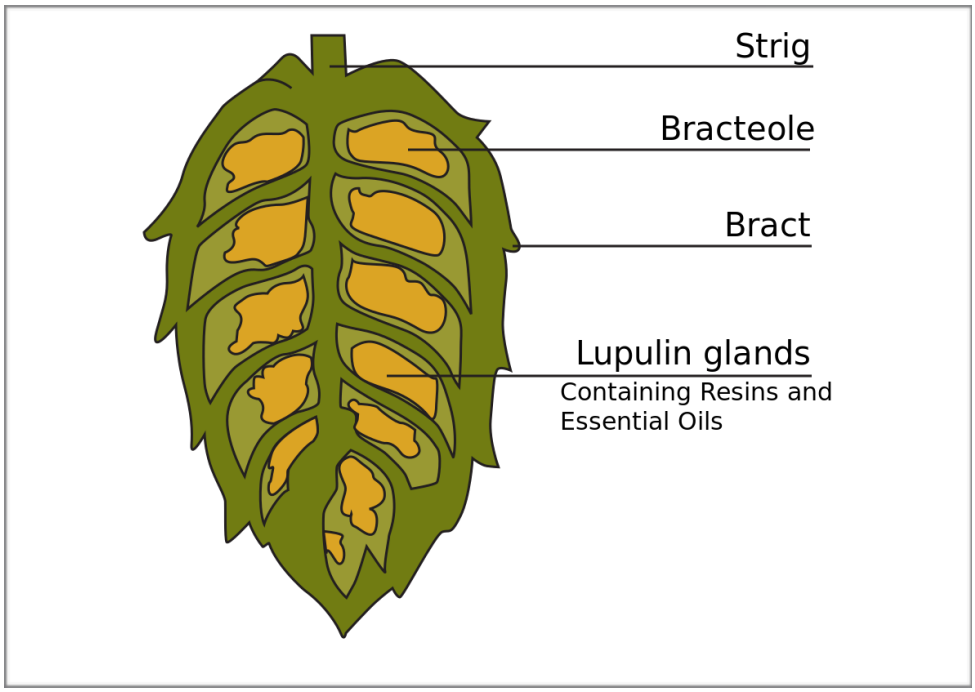
Hops are added to the boil. The longer you boil, the more alpha acid is isomerised and the more bitter the wort becomes.

Hops can also be added to the fermentor after fermentation. This imparts aroma and not bitterness and is called **dry hopping**.

Science

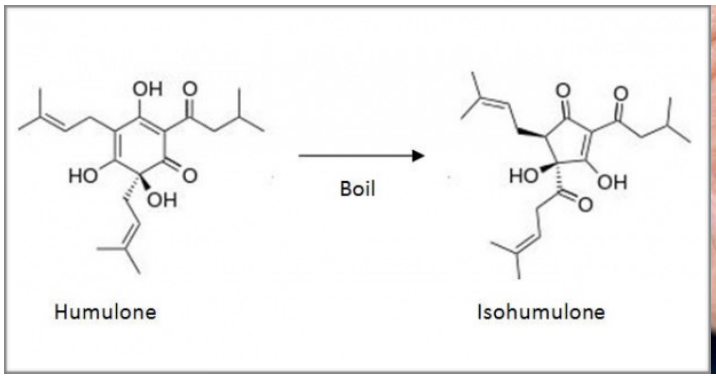
1 IBU = 1ppm iso-humulone

Hops have **lupulin** glands. It is within these glands that the resins and oils that are so important to brewers are found. Of these chemicals, the 2 that are of great importance are: alpha acids and essential oils.



Alpha acids:
Humulone - smooth bitterness, e.g. Amarillo
Cohumulone - harsh bitterness, e.g. Chinook
Adhumulone
Posthumulone
Prehumulone

These give the bitterness to the brew as the alpha acids are converted to iso-alpha acids (a molecule with the same chemical formula as the original compound, but with a different chemical structure)



Essential oils:
Humulene - earthy, woody, spicy, coriander-like, e.g. Northdown
Myrcene - green, grassy, peppery, fruity, citrusy, e.g. Admiral
Farensene - floral, herbal, e.g Cascade

These contribute aroma and flavour. They break down under heat and evaporate easily so are eliminated during boiling and are nullified by time and/or oxidation.

Beta acids?
These can also contribute bitterness but do not isomerise during boiling. Rather they create bitterness and vegetable-like off-flavours through oxidation so are something to be wary of!