

Hops!

# Bjcp Exam

- WICKED WEEDS?

- **HOPS WERE NOT FORBIDDEN BY HENRY VI**

- The hop plant (*Humulus Lupulus*) is a bine (not a vine), native to the northern latitudes (35-55° latitude) of the northern hemisphere. They require long growing days and well-drained soil of 5.0-7.0 pH. They can grow to be up to 20 feet tall. They are quite vulnerable to various types of mold, so they do well in drier climates. Alpha acids, responsible for hop bitterness, have a mildly bacteriostatic action on gram-positive bacteria, meaning that they have a preservative effect.

# Discuss hops

- 1. Active ingredient: Lupulin, gland of the female plant of Humulus Lupulus
- 2. Oils and Resins: Resins contain Alpha and Beta acids, Oils contain aromatics
- 3. Humulone and Cohumulone
- 4. Alpha and Beta
  - Alpha cause the bittering to occur in beer
  - Beta do not isomerize, but contribute to aroma

- 5. Isomerization: Through boiling, changing the structure of the molecules in hop alpha and beta acids so as to make them water soluble
- 6. Formula:  $\text{IBU Predicted} = \text{utilization \%} \times \text{alpha acid \%} \times \text{oz} \times 7490$   
gallons

# Hop Characteristics

Antibacterial/Preservative : Boiling hops in wort.

# Essential Hop Oils

Contribute hop aroma and flavor ☐

Myrcene: Provides important late hop flavor and aroma

Most abundant oil (30-60%) Evaporates quickly ☐

Humulene, Caryophyllene

Hop oils are volatile ☐

Lost during the boil

Linalool has a hoppy aroma.

Geraniol has a floral, perfumey aroma like geraniums.



# Beer Styles

- ID 4 different styles and describe the hops characteristics.
  1. American IPA
  2. English Bitter
  3. German Pils
  4. Cali Common

# Techniques

Mash Hopping : Higher pH in the mash creates non-volatile compounds in the wort, thought to lend a more rounded bitterness, whole hops help in lautering ☐

First-Wort Hopping: Volatile compounds bind to malt components, Hops have longer contact time

Bittering Addition: Hops added 60min from end of boil

Flavor Addition: Adding hops in the boil, typically 40-15min or less from end of boil

Aroma Addition: Adding hops in boil, 15min or less in the boil

Hop Bursting: Adding a large percentage of aroma hops at knockout.

Whirlpool hopping: Similar to hop bursting technique. A large percentage aroma hops added during whirlpool.

Hop back: Running wort through hops before going to fermenter.

Dry hopping: Adding aroma hops during or after fermentation.

# Hop Products

Whole ☐ Pellets ☐ Extracts ☐

Becoming more accepted by craft brewers, better products are available than in the past, reduces kettle solids and increases efficiency

- **BU:GU Ratio:** Since hop bitterness is balanced by alcoholic strength, malt bitterness, yeast character and other factors, a useful method of determining relative bitterness is by calculating the beer's BU:GU ratio. This is a subjective measurement invented by Ray Daniels, which is a ratio of the beer's IBU level against the last two digits of its Original Gravity. For example, an Imperial IPA with 100 IBU, but an O.G. of 1.050 would have a BU:GU ratio of 2:1 (extremely hoppy), while a Weizenbock (20 IBU, O.G. 1.070) would have a ratio of 1:3.5 (very malty).

# Resources

- For the love of hops by Stan Heironymus
- BJCP for Dummies
- A hand book of basic brewing calculations
- IPA by Mitch Steel
- Hop and IPA presentations by Matt Cole and Chris Altmont