

# Some of Dry Hop Effects on Beer

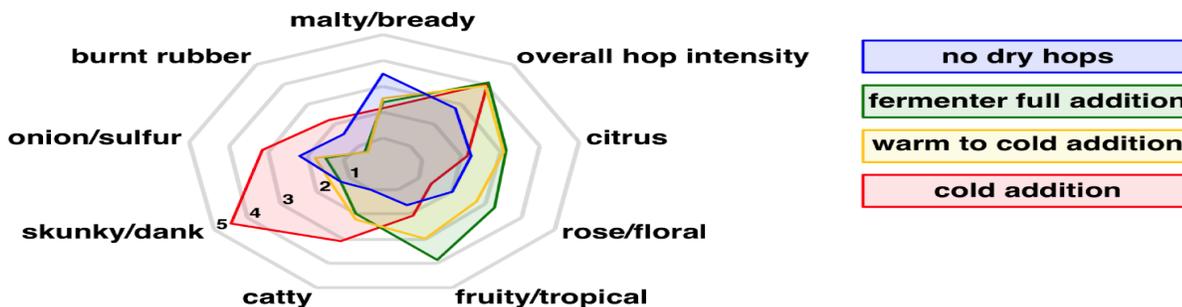
## Hop Creep

- The earliest reference found so far on this was in the Brewers Guardian from 1893 by Brown & Morris. This has recently been brought back to the forefront because commercial breweries must be within .3 of the stated ABV on the package and marketing material, and some were having issues complying to this, to the point of dumping beer (the likes of Allagash and Bells)
- Hop Creep (Freshening power of hops) – In the presence of yeast and fermentation temperatures, dry hopped beer will go through additional fermentation. It is believed this is from a glycolytic enzyme(s) in hops converting residual non-fermentable polysaccharides from malt into simple sugars that are then fermented by yeast (source ASBC). Dr. Shellhammer's Lab (Professor of Brewing Science at Oregon State University) indicate that enzymes in hops survive to act on finished fermented beer, posing potential quality concerns to brewers. The addition of Cascade hops to finished beer showed production of fermentable sugars glucose and maltose as a result of starch degrading enzymes in hops. Enzyme specific assays were used to detect starch degrading enzymes in Cascade pellet hops, **with the highest activities reported for amylases at 0.76** (source Kaylyin Kirkpatrick Masters Thesis)
- What has been found by the ASBC study, is that the SG or Plato of the beer does not go up after a dry hop addition (meaning there are not fermentable sugars in the hops), but rather the finished SG or Plato is lower, resulting in a higher ABV, dryer beer. This backs up the notion that the hops convert something already in the wort to become fermentable.
- It has been found that different hops have varying effects on the final SG and ABV.
- This is very important to understand if you package a beer shortly after dry hopping or dry hop it cool and allow it to warm back up (I'm talking to those of you that bottle condition!)

## Flavor effects on Hop timing

- Sierra Nevada recently did a presentation at the Master Brewers Association of the America's on the flavor and stability effect of hop timing. (There's also a pod cast out on it)
- There were 4 categories: No dry hop, dry hop at yeast pitch (fermenter full), dry hop 4 days after yeast pitch and at 72F (warm to cold), and dry hop after cold crash (cold)

**significant organoleptic qualities**  
quantitative descriptive panel assessment:  
n = 8 trained panelists per screening  
rated intensity from 0 to 8 (8 = most intense)



average of intensity ratings  
from n = 3 panels  
 $\alpha = 0.05$

impact of dry-hopping at different fermentation stages on beer quality | MEM, WFC | August 14, 2018 | JBC 2018 15

**\*\* Full sources and experiments located on our shared drive – Presentations > Dry Hop Effects \*\***