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HOP SCIENCE

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WHAT DETERMINES THE UNIQUENESS OF A HOP VARIETY?

This Japanese research group has been hunting the mystery of hop aroma in beer for a long time. In this recent work they brewed late hopped and dry hopped beers with 18 different hop varieties! From the U.S. they looked at Apollo, Bravo, Citra, Mosaic and Summit. From Germany were Hallertau Blanc, Hüll Melon, Mandarina Bavaria and Polaris. Then from New Zealand were Kohatu, Motueka, Nelson Sauvin, Pacific Jade, Rakau, Riwaka, Southern Cross, Wai-iti and Wimea. The researchers were looking for varietal differences especially in different monoterpene alcohols. They found no varietal differences in β -ionone and nerol content, but did see variations in the other components studied - but the differences were not coherent. Things are never easy with hops!

STABILITY OF HOP AROMA COMPOUNDS IN BEER

Using the U.S. hop variety Lemondrop, this German research team investigated how beer type influences the concentrations of hop aroma compounds and how these concentrations change over time. With the GC-method described they were able to determine not only monoterpene alcohols and some sesquiterpenes, but also various esters in the late and dry hopped beers. The results showed significantly higher concentrations of the mono- and sesquiterpenes myrcene, β -caryophyllene, α -humulene, β -farnesene and β -limonene in the pale ale style beer when compared to pilsner type beer (maybe filtration has an effect). No significant differences in these two beer styles were found for the more polar terpene alcohols linalool, geraniol, and α -terpineol. Only the amount of β -citronellol differed, which was lower in the pale ale. The behavior of esters among themselves was different. A significantly higher amount of isoamyl acetate was detectable in the pale ale, and little difference was seen in 2-methylbutyl isobutanoate between the two

beers types. Ethyl dodecanoate was detectable in a higher amount in the pilsner as compared to the pale ale. It was thought that perhaps the differences for esters were influenced by the types of yeast used in fermentation. A higher concentration of 2-undecanone was seen in the pale ale but no significant differences were detected for 2-nonanone and 2-decanone. With regard to stability of the aroma compounds, all showed a decrease in concentration over the storage time of 12 months except for alpha-terpineol.²

REFERENCES:

1. Takoi, K: Varietal Difference of Hop-Derived Flavour Compounds in Late-Hopped/Dry-Hopped Beers, *Brewing Science*, January / February 2016 (Vol. 69), www.brewingscience.de

2. Schmidt, C: Headspace Trap GC-MS analysis of hop aroma compounds in beer, *Brewing Science*, January / February 2016 (Vol. 69), www.brewingscience.de

EVENTS



BARTH-HAAS HOPS ACADEMY

- April 15th-16th: Hoppy Days in Perugia, Italy 2-day course presented in Italian
- June 3rd-4th: Hops Academy goes to Chile
- August 23rd: Spend a Happy Hoppy day in the UK at Paddock Wood, Kent

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