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HOP SCIENCE

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THE HOP FLAVONOID POTENTIAL FOR DRY HOPPED BEERS

In recent years, several positive physiological and pharmacological properties have been reported for the xanthohumol and other prenylflavonoids from hops, such as xanthohumol, isoxanthohumol, 6- and 8-prenynaringenin. This German research team has developed an HPLC-MS/MS method for identifying and quantifying nine hop flavonoids. They found that the concentration of these compounds in beer is variety dependent. Some of the flavonoids have very low flavour thresholds and in combination it is possible that they contribute to the bitter taste in dry hopped beer.¹

STAYING IN THE BITTER FIELD

We already know about hop flavonoids and their bitter taste, but there are other bitter compounds in hops we know and don't know. These researchers call these others "auxiliary bitter compounds," comprising the bitter compounds that do not include the iso-alpha acids. In a sensory context those components can influence the bitter quality. To assess the bittering effect of these compounds one can work with the ratio between the Bitter Units and the HPLC measured concentration of iso-alpha acids. This ratio of course increases with hop varieties with low alpha content e.g. land-race varieties. In addition to the above mentioned flavonoids, additional compounds present in hops are formed from α -acids (humulinones, deoxyhumulones), as well as those formed from β -acids during wort boiling (hulupones, hulupinic acid and hydroxyl-tricyclolupulones). Various studies have shown that the sensory evaluated bitterness quality correlates positively with higher IBU/iso-alpha acids ratios. So it is about time to leave behind the old categorization into bitter and aroma varieties, since yes, aroma varieties also give great (or even greater?) bitterness!²

HOP VARIETY CATEGORIZATION ACCORDING TO THE FREEDOM OF AROMA COMPOUNDS?

We now understand that there are several possible factors affecting the release of relevant aroma compounds during the brewing process that have a high flavour impact in finished beer. These Japanese researchers took a close look at the influence of geraniol. With the investigation of a total of 42 hop varieties, they found that many hop varieties could be classified in two geraniol-rich 'Flavour Hop' groupings, which tend to contribute a large amount of β -citronellol to finished beer. The two types are designated as "free geraniol dominant hops" and "geraniol precursor dominant hops." *Free geraniol dominant hops* contain mainly free geraniol at high levels along with some geraniol precursors. These include varieties such as NZ Motueka, US Bravo, US Cascade, US Citra, and US Mosaic. Conversely, *geraniol precursor dominant hops* contain mainly the geraniol precursors at high levels and to a lesser extent, free geraniol. Examples here are AUS Vic Secret, D Comet, D Hallertau Blanc, and D Polaris. Maybe something worth looking into when you define your next beer recipe!³

REFERENCES:

1. Schmidt, Ch.;Biendl, M.: LC-MS/MS Analysis of Hop Flavonoids in Dry-Hopped Beers, November / December 2017 (Vol. 70), http://www.brewingscience.de/index.php?tpl=table_of_contents&year=2017&edition=0011%2F0012&article=90608
2. Forster, A. et al: What are Auxiliary Bitter Compounds in Hops and how do they Affect the Quality of Bitterness in Beer? November / December 2017 (Vol. 70) http://www.brewingscience.de/index.php?tpl=table_of_contents&year=2017&edition=0011%2F0012&article=90609
3. Takoi, K: Systematic Analysis of Behaviour of Hop-Derived Monoterpene Alcohols During Fermentation and New Classification of Geraniol-Rich Flavour Hops, , November / December 2017 (Vol. 70), http://www.brewingscience.de/index.php?tpl=table_of_contents&year=2017&edition=0011%2F0012&article=90606

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