

Why cohumulone is better than its reputation

CHARACTER ASSASSINATION | The repercussions of a bad reputation are quite evident in the case of the cohumulone found in hops. This article offers a closer examination of the prejudices and false assumptions, which have been associated with cohumulone over a long period of time.

THE COHUMULONE FRACTION IN HOPS in the form of isocohumulone has been blamed for an unpleasant bitterness in beer for decades.

In brewing science and most likely in other technical fields as well, there are prevailing beliefs which are seldom questioned. But sometimes this information came about by falsely interpreting the data, by using outdated methods or simply through misunderstandings.

Due to new advances in methods of analysis, sensory evaluation and technology in general, it is often worthwhile to look more closely at topics generally considered to be thoroughly investigated and well understood, in order to determine if modern research can provide new data and a fresh

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interpretation. Therefore, the question is whether cohumulone is indeed responsible for an unpleasant bitterness in beer.

After reviewing the literature, the suspicion has been raised that this particular belief may have simply been based on a misunderstanding.

Comparative Studies Conducted in the Fifties

The alpha acids or the humulone compounds contained in hops can be divided into three categories: humulone, cohumulone and adhumulone. During wort boiling, these compounds are converted to isohumulone, isocohumulone and isoadhumulone, respectively. Cohumulone was isolated and identified by *Rigby and Bethune* in 1952 [1].

In hops, humulone and cohumulone comprise the largest fraction of bittering substances, ranging from 20 to 60 percent

depending on the hop variety. In comparative studies conducted by *Rigby and Bethune* in 1953, the flavor of isohumulone and isocohumulone was tested and no difference in flavor could be detected [2].

These flavor tests were performed using water as the medium. However, the influence of the pH was not taken into account. Depending on the pH, different amounts of isohumulone or isocohumulone will dissociate. This, in turn, influences the bitterness in quality and intensity.

In 1956, *Brenner* described a harsher bitterness in beer resulting from an increase in the pH [3]. Based on this research as well as the findings of *Meilgaard*, which showed that the undissociated form is linked to a finer bitterness than the dissociated form [4], *Rigby* in 1972 was able to conclude that beers with a larger portion of dissociated isocohumulone have a harsher and more intense bitterness despite the same iso- α acid content.

Rigby tested this in an experiment in which one beer was brewed with almost pure humulone and another primarily with cohumulone. The bitterness of the cohumulone beer was rated as stronger and harsher. Additionally, it showed that both beers exhibited very different amounts of iso- α acids. The beer brewed using cohumulone had a concentration of 34 mg of

iso-alpha-acid per liter, while the iso-alpha-acid concentration of the humulone beer was only 21 mg/l. Therefore, a comparison of these two beers is not possible, which Rigby himself also noted [5]. What has been established is the fact that the yields of cohumulone and isocohumulone are higher during the brewing process, particularly during fermentation, than the yields of humulone or isohumulone. This can be explained by the polar character and better solubility properties of cohumulone. The poor reputation of cohumulone can be traced back to this one study, and it is evident that the negative qualities attributed to cohumulone are simply based on conjecture. Neither Rigby's results, nor any research has shown that cohumulone is responsible for a decline in the quality of the bitterness. Although this information is available, it has had little effect on influencing the widespread opinion, albeit incorrect, that cohumulone contains less desirable bittering substances. Unfortunately, this work continues to be cited in the same manner as it has been in the past.

The Quality of the Bitterness of Isocohumulone

In the meantime, several research publications have focused on the quality of the bit-

terness of isocohumulone.

One example is the research by *Wackerbauer* from 1993 [6]. As part of his research, beer was brewed using pure humulone as well as pure cohumulone. During the sensory analysis, these beers were tasted for hop bitterness intensity and quality. As a result of this analysis, it was determined that beer brewed with cohumulone was not inferior to the other beer in any way. In addition to the various experiments conducted by *Hughes*, the more recent work by *Shellhammer*, which utilized state-of-the-art technology, has corroborated findings that there are no differences in quality in the bitterness due to isocohumulone and isohumulone. However, to date, these results appear to have largely been ignored [7].

It is debatable, of course, how important it is to set the record straight about cohumulone. In any case, the negative perception of cohumulone has influenced the trends in hop research over the past few decades, which has ultimately led to relatively low levels of cohumulone in all of the more recent hop cultivars. This holds true for bittering hop varieties as well as aroma hop varieties.

What a particularly ironic twist of fate given the current high prices for hops, since brewers could potentially extract more bit-

terness from their hops due to the higher yields of cohumulone

The fact remains: cohumulone is much better than its reputation would suggest – and therefore this matter had to be set right, once and for all. ■

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News

In the merry month of April



Prof Dr Thomas Becker

As from 1 April 2009 the two former departments Technology of Brewing 1 and 2 at the Centre of Life and Food Sciences Weihenstephan at the Technical University of Munich have been combined into one department and renamed. The new name "Institute of Brewing- und Beverage Technology" also indicates the direction the department is planning to take, i.e. expanding their focus, which hitherto had been restricted to brewing, towards other related subjects concerning beverage technology.

The new institute's front man is Prof Dr Thomas Becker (44), who up to now had been leading the department Process Analysis and Cereal Technology at the University of Hohenheim. Prof Becker, who had

studied food technology at Weihenstephan went to Hohenheim in 2004. Before that he had been working as scientific assistant to Prof Delgado at the department of Fluid Mechanics and Process Automation where he was involved in several brewery-related research projects.

Prof Becker: „I am very glad to have the opportunity to lead the new department – not only because I have already been working very intensely on the subject beer and beverages in Hohenheim but also because of the very promising synergy-effects that derive from the fact that both my former and my current department are using the same raw materials and nearly the same enzymes and microorganisms. It's simply perfect.“