

The beer's volatolome, a comparative study of five bottled refermented handmade beers

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Fermented beverages, such as beer, are considered as complex mixtures by flavor and food chemists. The beer volatolome contains hundreds of compounds, which affect the taste and the mouthfeel. In this highly competitive market, it is crucial for brewers to master each step of the process to understand and control the taste and to guarantee aroma quality and stability. Aroma compounds are essentially derived from the raw ingredients and the conditions used to produce beers. This study aims to determine the impact of the yeast used for bottle fermentation on beer's volatolome.

We brewed 5 different beers with the same feedstock. During the bottling, we used 5 distinct yeasts generally used by brewers. After an aging period of 8 weeks, all samples were analyzed using solid-phase microextraction couple with comprehensive two-dimensional gas chromatography coupled to mass spectrometry (SPME-GC×GC-TOFMS). A dedicated data processing workflow was then optimized. Principal component analysis (PCA) was used to visualize the clustering between samples.

After data curation, peaks area of VOCs founds in each beer were used to carry out unsupervised statistical analyses. Three distinct groups were observed on PCA; two beers are considered very different regarding the VOCs while the remaining three constitute another cluster. Based on these results, the aroma profile of the different beers could be dressed. While the two first beers were dominated by specific ethyl esters giving fruity aromas, less associated fruity fragrance esters were expressed in the other group.