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Editorial

Advances in Food Flavor Analysis

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Food flavour is an important key driver in consumer acceptability. It is influenced by the combined responses of olfaction, taste, and the somatosenses, and well as the cognitive processing of these inputs in the brain.

Food flavour primarily depends on the concentration and nature of volatile and non-volatile compounds in the food product. These compounds can change dramatically depending on agronomical (i.e., ripening, senescence, and decay of fruit and vegetables) and technological factors such as food processing and storage (i.e., fermentation, cooking, packaging, etc.). However, oral processing while tasting or eating food also has a significant impact on these compounds. In fact, in this case, various human physiological and/or matrix effects are able to modulate flavour release in the mouth.

This Special Issue entitled "Advances in Food Flavor Analysis" aims to provide an insight into the recent developments regarding food flavour analysis. Studies regarding the characterisation of volatile and non-volatile flavour compounds in food and beverages have been collected for this purpose. Aspects of food processing that influence the formation of flavour compounds, the modality of aroma release during and after eating, and the effects of aroma–food matrix interaction are presented.

Buck, Tina Goblirsch, Jonathan Beauchamp, and Eva Ortner [1] characterised the key aroma-active compounds of two different gins produced in a distillery in the German state of Bavaria, one produced using 50 individual botanicals (The King Gin Kini gin) and another using only 15 (The King Gin Gspusi gin). The authors were able to identify terpenes (limonene, 1,8-cineole, and linalool) as the most active compounds of gin, followed by aldehydes and phenylpropanoids (nonanal, eugenol, estragole, and *trans*-anethole) by using gas chromatography–mass spectrometry/olfactometry (GC-MS/O) and aroma extract dilution assays (AEDA). The authors also found that the botanical species used affected the concentrations of key aroma compounds and the final sensory profile of the spirit, which could be modulated and adjusted by the use of specific botanicals.

For the first time, Budić-Leto, Humar, Gajdoš Kljusurić, Zdunić, and Zlatić [2] reported the free and glycosidically bound volatile compounds in the autochthonous grape of cv 'Maraština' used to produce the sweet Prošek wine. The authors also studied the effect of the dehydration of grapes on the free and bound volatile compounds of grapes. Two grape dehydration systems were compared; one was obtained in a greenhouse at temperatures between 17 and 37 °C, and another in an environmentally controlled chamber at 50 °C. The grapes dried in the greenhouse positively influenced the concentration of C-6 alcohols, ethyl hexanoate, terpinen-4-ol, o-cymene, and β-damascenone by improving the fruity descriptors of the must, mainly being overripe plums and stewed apple.

The removal of potentially oxidisable substances from the must can improve the wine ageing process. For this purpose, Pokrývková, Ailer, Jedlička, Chlebo, and Jurík [3] examined two different technological processes in winemaking. The authors verified the effect of the targeted must oxidation method by comparing it to the conventional

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reductive method. The results showed that targeted oxygenation, carried out simultaneously with the pre-fermentation maceration of must, produced wines that were richer in aromatic compounds.

Wine volatile compound–polyphenol interaction is an active area of research in oenology because it affects the sensory perception of wine. Pittari, Moio, and Piombino [4] described these effects in a detailed review article. The authors reported that in the orthonasal route, the release of some terpenoids decreases under increasing tannin concentrations. For esters, hydrophobicity represents the main driving force that causes their release from wine. Esters with higher log p values (>2.85) decreased independently from the polyphenols level, while those with a log p value of less than 2.85 diminished at lower polyphenols levels. For volatile phenols such as 4-ethylphenol and 4-ethylguaiacol, their release was essentially reduced by the presence of wine polyphenols. In the retronasal conditions, some salivary enzymatic activities could reduce the release of volatile compounds (e.g., esters, thiols, etc.), while other salivary constituents such as mucin could strongly interact with polyphenols and compete with aromas in their interaction with wine polyphenols, modifying the aroma release.

Genovese, Caporaso, and Sacchi [5] described the factors influencing the flavour formation of virgin olive oil and the mechanisms involved in its perception during tasting. The authors reported that the level and nature of volatile compounds in olive oil are influenced by agronomical and technological factors such as the olive variety, olive ripening degree, climatic conditions, olive harvest modality, olive crushing system, malaxation phase, and oil separation process. In addition, when tasting olive oil, saliva, mouth size, breathing, and mouth temperature could affect the volatility of volatile compounds and the perception of virgin olive oil. Phenolic compounds have also been shown to influence the aroma release of certain volatile compounds in virgin olive oil. In particular, they are able to affect 1-penten-3-one, *trans*-2-hexenal, *cis*-3-hexenyl acetate, and ethyl butanoate, which are released and perceived at a lower level in the mouth.

Iwasa, Seta, Matsuo, and Noakahara [6] carried out research regarding specialty Arabica coffee beans from Guatemala to understand the relationship between the cupping score by trained panellists and the composition of the beans. They found that the samples with higher cupping scores also had high levels of methyl-esterified compounds (including 3-methylbutanoic acid methyl ester) and other fatty acid methyl esters. Interestingly, the authors then spiked the coffee brew with 3-methylbutanoic acid methyl ester and were able to verify a direct relationship with the fruity aroma and cleanness of the coffee, resulting in the highest cupping scores.

De Luca, Aiello, Pizzolongo, Blaiotta, Aponte, and Romano [7] investigated bread made by using sourdoughs of different origins, i.e., prepared using beer yeasts or a mixture of different bacteria and yeasts. In addition to the physico-chemical characterisation of the bread, the authors reported the content of volatile compounds via SPME-GC/MS. They were able to conclude that the ratio between bacteria and yeast during fermentation affects the aroma profile of the bread and that the best characteristics were obtained with a 1.5 ratio. This ratio also resulted in the highest content of total alcohols and acetic acid when compared to other ratios.

In conclusion, the success of this Special Issue can also help the food and beverage industry to improve the quality and taste of its products and foster innovation in food production.

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