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Division of Analytical Sciences

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Key Odorants of Cocoa

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Keywords: Cocoa · Gas chromatography – olfactometry · Key odorants

The flavour of cocoa and chocolate is beloved all over the world and can be regarded as the final result of many different processing steps along the cocoa value chain, such as the cultivation, the post-harvest treatment, and last but not least the technological processing such as roasting and conching. All these steps impact the flavour properties of the final product, the chocolate. For this reason, many different research groups started already more than 30 years ago to gain insights into the molecular composition of cocoa flavour. Thereby, a high number of volatile compounds (>500) could be identified in cocoa products and chocolate intermediates.^[1] However, more recent research studies could show that only a small percentage of these volatiles significantly contribute to the overall aroma of cocoa.^[2] The so-called key odorants of cocoa were also recently identified in Swiss dark chocolates^[3] and cocoa beans deriving from different post-harvest treatments^[4] by gas chromatography – olfactometry, a technique that allows the differentiation between odourless volatiles and odour-active compounds. Based on the findings of our research and of other research groups, the key odorants of cocoa can be grouped in different categories based on their generation

ties which have to be present in specific concentrations in order to evoke the aroma of cocoa or chocolate. These compounds have been recently compiled to a sensory kit, a cocoa aroma library containing 25 most important cocoa odorants, with the aim to give insights into the cocoa odour constitution and to be used as a training tool for the sensory evaluation of cocoa.^[5]

Although a lot of research has been done in the past in order to decode the cocoa flavour on a molecular level, there is still a lot to do to understand the flavour properties of cocoa as a result of its variety and origin. This knowledge might also help to promote biodiversity and fair cocoa farming and ensure the quality of cocoa products in the future.

Received: September 6, 2021

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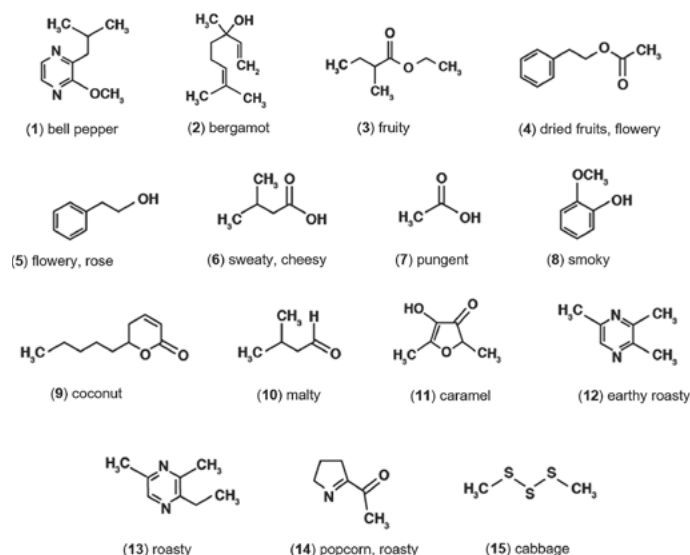


Fig. 2. Key odorants of cocoa. Compounds present in raw and unfermented cocoa beans: (1) 2-isobutyl-3-methoxypyrazine, (2) linalool; compounds deriving from fermentation: (3) ethyl-2-methylbutanoate, (4) 2-phenylethyl acetate, (5) 2-phenylethanol, (6) 3-methylbutanoic acid, (7) acetic acid, (8) guaiacol, (9) δ -decenolactone; compounds deriving from thermal processing: (10) 3-methylbutanal, (11) furaneol, (12) 2,3,5-trimethylpyrazine, (13) 2-ethyl-3,5-dimethylpyrazine, (14) 2-acetyl-1-pyrroline, (15) dimethyl trisulfide.

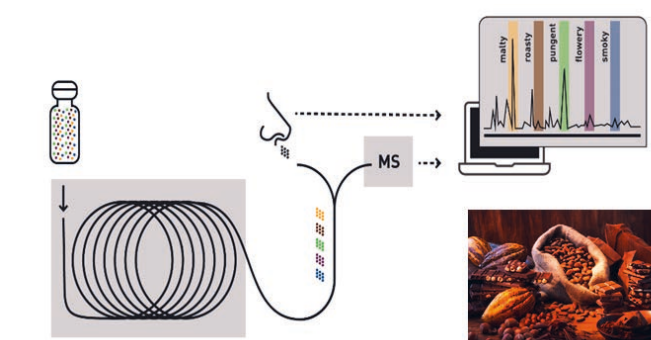


Fig. 1. Analysis of cocoa key odorants by gas chromatography – olfactometry.

along the cocoa value chain. There are some compounds which are already present in raw and unfermented cocoa beans, others arising during the post-harvest treatment, and further compounds mainly formed during thermal processing. Interestingly, there is no odorant which elicits the odour of cocoa or chocolate itself, it is more the combination of odorants with different odour quali-

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