

BOOK OF ABSTRACTS

11th International Symposium on **RECENT ADVANCES IN FOOD ANALYSIS**

**November 5-8, 2024
Prague, Czech Republic**

Jana Pulkrabová, Monika Tomaniová, Stefan van Leeuwen, Michele Suman,
Michel Nielen and Jana Hajšlová
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FOODOMICS APPROACH FOR THE CHARACTERIZATION DEFECTIVE COCOA LIQUORS IN ENSURING COCOA QUALITY

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Theobroma cacao is a worldwide comfort food with numerous benefits, including potential cardiovascular effects and positive influence on mood [1]. Political tensions in cocoa production regions and climate changes severely impact cocoa yield and quality, causing premature ripening, fermentation irregularities and mold growth in beans. These factors can also alter the chemical flavour profile of cocoa products, affecting market value and the choices of manufacturers and consumers [2]. This study aims to characterize cocoa defects for effective quality control [2-3]. Guided by company panel sensory characterization, different Good and Bad samples were analyzed using several advanced analytical techniques within a foodomic approach. We investigated several chemical fractions contributing to cocoa flavour and emerging off-notes. Chromatographic targeted fingerprint were processed using multivariate analysis to identify chemical differences between defective samples and quality standards. Headspace Solid-Phase Microextraction and Gas Chromatography-Mass Spectrometry (HSPME-GC-MS) provided an overall profile of volatile fraction in cocoa samples, but no significant differences between the two groups were found. We then adopted a targeted approach focusing on fractions affecting the main defective sensory descriptors identified by the panel: bitter, astringent, sour, and earthy. Chemical fingerprint analysis showed significant differences between Good and Bad samples only for the volatile acidic fraction. For the non-volatile fraction, we determined the Total Phenolic Content (TPC) and through Liquid Chromatography with Ultraviolet Diode-Array Detection (LC-UV-DAD) we analysed the fractions responsible for bitter and astringent taste (polyphenols and methylxanthines). No significant results were highlighted in discrimination of defective samples due to a "seasonality" effect that influence data interpretation caused by harvest batches periods and high sample variability. We then adopted a sensomic approach, analyzing the most representative cocoa samples of the two groups using Gas Chromatography-Olfactometry-Mass Spectrometry (GC-O-MS) to enable olfactory identification of main cocoa odorant compounds [3]. Results identified chromatographic regions with off-notes in defective samples, particularly a strong moldy odor and aromatic imbalance. Next step will involve the Comprehensive two-dimensional Gas Chromatography-Time Of Flight Mass Spectrometry (GC×GC-TOF MS) analyses to precisely identify this defect-causing molecules.

[1] García, L. C. et al (2020). *The FASEB Journal*, 34(S1).

[2] Aprotosoiaie, A. C., et al (2016). *Comprehensive Reviews in Food Science and Food Safety*, 15(1), 73

[3] Ullrich, L., et al. (2022). *Journal of Agricultural and Food Chemistry*, 70(42).

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