Short Oral Communications

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Transfer of volatiles and aroma precursors into the coffee seeds during fermentation, a reality?

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Text For the consumer, the flavor is arguably the most important aspect of coffee. Thereby, the coffee industry has dedicated efforts in improving and controlling the final beverage quality using roasting and brewing steps [1]. Moreover, recent research studies have highlighted that the postharvest processing can have a direct impact on the quality and value of the final product, and they showed that wet processing offers a coffee with higher acidity and more aroma than dry and semi-dry processing [2]. Furthermore, de Melo Pereira et al., [3], Lee et al., [4] and D. de Carvalho Neto et al., [5] assumed that it might exist a diffusion process of microbial metabolites into the coffee beans during the fermentation, enhancing the final coffee quality. However, one question remains: are these molecules of interest (volatiles and aroma precursors) able to cross the different layers (mucilage and parchment) surrounding the coffee beans?

To answer this question, 7 labelled molecules were chosen to follow their transfer into coffee beans (extracted from frozen coffee cherries – unfermented) during simulated fermentation. The molecules transfer was studied in 4 media following a progressive experimental approach to evaluate the resistance of the different layers. The first medium contained green coffee beans without their mucilage and parchment, the second with green coffee beans and parchment, the third with depulped coffee, and the fourth with depulped coffee and yeast. 10g of coffee samples were submerged in distilled water concentrated in marked compounds; they were maintained at 25°C and under agitation (120 rpm) for 12h. Then, the labelled volatiles (butanal, 2-phenylethnaol, isoamyl acetate) were analyzed by SPME-GCMS, and the labelled aroma precursors (fructose, glutamic acid, alanine and lactic acid) were analyzed by GC-MS after extraction and derivation.

Results showed that all studied compounds (volatiles and precursors) could diffuse from water to the coffee beans in the 4 media. The comparison of the transferred molecules' amounts in the 4 media revealed that the parchment, with its fibrous structure, acts as a molecular filter. Related to the molecule conformation, only the 2-phenylethanol amount decreased significantly in coffee beans with parchment. Furthermore, during fermentation, it was shown that some molecules could interact with yeasts.

References:
[1] de Carvalho Neto, D. P., de Melo Pereira, G. V., Finco, A. M. O., Letti, L. A. J., da Silva, B. J. G., Vandenberghe, L. P. S., & Soccol, C. R, (2018), Efficient coffee beans mucilage layer removal using lactic acid fermentation in a stirred-tank bioreactor: Kinetic, metabolic and sensorial studies, Elsevier, Food Bioscience, 26 , 80-87
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