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Introduction

The espresso coffee (EC) quality is driven by several variables related to water, roasting profile, particle sizes and barista skills. However, researchers have not studied yet in depth how different tools such as filter baskets and perforated disc heights can be adjusted complementarily with particle sizes during coffee extraction.

Materials/Methods

The present project was based on the study and comparison of ECs prepared by decreasing the amount (from 14 to 12 g for double EC extraction) of specific particle sizes (from 200 to 1000 µm) of ground coffee in three variously designed filter baskets (A, B, C). The second part of the work was to investigate various heights of perforated disc under the shower (4-7 mm), and to prepare coffee with 14 and 12 g of ground coffee (Figure 1). ECs were analyzed for the content of total solids and bioactive compounds with HPLC-VVWD, while volatiles with HS-SPME-GC-MS.



Figure 1: Espresso coffee machine used for the study and the diagram of the extraction chamber with filter basket and perforated disc.

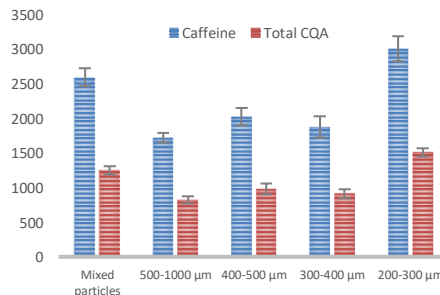


Figure 2: Content of caffeine and total chlorogenic acids (mg/L) in ECs prepared with standard filter basket (A) at various particle sizes by using 14 g.

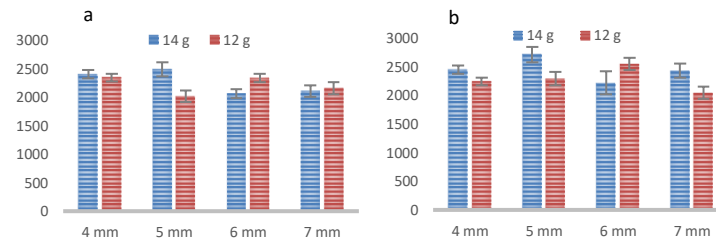


Figure 3a and b: Content of total chlorogenic acids (mg/L) found in ECs prepared with different perforated disc heights by using 14 and 12 g. The extraction has been performed keeping constant volume (a) and then time (b).

Results/Discussion

Extracting with smaller particles escalates the quantity of bioactive compounds (Figure 2). The amount of caffeine per cup increased moving from 500–1000 µm to 200–300 µm particle size, both in Arabica and Robusta for all filter baskets. Using lower amount of ground coffee permitted to obtain the same extraction yield increasing the height of perforated disc (Figure 3a and b). Keeping constant the volume of EC at various heights of perforated disc, the amount of bioactive compounds at 12 g were only around 9% lower than at 14 g [1,2].

Conclusion/Perspectives

The right implementation on EC machine of these tools, simple and feasible as they are, could lead to a more sustainable consumption of the beverage by reducing the amount of used R&G coffee and by producing lower spent coffee ground, while maintaining the same cup quality.

References:

- [1] Khamitova et al. 2020 Food Chemistry DOI: 10.1016/j.foodchem.2020.126220;
- [2] Khamitova et al. 2020 Food Research International DOI: 10.1016/j.foodres.2020.109220.