

Chlorogenic acids profile of *Coffea arabica* by-products (cascara and silverskin): a comparison with green and roasted beans



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Introduction

Coffee, one of the most traded commodities in the world, contains several compounds with health-promoting properties [1,2]. The presence of chlorogenic acids (CGA) is not only responsible for its bitter and astringent taste, but also for its anti-inflammatory, antitumoral, and antioxidant effects [1,2]. However, coffee production generates huge quantities of by-products that have a negative impact on the environment if they are not treated [3]. Cascara and silverskin are the primary by-products of coffee cherries pulping and green coffee roasting, respectively [3]. In this work, the CGA profile of these two coffee by-products were studied and compared with those of coffee beans (green and roasted), aiming a possible valorization in a circular economy context.

Methodology

0.4 g (roasted and green beans) or 1.2 g (silverskin and cascara) of sample



40 ml of ethanol: water (1:1)



Agitation Multi Reax 30 min, 2000 rpm



Centrifugation 10 min, 4500g



The samples were all of *Coffea arabica* from Colombia. Before solid-liquid extraction, the samples were milled.

The supernatants were analysed by RP-HPLC-DAD. The CGA were identified by comparing their retention times with those of known standards



Results and discussion

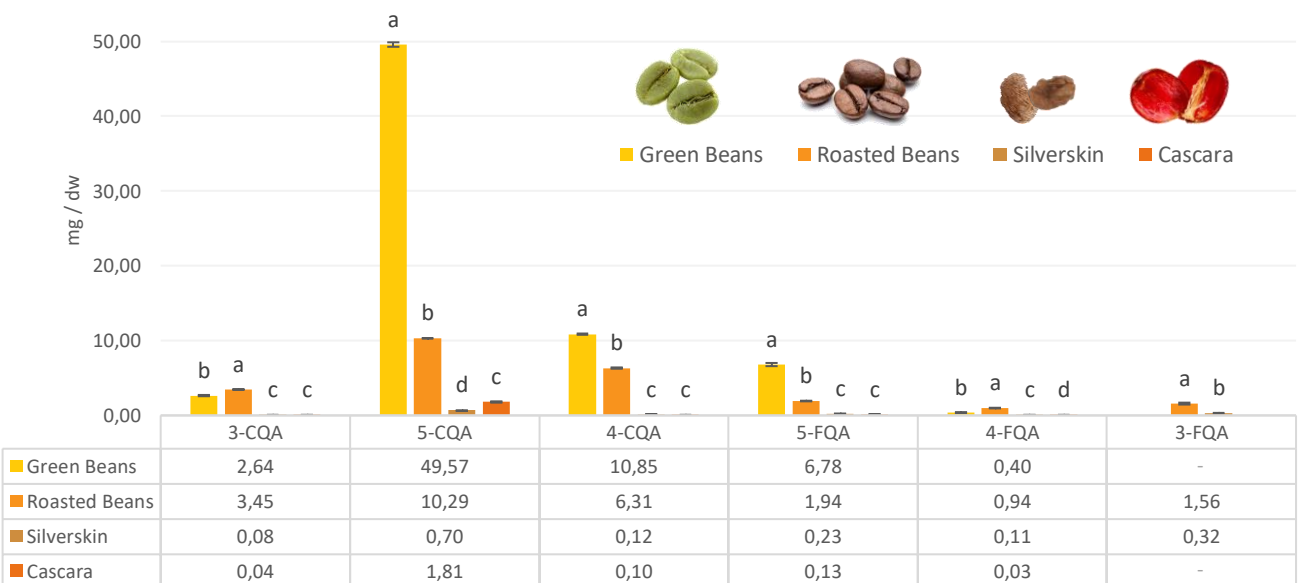


Figure 1 Chlorogenic acid content (mg/g dry weight) in coffee beans (green and roasted), cascara and silverskin (mean \pm standard deviation, n =3). CQA, caffeoylquinic acid; FQA, feruloylquinic acid. Different letters indicate significant differences between groups ($p < 0.05$)

The results show that these coffee by-products have a significantly lower CGA content than green or roasted beans. In all samples, the predominant CGA was the 5-CQA. Cascara contained the highest concentration of 5-CQA among the by-products (1.11 ± 0.07 mg/g dw), while green beans presented the highest amount (49.57 ± 0.27 mg/g dw). In fact, roasted beans and silverskin are roasted at high temperatures, rendering CQAs susceptible to degradation, transesterification, isomerization, and conversion into lactones [5]. When compared to green beans, the 5-CQA content of roasted beans was nearly five times lower (10.29 ± 0.07 mg/g dw). FQA are present in smaller amounts, with the highest concentration found in green beans (6.78 ± 0.27 mg/g dw for 5-FQA).

Conclusion

To conclude, while cascara and silverskin contain less CGA than coffee beans, they can still be considered a source of these high-value compounds. CGA in by-products could be recovered and used to improve the functionality of foods as well as in the pharmaceutical industry.

References: [1] Bondam, A. F. et al. Trends Food Sci., 123, (2022), 172-186. [2] Rojas-Gonzalez, A. et al. Molecules, 27 (11), (2022), 3400. [3] Zhang, J. et al. Foods, 11 (12), (2022), 1710. [4] Puga, H. et al. J. Clean. Prod., 168, (2017), 14-21. [5] Peixoto, J.A.B. et al. Foods, 11 (12), (2022), 1671.

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