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Foods 2024 Conference

The 5th International Electronic Conference on Foods

28–30 October 2024 | Online

MDPI

Exploring the Commercial Viability of Coffee Pulp Infusion as a Functional Beverage: Physicochemical and Sensory Evaluation

María Martín-Trueba[1,2], Shuai Hu[1,2], Silvia Cañas[1,2], Miguel Rebollo-Hernanz[1,2], Alicia Gil-Ramírez[1,2], María Ángeles Martín-Cabrejas[1,2], Vanesa Benítez[1,2], Yolanda Aguilera[1,2]

[1] Department of Agricultural Chemistry and Food Science, Faculty of Science, C/ Francisco Tomás y Valiente, 7. Universidad Autónoma de Madrid, 28049, Madrid, Spain.

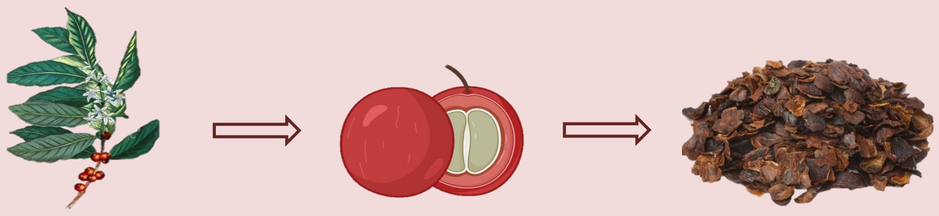
[2] Department of Production and Characterization of Novel Foods, Institute of Food Science Research, CIAL (UAM-CSIC), 28049 Madrid, Spain

INTRODUCTION & AIM

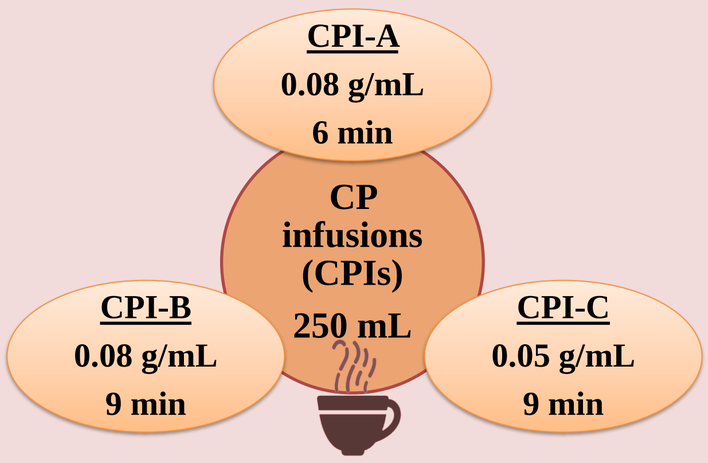
The food industry's interest in functional beverages is on the rise, driven by their potential health benefits. In this context, coffee pulp, the main by-product of coffee processing, has emerged as a sustainable source for functional infusions.

This work aimed to evaluate the physicochemical and sensory properties of three antioxidant and anti-inflammatory coffee pulp infusions (CPIs) to assess their potential commercialization.

METHOD



Coffea L plant — **Coffee cherry** — **Coffee Pulp (CP)**



Physicochemical parameters

- pH
- Titratable acidity
- Turbidity
- Density
- Refractive index
- Soluble solids
- Color (CIELAB)

Sensory analysis tests

- Preference
- Satisfaction
- Purchase intention

RESULTS & DISCUSSION

No significant differences were found among the infusions' pH (3.8), density (0.99 g/L), and refractive index (1.34). In contrast, differences were detected in titratable acidity (0.19–0.29 g citric acid/100 mL infusion), turbidity (0.64–1.07), and soluble solids (3.1–3.9 ºBrix), with the lowest values belonging to CPI-A and the highest belonging to CPI-B (**Table 1**).

Table. 1. Physicochemical parameters of CPI-A, CPI-B and CPI-C

	CPI-A	CPI-B	CPI-C
pH (20ºC)	3.77 ± 0.00	3.78 ± 0.00	3.79 ± 0.00
Density (g/L)	0.985 ± 0.000	0.986 ± 0.000	0.999 ± 0.000
Refractive index	1.337 ± 0.001	1.339 ± 0.001	1.338 ± 0.001
Titratable acidity (% w/v)	0.192 ± 0.000	0.288 ± 0.000	0,224 ± 0.000
Turbidity (NTU)	0.641 ± 0.057	1.066 ± 0.051	0.731 ± 0.049
Soluble solids (ºBrix)	3.07 ± 0.28	3.92 ± 0.36	3.53 ± 0.03

The chromatic model exhibited that, in all the infusions, the a* results moved toward red and b* toward yellow, reflecting their brown coloration. Regarding the L* and C* parameters, CPI-A showed the highest values, followed by CPI-C.

Table. 2. Color (CIELAB) of CPI-A, CPI-B and CPI-C

	CPI-A	CPI-B	CPI-C
L	33.88 ± 0.49	18.88 ± 0.13	29.69 ± 0.16
a	44.12 ± 0.33	38.79 ± 0.82	43.91 ± 0.12
b	55.79 ± 2.47	30.69 ± 5.51	51.49 ± 6.28
C	71.13 ± 2.14	49.60 ± 3.03	67.76 ± 4.64
h	0.90 ± 0.02	0.67 ± 0.09	0.86 ± 0,06

For the preference test, 40% of consumers chose CPI-A (**Fig. 1A**). However, on a satisfaction scale from 1 (strongly dislike) to 9 (strongly like), the rate for color, brightness, and aroma was 6 (like) for all the infusions, while the overall satisfaction and bitterness rate was 5 (neither like nor dislike) (**Fig. 1B**). The purchase intention results showed that consumers would probably not buy any CPIs (**Fig. 2**).

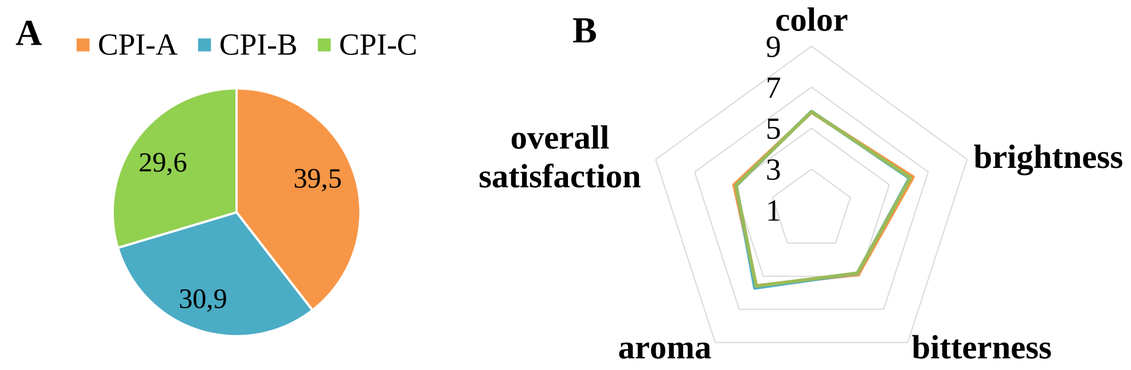


Fig. 1. Preference test (%) and satisfaction scale of CPI-A, CPI-B, and CPI-C

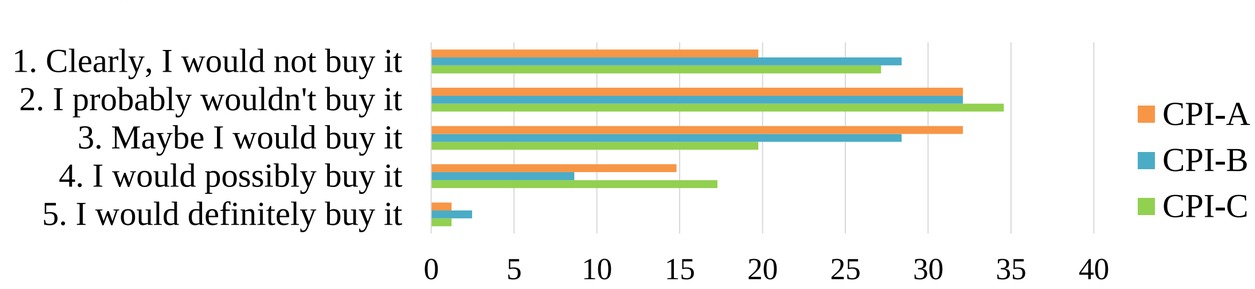


Fig. 2. Purchase intention (%) of CPI-A, CPI-B, and CPI-C

CONCLUSION

The CPIs exhibited stable physicochemical properties, with minor differences in titratable acidity, turbidity, and soluble solids. Therefore, improving their organoleptic properties by adding aromas and ingredients without modifying their functional properties would be necessary to commercialize them.