

Evaluation of the chemical composition volatile and non-volatile coffee conilon harvested at different times of the season

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Introduction

To achieve specialty coffees with outstanding sensory quality and higher market value, it is essential to understand how pre- and post-harvest factors influence bean characteristics. Among these, harvest timing plays a decisive role. This study evaluates the effects of harvest periods, focusing on the interval between June (CA) and August (CB) 2023.

Materials/Methods

Coffea canephora (conilon) samples were collected in Castelo, ES, and subjected to spontaneous fermentation (washed), followed by drying and roasting according to the Uganda Coffee Development Authority (UCDA) protocol. Sensory evaluation was performed by certified R graders. Non-volatile compounds were analyzed by nuclear magnetic resonance (NMR), using samples dissolved in deuterated water and spectra acquired on a VNMRs (400 MHz for ¹H, 9.4 T). Volatile compounds were identified by headspace gas chromatography–mass spectrometry (GC–MS).

Results/Discussion

NMR and GC-MS analyzes revealed clear chemical distinctions between harvests (Figure 1 and 2). The first harvest (CA) was marked by chlorogenic acids, lipids, and acetates, while volatiles included pyrrole and dimethylpyrazines. The second harvest (CB) showed a richer profile, with lactates, γ-butyrolactone, trigonelline, caffeine, sugars, HMF, citrate, and malate, and volatiles such as 2-butanone, acetoin, 5-methyl-2-furfural, 3-hexanone, and acetic acid. Sensory analysis confirmed that CB samples scored higher (CA: 79.60 ± 1.40; CB: 80.49 ± 1.57), reflecting superior beverage quality. These results suggest slower fruit maturation in August promotes accumulation of compounds that enhance complexity and flavor, likely influenced by regional climate conditions.

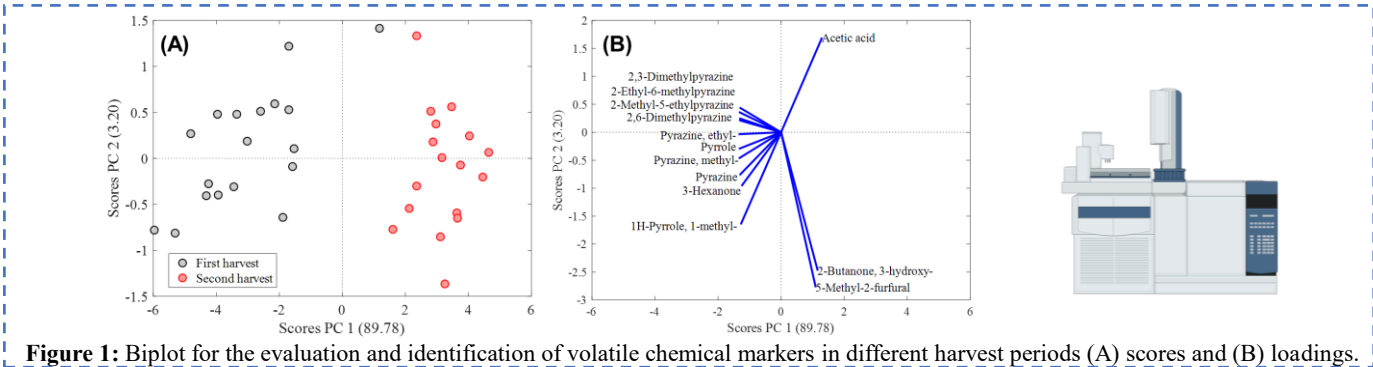


Figure 1: Biplot for the evaluation and identification of volatile chemical markers in different harvest periods (A) scores and (B) loadings.

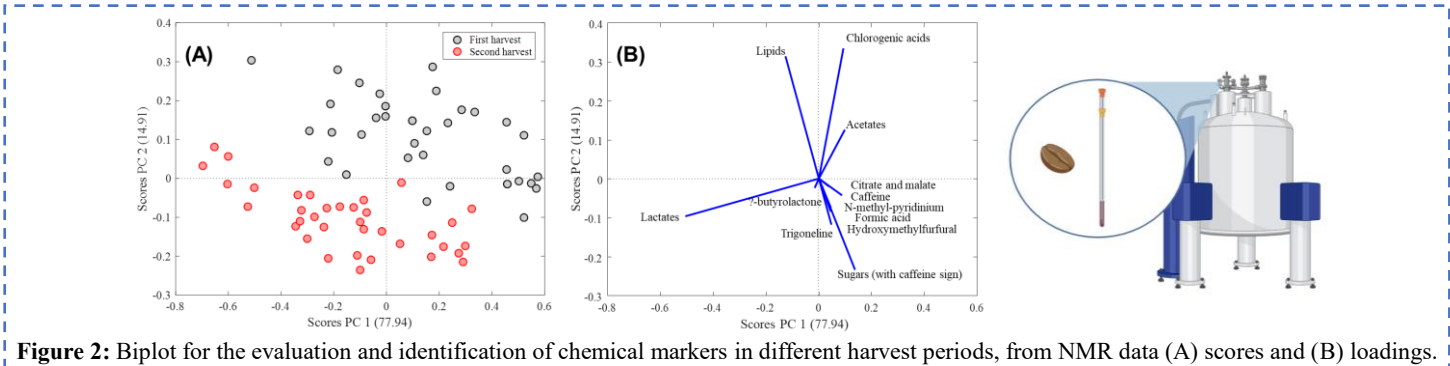


Figure 2: Biplot for the evaluation and identification of chemical markers in different harvest periods, from NMR data (A) scores and (B) loadings.

Conclusion/Perspectives

These results highlight the influence of harvest timing on conilon coffee. Slow fruit maturation appears to promote a richer chemical profile, contributing to a more complex and higher-quality beverage.

References:

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