

Impact of *terroir* on alcohol formation in Paraíso variety coffees

Laila ALONSO¹, Karolina BORBA¹, Gisele COSTA², Matheus DE SOUZA GOMES¹, Pedro BERTARINI¹, Laurence AMARAL¹, Liliane OLIVEIRA³, Líbia SANTOS¹

¹ Federal University of Uberlândia (UFU), Patos de Minas, Minas Gerais, Brazil ; ² Federal University of Rural do Rio de Janeiro (UFRRJ), Seropédica, Rio de Janeiro, Brazil ; ³ Federal University of São João del Rei (UFSJ), Sete Lagoas, Minas Gerais, Brazil.

Introduction

During the coffee fermentation process, substrates, mainly sugars, are consumed, leading to the formation of compounds such as organic acids and alcohols. The presence of glycerol and ethanol, when in balance, has positive effects on the final beverage, contributing to body and flavor, and consequently enhancing its quality[1, 2].

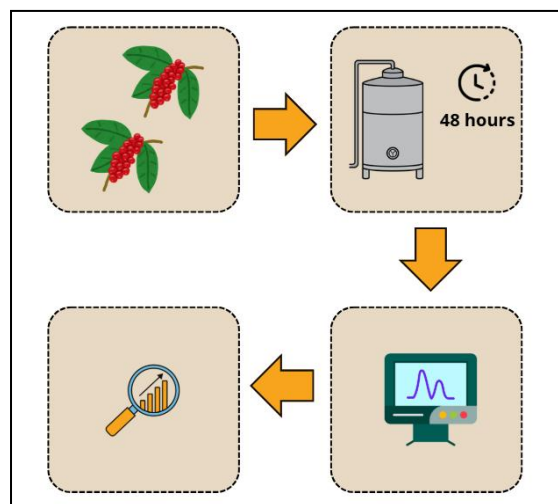


Figure 1: Methodological representation

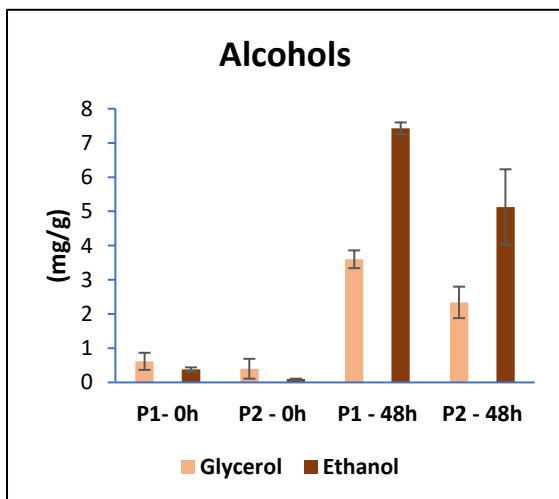


Figure 2: Graphical representation of alcohol contents

Materials/Methods

This study aimed to analyze and compare the alcohols formed after 48 hours of fermentation of Arabica coffee, Paraíso variety, natural cherry, cultivated on two different farms, Chuá (P1) and Capão (P2), both located in Patos de Minas, Minas Gerais. The fermentations were carried out under controlled conditions in 15,000 L bioreactors, in a solid-state system without the addition of inoculants, for a period of 48 hours. The quantification of alcohols (ethanol and glycerol) was performed using high-performance liquid chromatography (HPLC), in triplicate. The data obtained were subjected to statistical analysis by ANOVA and Tukey's test, with a significance level of $p \leq 0.05$, using MiniTab® software version 17.1.0.

Results/Discussion

The initial and final average values of glycerol were: P1_{0h} (0.616 ± 0.25)^{Ba}, P1_{48h} (3.60 ± 0.26)^{Aa}, P2_{0h} (0.40 ± 0.29)^{Ba} e P2_{48h} (2.34 ± 0.46)^{Ab}. As for ethanol concentrations, the results were: P1_{0h} (0.38 ± 0.06)^{Ba}, P1_{48h} (7.43 ± 0.17)^{Aa}, P2_{0h} (0.1 ± 0.01)^{Bb} e P2_{48h} (5.13 ± 1.10)^{Ab}. When comparing the same sample at different time points, a significant increase in glycerol and ethanol concentrations was observed after 48 hours of fermentation. This is due to the metabolism of substrates during the fermentation process, resulting in the formation and accumulation of these compounds [2]. When comparing samples at the same time point, it was observed that the average concentrations of both alcohols were higher in the fermentation of Paraíso coffee cultivated on the Chuá farm (P1). These results indicate that, even using the same variety and experimental protocol, edaphoclimatic factors significantly influence the compounds formed during fermentation and, consequently, can impact the final quality of the beverage.

Conclusion/Perspectives

It can be concluded, therefore, that there is an intrinsic interference related to *terroir*, as evidenced by the chemical differences in the beans from the different farms. These edaphoclimatic factors have a direct influence on the outcomes of the fermentation process and on the sensory quality of the coffee produced [3].

References:

1. ROCHA, Renata AR et al. Evaluation of arabica coffee fermentation using machine learning. *Foods*, v. 13, n. 3, p. 454, 2024.
2. FERREIRA, Ludmilla Janne Carvalho et al. Coffee fermentation process: A review. *Food Research International*, v. 169, p. 112793, 2023.
3. SIMMER, Marinalva Maria Bratz et al. Edaphoclimatic conditions and the soil and fruit microbiota influence on the chemical and sensory quality of the coffee beverage. *European Food Research and Technology*, v. 248, n. 12, p. 2941-2953, 2022.

Acknowledgments:

