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Study of a Local Productive Arrangement (LPA): Characterization of Aromatic Compounds Present in Cachaças from the Region of Orizona – Goiás - Brazil

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INTRODUCTION

Cachaça, Brazil's national beverage, is a traditional alcoholic drink produced by fermenting and distilling sugarcane juice. Aromatic compounds are formed throughout the fermentation and distillation processes and are influenced by the type of sugarcane, fermentation conditions, type of still, and, in some cases, aging in wooden barrels. This complex interaction results in a wide variety of flavors and aromas across different types of cachaça. Cachaça ranks as the third most consumed distilled spirit globally, holding an 86% market share among distilled drinks in Brazil, with an annual per capita consumption of approximately 6.9 liters. The industry generates approximately USD 3 billion per year, producing 1.3 billion liters annually, with 30% coming from artisanal copper stills. Most producers (98%) are small to medium-sized enterprises, emphasizing its craft status. Despite having over 6,795 registered brands, only 0.5% to 1% of production is exported. The aim of this work was to characterize the aromatic compounds of four cachaças produced in the Orizona region, state of Goiás, Brazil, showcasing the diversity and complexity inherent to this iconic Brazilian spirit.

MATERIAL AND METHODS

The collection of white cachaça samples from three companies in the Orizona region, Goiás, Brazil, followed a standardized protocol to ensure the representativeness and quality of the samples. The companies were selected based on tradition and regional relevance. During visits to the distilleries, samples were taken directly from production batches and stored in amber glass flasks to preserve volatile compounds, with detailed information about each sample properly recorded. All samples were kept under controlled conditions until analysis.

Figure 1. Cachaça Production Process in the Orizona Region, Goiás, Brazil.A) Sugarcane Samples, B) Distillation Process, C) Produced Cachaça Samples

In all cases, the white cachaça was produced following the same process. Initially, sugarcane juice is extracted and undergoes fermentation with yeast, which converts the sugars into alcohol. The fermented liquid is then distilled, with the fractions known as "head" and "tail" being discarded, retaining only the "heart," which is the noble part of the distillate. After distillation, the cachaça is filtered, standardized, and bottled without undergoing aging.

Volatile aromatic compounds were analyzed using a Shimadzu Nexis GC2030 gas chromatograph coupled with a mass spectrometer and an AOC automatic injector, equipped with an SH-Stabilwax-ms column. The DA powder (0.3 g) was injected, and the oven temperature program began at 40 °C for 5 minutes, then increased gradually to 250 °C. The total analysis lasted 55 minutes, using a split ratio of 1:10 and helium as the carrier gas. Temperatures for the injector, interface, and ion source were set at 250 °C, with electron ionization at 70 eV, and spectra compared with the NIST 17 library.

RESULTS AND DISCUSSION

The analysis of cachaça samples from Companies A, B, C, and D revealed notable differences in aromatic compounds (Table 1). Ethyl acetate, contributing fruity notes, was highest in Company C, while alcoholic compounds like 1-Propanol varied, with Company B showing high levels. Acetic acid, adding sourness, peaked in Company A. Subtle floral notes from phenylethyl alcohol and minimal fatty compounds were observed. These variations highlight how production methods shape cachaça's sensory profile, emphasizing the need to balance aromatic compounds for a distinctive and high-quality product.

Table 1. Relative Percentages and Characteristic Aromas of Volatile Compounds in Different Cachaça Samples

Volatile Aromatic Compounds	Characteristic Aroma	Company A (%)	Company B (%)	Company C (%)	Company D (%)
Ethyl Acetate	Fruity, sweet	6.29	4.11	90.44	0.81
1-Propanol	Alcoholic, mild solvent	18.19	8.38	0.64	14.13
1-Butanol, 2-methyl-	Alcoholic, slightly fruity	4.16	41.14	1.44	15.48
Acetic Acid	Vinegar-like, sour	4.74	2.89	0.58	1.71
Phenylethyl Alcohol	Floral, rose-like	0.28	0.68	0.1	0.61
n-Decanoic Acid	Waxy, fatty	0.14	0.22	0.01	0.11
2-Butanol	Solvent-like	ND	ND	0.12	0.45
Hexanoic Acid	Cheesy, rancid	0.22	0.32	ND	0.09
3-Pentanol	Alcoholic, mild	ND	ND	0.05	0.21
2-Methyl-1-butanol	Fruity, wine-like	0.11	0.15	ND	0.34

CONCLUSION

The variability in volatile compounds across the cachaça samples illustrates the profound impact of production methods on their sensory profiles. Achieving a balance of key compounds such as ethyl acetate, 1-Propanol, and acetic acid is essential for creating distinctive, high-quality cachaça, showcasing both the artistry and precision involved in its production. This also underscores the potential to tailor flavor profiles to cater to diverse consumer tastes.

REFERENCES

- BORTOLETTO, A. M. Rum and cachaça. Distilled Spirits, p. 61–74, 2023. DOI: https://doi.org/10.1016/B978-0-12-822443-4.00013-X.
- DE OLIVEIRA, L. de O.; FERRAREZI JUNIOR, E. Produção de cachaça artesanal. Revista Interface Tecnológica, v. 19, n. 2, p. 810–818, 2022. DOI: https://doi.org/10.31510/infa.v19i2.1542.
- LIMA, C. M. G. et al. A state-of-the-art review of the chemical composition of sugarcane spirits and current advances in quality control. Journal of Food Composition and Analysis, v. 106, Sep. 2021, p. 104338. DOI: https://doi.org/10.1016/j.jfca.2021.104338.
- NASCIMENTO, E. S. P.; CARDOSO, D. R.; FRANCO, D. W. Quantitative ester analysis in cachaça and distilled spirits by Gas Chromatography-Mass Spectrometry (GC-MS). Journal of Agricultural and Food Chemistry, v. 56, n. 14, p. 5488–5493, 2008. DOI: https://doi.org/10.1021/jf800551d.

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