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Effects of Fermentation Using a Symbiotic Culture of Bacteria and Yeast on the Composition and Bioactivity of Kombucha from Excelsa Coffee Cascara (Coffea Liberica Var. Dewevrei)

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Abstract

Excelsa coffee cascara (Coffea liberica var. dewevrei) is an abundant coffee processing by-product that has not been optimally valorized. This study aimed to determine the effects of fermentation time using a Symbiotic Culture of Bacteria and Yeast (SCOBY) for 0, 1, 2, 3, 4, 5, and 6 days on the physicochemical characteristics, bioactive compound content, and bioactivity of excelsa coffee cascara-based kombucha. The research methods included the preparation of a 2 g/100 mL cascara infusion with 5 g/100 mL sugar, inoculation with 2.5 g/100 mL SCOBY (specific growth rate of 0.40 g/L-day), and fermentation at room temperature (25 °C). The results showed that increasing fermentation time led to a decrease in pH to 3.67 ± 0.05 and an increase in total acid content to 0.38 ± 0.05 g/100 mL by day 6. At the end of fermentation, bioactive compound concentrations reached 895.60 ± 34.14 µg GAE/mL for total phenolic content (TPC), 19.13 ± 0.22 µg QE/mL for total flavonoid content (TFC), and 0.11 ± 0.01 mg/mL for ascorbic acid. Antioxidant activity remained stable with a DPPH value (IC50) of 207.04 ± 3.28 mL/L and a FRAP value of 11.81 ± 1.06 mM. Antibacterial activity against Escherichia coli and Staphylococcus aureus was first detected on day 6 with a minimum inhibitory concentration (MIC) of 500 µL/mL. The anti-inflammatory activity (IC50) on day 6 was recorded at 28,184.40 ± 3,176.22 ppm. In conclusion, a 6-day fermentation period effectively increases acidity and antibacterial activity, while maintaining the bioactive compound content as well as the antioxidant and anti-inflammatory capacities of excelsa coffee cascara-based kombucha as a health beverage.

Keywords: Bioactive compounds, Bioactivity, Excelsa cascara, Fermentation, Kombucha

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