

A COMPARATIVE ANALYSIS OF PASSIONFRUIT (*Passiflora edulis* f. *flavicarpa* Deg.) WINE FERMENTATION USING *Saccharomyces cerevisiae* VERSUS INDIGENOUS PASSIONFRUIT MICROFLORA

I.U.K. Nanayakkara^{1*}, B.S. Nanayakkara¹, R.P.N.P. Rajapakse² and K.M.G.G. Jayasuriya¹

¹Department of Botany, University of Peradeniya, Peradeniya, Sri Lanka.

²Department of Food Science and Technology, University of Peradeniya, Peradeniya, Sri Lanka.

*uthkarshaisuri@gmail.com

Passionfruit (*Passiflora edulis* f. *flavicarpa* Deg.) is valued for nutritional and bioactive properties, suitable for winemaking. This study evaluated fermentation with commercial *Saccharomyces cerevisiae* (yeast) and indigenous passionfruit microflora to assess physicochemical and bioactive effects on the wine. Wines used both inocula, six replicates per treatment. Fermentation was monitored weekly for four weeks by determining pH, temperature, residual sugar (°Brix) content, and alcohol content, although the first 7 – 10 days may capture critical changes. Microbial diversity was assessed on Sabouraud Dextrose Agar and Plate Count Agar, confirming *S. cerevisiae* in both fermentations. Antioxidant activity and antimicrobial activity were determined using DPPH free-radical scavenging assay and agar well diffusion, respectively, against *Staphylococcus aureus*, *Enterococcus faecalis* (Gram-positive), *Escherichia coli*, *Pseudomonas aeruginosa* (Gram-negative), and *Candida albicans*. Data was analysed using two-way ANOVA by Past4.03. Yeast-fermented wine (YW) showed a significantly higher ($p < 0.05$) pH (3.8 ± 0.06), higher alcohol content (10.60 ± 0.43)%, lower residual sugar content (9.20 ± 0.36) °Brix and rapid increment in temperature compared to indigenous wine (IW) with pH (2.40 ± 0.12), alcohol content (3.10 ± 0.91)%, and sugar content (9.92 ± 0.34) °Brix. Microbial colony diversity decreased over time in both wines. Compared to YW, IW produced significantly greater antioxidant activity (IC_{50} of 2.14 ± 0.14 mg mL⁻¹) for yeast wine ($p < 0.05$). Compared to IW, YW exhibited smaller inhibition zones: *S. aureus* (14.08 ± 3.00 vs. 0 mm), *E. faecalis* (19.22 ± 1.60 vs. 10.92 ± 2.00 mm), *E. coli* (14.33 ± 1.00 mm vs. 5.31 ± 1.47 mm), *P. aeruginosa* (8.00 ± 0.84 vs. 0 mm), and no inhibition against *C. albicans*. Indigenous microflora enhances antioxidant and antimicrobial properties of passionfruit wine, supporting potential functional benefits. Yet, further validation (toxicity, sensory, *in vivo* studies) is needed. The lower alcohol content in indigenous wine may limit its classification as a wine, suggesting the need for optimisation.

Keywords: Agar well diffusion, Antimicrobial activity, Antioxidant activity, Bioactive compounds, DPPH assay