

Abstract

The high production of banana (*Musa acuminata*), pineapple (*Ananas comosus*), and cempedak (*Artocarpus integer*) in Indonesia generates large quantities of fruit peel waste that remain underutilized. This study investigated the potential utilization of these fruit peels as alternative carbon sources for microbial growth media, through extraction, characterization, and microbial growth analysis. Fruit peel extracts were obtained using maceration with 60% ethanol and characterized by extraction yield, reducing sugar, total phenolic content (TPC), total flavonoid content (TFC), DPPH antioxidant assay, Fourier transform infrared (FTIR) spectroscopy. The extraction yield differed significantly ($p < 0.05$), with Banana Peel Extract (BPE) showing the highest yield ($38.28 \pm 0.68\%$), followed by Pineapple Peel Extract (PPE) ($31.28 \pm 2.10\%$) and Cempedak Peel Extract (CPE) ($24.27 \pm 0.90\%$). CPE exhibited the highest TPC (59.74 ± 0.02 mg GAE/g) and TFC (1.91 ± 0.00 mg QE/g), indicating presence of more phenolic and flavonoid compounds compared to BPE and PPE. Antioxidant activity analysis revealed that CPE demonstrated the strongest antioxidant activity with the lowest IC₅₀ value (49.71 ± 1.49 μ g/mL), followed by PPE and BPE. FTIR analysis confirmed the presence of functional groups, suggesting the presence of carbohydrates, phenolics, and other bioactive compounds. Preliminary findings indicate that fruit peel extracts may support *K. phaffi* and *S. cerevisiae* growth more effectively than glucose, with CPE and PPE showing higher OD₆₀₀ values during cultivation and higher specific growth rate in *S. cerevisiae*.

Keywords: Alternative carbon source; Bioactive Compounds; Fruit peel extracts; *Komagataella phaffi*; *Saccharomyces cerevisiae*