

**Effect of Temperatures on Drying Kinetics, Extraction Yield, Phenolics,
Flavonoids, and Antioxidant Activity of *Phaleria macrocarpa* (Scheff.) Boerl.
(Mahkota Dewa) Fruits**

ABSTRACT

Phaleria macrocarpa (Scheff.) Boerl. or 'Mahkota Dewa' is a popular plant found in Malaysia as it is a valuable source of phytochemicals and therapeutic properties. Drying is an essential step in the storage of *P. macrocarpa* fruits at an industrial level to ensure their availability for a prolonged shelf life as well as preserving their bioactive compounds. Hence, this study evaluates the effect of different temperatures on the drying kinetics, extraction yield, phenolics, flavonoids, and antioxidant activity of *P. macrocarpa* fruits. The oven-drying process was carried out in this study at temperatures of 40 °C, 50 °C, 60 °C, 70 °C, and 80 °C. Six thin-layer drying models (i.e., Lewis, Page, Henderson and Pabis, two-term exponential, Logarithmic, and Midilli and Kucuk models) were evaluated to study the behaviour of oven-dried *P. macrocarpa* fruits based on the coefficient of determination (R^2), root mean square error (RMSE), and chi-square (χ^2). The quality of the oven-dried *P. macrocarpa* fruits was determined based on their extraction yield, total phenolic content (TPC), total flavonoid content (TFC), and antioxidant activity (2,2-diphenyl-1-picrylhydrazyl) using ultrasound-assisted extraction. The results showed that the time for moisture removal correspondingly increased in the oven-dried *P. macrocarpa* fruits. Apparently, the Midilli and Kucuk model is the most appropriate model to describe the drying process. The range of effective moisture diffusivity was 1.22×10^{-8} to 4.86×10^{-8} m²/s, and the activation energy was 32.33 kJ/mol. The oven-dried *P. macrocarpa* fruits resulted in the highest extraction yield ($33.99 \pm 0.05\%$), TPC (55.39 ± 0.03 mg GAE/g), TFC (15.47 ± 0.00 mg RE/g), and DPPH inhibition activity ($84.49 \pm 0.02\%$) at 60 °C based on the significant difference ($p < 0.05$). A strong correlation was seen between the antioxidant activity, TPC, and TFC in the oven-dried *P. macrocarpa* fruits. The current study suggests that the oven-drying method improved the TPC, TFC, and antioxidant activity of the *P. macrocarpa* fruits, which can be used to produce functional ingredients in foods and nutraceuticals.