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The Effect of Maturity and Extraction Solvents on Bioactive Compounds and Antioxidant Activity of Mulberry (*Morus alba*) Fruits and Leaves

Centhyea¹, Ruzaidi Azli Mohd Mokhtar², Muhamad Shirwan Abdullah Sani^{3,4} and Nor Qhairul Izzreen Mohd Noor^{1*}

¹Faculty of Food Science and Nutrition, Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia, centhyea97@gmail.com, *qhairul@ums.edu.my

²Biotechnology Research Institute, Universiti Malaysia Sabah, 88400 Kota Kinabalu, Sabah, Malaysia, ruzaidi@ums.edu.my

³International Institute for Halal Research and Training, Level 3, KICT Building, International Islamic University Malaysia, Jalan Gombak, 53100, Kuala Lumpur, Malaysia, shirwansany@iium.edu.my

⁴Konsortium Institut Halal IPT Malaysia, Ministry of Higher Education, Block E8, Complex E, Federal Government Administrative Centre, 62604, Putrajaya, Malaysia.

Abstract: Cultivation location, maturity levels, and extraction solvents could affect the bioactive compounds and biological activities of mulberry (*Morus alba* Linnaeus). The lack of study on Malaysia-grown mulberry causes its underutilization. This study investigated the total bioactive compounds content and the antioxidant activity of Sabah-grown mulberry fruits and leaves. Samples were analyzed at two different maturity stages (fruits: red mature and black fully ripe; leaves: mature and young) and extracted using 70% (v/v) methanol, 60% (v/v) ethanol and 65% (v/v) acetone. The analyses included the total content of phenolic, flavonoid, and anthocyanin, UHPLC-DAD quantification of chlorogenic acid and rutin, Free Radical Scavenging 2,2-Dyphenyl-1-Pikrilhidrazil (DPPH), Radical Cation 2,2'-Azino-bis(3-ethylbenzthiazoline-6-sulphonic acid) (ABTS) and Ferric Reduction Antioxidant Power (FRAP) assays. Results showed that mulberry fruits demonstrated maturity-dependent increment (except UHPLC-DAD quantification), while the leaves revealed maturity-dependent reduction. Principal component analysis (PCA) displayed 65% (v/v) acetone black fully ripe fruits in 65% (v/v) acetone as the best phenolics and antioxidant sources. However, the 60% (v/v) ethanol black fully ripe fruits contained 20.08%–68.43% higher total anthocyanins. Meanwhile, the 65% (v/v) acetone and 70% (v/v) methanol red mature fruits were higher in chlorogenic acid (27.53%–47.12%) and rutin (31.42%–35.92%) than other fruit extracts, respectively. For leaves, young leaves in 65% (v/v) acetone young leaves were the best phenolics and antioxidant sources. However, the 60% (v/v) ethanol young leaves possessed greater chlorogenic acid (19.56%–74.11%) than other leaf extracts. Overall, Malaysia-grown mulberry is rich in phenolics and antioxidants, suggesting its potential application in food and pharmaceutical products.

Keywords: *Morus alba* Linnaeus fruits, *Morus alba* Linnaeus leaves, bioactive compounds, antioxidant activity, principal component analysis (PCA)