

**KINERJA MICROWAVE-ASSISTED EXTRACTION SENYAWA
BIOAKTIF DARI BERAS HITAM (*Oryza Sativa L. Indica*) DENGAN
PERLAKUAN KONSENTRASI ASAM SITRAT DAN DAYA *MICROWAVE***

INTISARI

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Eksplorasi pengembangan metode ekstraksi senyawa bioaktif dari bahan alam untuk bahan produksi antioksidan telah banyak dilakukan. Beras hitam (*Oryza sativa L. indica*) diketahui merupakan salah satu sumber senyawa bioaktif berupa fenolik dan antosianin alami alternatif pengganti bahan sintetik. Pemungutan senyawa fenolik dan antosianin dapat dilakukan dengan ekstraksi. Kendala proses ekstraksi senyawa fenolik dan antosianin dari beras hitam perlu diatasi karena memiliki keterikatan kuat dengan penggunaan pelarut yang toksik bagi tubuh. Tujuan penelitian ini adalah pengembangan metode ekstraksi *Microwave Assisted Extraction* dengan penggunaan *green solvent* berupa asam sitrat untuk memaksimalkan perolehan senyawa bioaktif dari beras hitam. Analisis kinerja MAE dilakukan dengan kinetika *pseudo* orde dua dan *two-way* ANOVA untuk mengetahui pengaruh faktor-faktor independent berupa konsentrasi asam sitrat (0%, 1%, dan 2%), daya *microwave* (640 W, 720 W, dan 800W) terhadap kandungan total fenolik (TPC), *Total dissolve solids* (TDS), antosianin, dan warna ekstrak. Hasil penelitian menunjukkan bahwa kombinasi asam sitrat 2% dan daya *microwave* 800 W menghasilkan kandungan total fenolik (TPC) dan antosianin tertinggi dibandingkan kombinasi yang lain, yaitu 1,95 mg GAE/ml dan 0,000718 mg/ml dengan karakteristik nilai TDS 0,06% dan warna ungu gelap dengan nilai L^* 14,08, a^* 11,14, dan b^* 5,54. Dengan menggunakan kinetika *pseudo* orde dua, didapatkan kapasitas maksimum ekstraksi berkisar antara 1,45 – 1,94 mg.ml⁻¹.menit⁻¹ dan laju ekstraksi berkisar antara 0,25 – 0,91 mg.ml⁻¹.menit⁻¹. Analisis *two-way* ANOVA didapatkan untuk masing masing variabel serta interaksi keduanya memberikan pengaruh nyata terhadap perolehan kandungan total fenolik, dan TDS ($\alpha < 0,05$).

Kata Kunci : Asam sitrat, beras hitam, daya *microwave*, *Microwave Assisted Extraction*, Senyawa bioaktif

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**PERFORMANCE OF MICROWAVE ASSISTED EXTRACTION OF
BIOACTIVE COMPOUNDS FROM BLACK RICE (*ORYZA SATIVA L.
INDICA*) BY TREATMENT CITRIC ACID CONCENTRATION AND
MICROWAVE POWER**

ABSTRACT

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Exploration of the development of extraction methods of bioactive compounds from natural materials has been widely carried out for antioxidant production materials. Black rice (*Oryza sativa L. indica*) is known to be one of the sources of bioactive compounds in the form of phenolic and anthocyanin natural alternatives to synthetic materials. The extraction of phenolic compounds and anthocyanins can be done by extraction. The obstacles of the extraction process of phenolic compounds and anthocyanins from black rice need to be overcome because they have a strong attachment to the use of solvents that are toxic to the body. The purpose of this research is the development of Microwave Assisted Extraction method with the use of green solvent in the form of citric acid to maximize the acquisition of bioactive compounds from black rice. MAE performance analysis was conducted with second-order pseudo kinetics and two-way ANOVA to determine the effect of independent factors such as citric acid concentration (0%, 1%, and 2%), microwave power (640 W, 720 W, and 800W) on total phenolic content (TPC), total dissolved solids (TDS), anthocyanins, and extract colour. The results showed that the combination of 2% citric acid and 800 W microwave power produced the highest total phenolic content (TPC) and anthocyanins compared to other combinations, namely 1.95 mg GAE/ml and 0.000718 mg/ml with a characteristic TDS value of 0.06% and a dark purple colour with L* values of 14.08, a* 11.14, and b* 5.54. Using second-order pseudo kinetics, the maximum extraction capacity ranged from 1.45 - 1.94 mg.ml⁻¹.min⁻¹ and the extraction rate ranged from 0.25 - 0.91 mg.ml⁻¹.min⁻¹. Two-way ANOVA analysis obtained for each variable as well as the interaction of the two gave a significant effect on the acquisition of total phenolic content and TDS ($\alpha < 0.05$).

Keywords : Bioactive compound, black rice, citric acid, microwave assisted extraction, microwave power

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