

Ekstraksi Daun Kejibeling dengan Metode Ultrasound-Assisted Enzymatic Extraction Menggunakan Enzim Selulase yang Terimobilisasi secara Entrapment-Cross-Linking = Extraction of Kejibeling Leaf by Ultrasound-Assisted Enzymatic Extraction Method Using Entrapment-Cross-Linking Immobilized Cellulase Enzyme

Nabila Azka Amalia, author

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Abstrak

Tanaman kejibeling adalah salah satu jenis tanaman obat yang memiliki banyak khasiat karena terkandung banyak senyawa kimia di dalamnya. Untuk mendapatkan senyawa kimia daun kejibeling seperti fenolik dan flavonoid, maka dilakukan metode Ultrasound Assisted Enzymatic Extraction (UAEE). Namun, penggunaan enzim selulase memiliki kekurangan dari segi ekonomis. Hal ini dapat diatasi dengan mengimobilisasi enzim secara entrapment-cross-linking dengan glutaraldehid, sodium alginat, dan kalsium klorida. Penelitian ini menggunakan variasi konsentrasi awal enzim selulase. Efisiensi imobilisasi tertinggi, yaitu 94,94%, didapatkan dari konsentrasi awal enzim selulase sebesar 4,65 mg/mL. Variasi konsentrasi ini menghasilkan selulase yang terperangkap sebanyak 4,42 mg/mL di dalam matriks imobilisasi. Nilai TPC dan TFC tertinggi dihasilkan oleh UAEE menggunakan enzim terimobilisasi konsentrasi 4,42 mg/mL, di mana nilai TPC dan TFC berturut-turut sebesar 11,051 mg GAE/g daun kering dan 1,804 mg QE/g daun kering. Hasil ini lebih tinggi daripada perolehan TPC UAEE dengan enzim bebas yang bernilai 8,438 mg GAE/g daun kering. Hasil TFC UAEE dengan enzim bebas sebesar 1,820 mg QE/g daun kering dinyatakan sama dengan TFC enzim terimobilisasi 4,42 mg/mL berdasarkan hasil uji statistik. Enzim selulase terimobilisasi menunjukkan kemampuan stabilitas yang baik setelah digunakan untuk UAEE kejibeling sebanyak tiga siklus.

.....Kejibeling is one of the herbal plants that has many benefits because it contains phenolics and flavonoids. Ultrasound-Assisted Enzymatic Extraction (UAEE) method was conducted to extract phenolic and flavonoid compounds of kejibeling leaves. However, the use of cellulase enzymes has shortcomings in terms of economics. This can be overcome by immobilizing the enzyme by entrapment-cross-linking with glutaraldehyde, sodium alginate, and calcium chloride. This study used a variation of cellulase initial concentration. The highest immobilization efficiency, 94.94%, was obtained from the cellulase initial concentration of 4.65 mg/mL. This concentration variation resulted in 4.42 mg/mL of entrapped cellulase in the immobilization matrix. The highest TPC and TFC values were obtained by UAEE using immobilized cellulase concentration of 4.42 mg/mL, where the TPC and TFC values were 11.051 mg GAE/g dry leaves and 1.804 mg QE/g dry leaves, respectively. This result was higher than the TPC of UAEE with free enzyme which was 8.438 mg GAE/g dry leaves. The TFC result of UAEE with free enzyme was 1.820 mg QE/g dry leaves, which was equal to the TFC of the immobilized cellulase of 4.42 mg/mL. The immobilized cellulase indicated good stability after being used for UAEE of kejibeling for three cycles.