

**KARAKTERISTIK MIKROKAPSUL EKSTRAK TEMULAWAK
(*Curcuma xanthorrhiza* Roxb.) DENGAN PENYALUT KONJUGAT
KONSENTRAT PROTEIN KEDELAI - PEKTIN**

INTISARI

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Temulawak (*Curcuma xanthorrhiza* Roxb.) merupakan tanaman herbal asli Indonesia. Tanaman ini yang mengandung senyawa bioaktif yang memiliki banyak manfaat bagi kesehatan seperti kurkumin dan xanthorrhizol. Namun, tantangan dari senyawa bioaktif ini adalah sulit larut air, stabilitas kimia yang buruk, dan metabolisme yang cepat. Penelitian ini bertujuan untuk mengatasi tantangan stabilitas dan bioavailabilitas rendah senyawa bioaktif dalam temulawak melalui enkapsulasi menggunakan konjugat konsentrat protein kedelai (SPC)-pektin. SPC dipilih karena kemampuan emulsifikasinya yang baik, sedangkan pektin dipilih karena stabilitasnya terhadap panas dan sistem pencernaan. Dari lima rasio konsentrasi, konjugat dilakukan analisis *emulsifying activity index*, *emulsifying stability index*, derajat glikasi, dan *browning index value* untuk menentukan rasio optimal. Ekstrak temulawak kemudian dienkapsulasi menggunakan rasio optimal dan diuji efisiensi enkapsulasi, kadar air, aktivitas air, kelarutan, stabilitas kurkumin, kandungan total fenolik, aktivitas antioksidan, kadar total kurkumin, kadar xanthorrhizol, dan morfologi menggunakan SEM. Hasil penelitian menunjukkan bahwa mikrokapsul ekstrak temulawak dengan konjugat SPC-pektin menghasilkan 71,36±5,86% efisiensi enkapsulasi, 7,2±0,73% kadar air, 0,35±0,01 aktivitas air, 57,50±4,08% kelarutan, 91,56±2,01% stabilitas kurkumin, 2792,01±227,98 (mg GAE/g db ekstrak) kandungan fenolik 55,76±0,95% aktivitas antioksidan, 47,24±4,33 (µg/mg db ekstrak) kadar kurkumin, 2010,96±15,56 (µg/mg db ekstrak) kadar xanthorrhizol, dan bentuk morfologi yang relatif bulat dengan permukaan yang sedikit berkerut.

Kata kunci : *temulawak, spc, pektin, enkapsulasi, konjugat*

MICROCAPSULE CHARACTERISTICS OF *CURCUMA XANTHORRHIZA* ROXB. EXTRACT COATED WITH SOY PROTEIN CONCENTRATE - PECTIN CONJUGATE

ABSTRACT

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Temulawak (*Curcuma xanthorrhiza* Roxb.) is a traditional herbal plant from Indonesia. It contains bioactive compounds like curcumin and xanthorrhizol, which provide various health benefits. However, these compounds exhibit poor water solubility, are prone to degradation, and are rapidly metabolized by the body. This study aims to overcome these issues by using encapsulation with soy protein concentrate (SPC)-pectin conjugates. SPC was selected due to its superior emulsifying properties, while pectin was selected for its thermal stability and resistance to digestion. Five different concentration ratios were evaluated to determine the optimal formulation, based on the emulsifying activity index, emulsifying stability index, degree of glycation, and browning index value. The optimized conjugate was then used to encapsulate temulawak extract. The final encapsulated product was evaluated for encapsulation efficiency, moisture content, water activity, solubility, curcumin stability, total phenolic content, antioxidant activity, total curcumin content, xanthorrhizol content, and morphology using scanning electron microscopy (SEM). The results showed that temulawak extract microcapsules prepared using an SPC-pectin conjugate achieved the encapsulation efficiency of $71,36 \pm 5,86\%$, a moisture content of $7,2 \pm 0,73\%$, a water activity of $0,35 \pm 0,01$, a solubility of $57,50 \pm 4,08\%$, and curcumin stability of $91,56 \pm 2,01\%$. In addition, the microcapsules exhibited a total phenolic content of $2792,01 \pm 227,98$ (mg GAE/g dry basis extract), an antioxidant activity of $55,76 \pm 0,95\%$, a curcumin content of $47,24 \pm 4,33$ ($\mu\text{g}/\text{mg}$ dry basis extract), and a xanthorrhizol content of $2010,96 \pm 15,56$ ($\mu\text{g}/\text{mg}$ dry basis extract). Morphologically, the microcapsules were relatively spherical with slightly wrinkled surfaces.

Keywords : *temulawak, spc, pectin, encapsulation, conjugate*