PENGARUH RASIO SAMPEL DAN PELARUT PADA EKSTRAKSI ROSELLA TERHADAP AKTIVITAS ANTIOKSIDAN, STABILITAS LIPID, DAN KARAKTER FISIK COKELAT HITAM FORTIFIKASI KONSENTRAT ROSELLA

INTISARI

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Peningkatan konsumsi cokelat mendorong pengembangan produk yang tidak hanya bercita rasa baik tetapi juga stabil selama penyimpanan. Cokelat hitam kaya antioksidan namun rentan terhadap oksidasi lipid akibat kandungan lemak kakao tinggi, sehingga menurunkan kualitas dan umur simpan. Penambahan antioksidan alami seperti rosella (*Hibiscus sabdariffa* L.) yang kaya senyawa fenolik menjadi salah satu solusi, meskipun pemanfaatannya pada cokelat masih terbatas. Penelitian ini bertujuan mengevaluasi pengaruh rasio sampel dan pelarut pada ekstraksi rosella terhadap aktivitas antioksidan, stabilitas lipid, dan karakter fisik cokelat hitam fortifikasi konsentrat rosella selama penyimpanan terakselerasi. Konsentrat rosella dibuat melalui ekstraksi bubuk rosella menggunakan metode *ultrasound-assisted cold brew* dengan tiga variasi perlakuan (R1, R2, dan R3) serta kontrol, kemudian dipekatkan hingga mencapai viskositas 1847,50 ± 41,72 cP. Konsentrat ditambahkan ke dalam formulasi cokelat sebanyak 3% dan disimpan pada suhu 20, 30, dan 40 °C menggunakan metode *Accelerated Shelf Life Test*. Parameter yang dianalisis meliputi aktivitas antioksidan, angka peroksida, nilai *p*-anisidin, TOTOX, serta karakteristik fisik cokelat. Data dianalisis dengan *Two Way* ANOVA dan uji lanjut Tukey (p<0,05). Hasil penelitian menunjukkan bahwa penambahan konsentrat ekstrak rosella meningkatkan aktivitas antioksidan serta menekan oksidasi lipid cokelat dibandingkan kontrol. Penambahan rosella juga meningkatkan kekerasan cokelat dan menghasilkan warna lebih gelap kemerahan akibat pigmen antosianin. Formulasi terbaik adalah R3 yang ditentukan berdasarkan parameter angka peroksida, nilai *p*-anisidin, dan TOTOX dengan estimasi umur simpan 592 hari dan titik leleh 28,4 °C. Hasil ini menunjukkan bahwa konsentrat ekstrak rosella berpotensi sebagai sumber antioksidan alami dalam pengembangan cokelat hitam fungsional dengan stabilitas kualitas yang lebih baik selama penyimpanan.

Kata kunci: Aktivitas Antioksidan, Cokelat Hitam, Rosella, Stabilitas Oksidatif Lipid

EFFECT OF SAMPLE-TO-SOLVENT RATIO IN ROSELLE EXTRACTION ON ANTIOXIDANT ACTIVITY, LIPID STABILITY, AND PHYSICAL CHARACTERISTICS OF ROSELLE-CONCENTRATE-FORTIFIED DARK CHOCOLATE

ABSTRACT

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The increasing consumption of chocolate has driven the development of products that not only possess desirable sensory qualities but also maintain stability during storage. Dark chocolate is rich in antioxidants; however, its high cocoa butter content makes it susceptible to lipid oxidation, which can reduce product quality and shelf life. The addition of natural antioxidants such as roselle (*Hibiscus sabdariffa* L.), which is rich in phenolic compounds, offers a potential solution, although its application in high-fat products like chocolate remains limited. This study aimed to evaluate the effect of sample-to-solvent ratio in roselle extraction on antioxidant activity, lipid stability, and physical characteristics of roselle-concentrate-fortified dark chocolate during accelerated storage. Roselle concentrate was prepared by extracting roselle powder using an ultrasound-assisted cold brew method with three treatment variations (R1, R2, and R3) and a control, followed by concentration to a viscosity of 1847.50 ± 41.72 cP. The concentrate was incorporated into chocolate at 3% and stored at 20, 30, and 40 °C using the Accelerated Shelf Life Test method.The analyzed parameters included antioxidant activity, peroxide value, p-anisidine value, TOTOX, and physical characteristics. Data were analyzed using two-way ANOVA followed by Tukey's post hoc test ($p<0.05$). The results showed that the addition of roselle extract concentrate increased antioxidant activity and reduced lipid oxidation compared to the control. It also increased chocolate hardness and produced a darker reddish color due to anthocyanin pigments. The best formulation was R3, determined based on peroxide value, p-anisidine value, and TOTOX, with an estimated shelf life of 592 days and a melting point of 28.4 °C. These findings indicate that roselle extract concentrate has potential as a natural antioxidant source in the development of functional dark chocolate with improved oxidative stability during storage.

Keywords: Antioxidant Activity, Dark Chocolate, Lipid Oxidative Stability, Rosella