



## INTISARI

Ekstraksi minyak dengan bantuan surfaktan dan *ultrasound* digunakan sebagai metode alternatif ramah lingkungan. Penelitian ini memperkenalkan ekstraksi minyak pada bekatul padi menggunakan 2 jenis surfaktan nonionik yaitu Tween 80 dan Ecosurf EH3 sebagai metode alternatif pengganti ekstraksi pelarut heksana yang lebih umum digunakan. Penelitian ini meliputi tahap-tahap sebagai berikut: (I) Tahap pertama penelitian ini bertujuan mempelajari ekstraksi minyak bekatul dengan bantuan surfaktan dan *ultrasound*. (ii) Tahap kedua penelitian ini bertujuan mendapatkan kondisi ekstraksi minyak yang optimum *dengan response surface methods* (RSM) *box behnken design* (BBD). (iii) Tahap ketiga penelitian ini bertujuan untuk mengetahui pengaruh *nanosize lipid carrier* (NLC) minyak bekatul yang diaplikasikan pada model minuman sari apel dan sari jeruk komersial

Hasil penelitian menunjukkan ekstraksi minyak bekatul dengan ecosurf EH3 lebih efektif daripada tween 80 dengan *recovery* minyak 97,47% . Sedangkan dengan tween 80 memiliki *recovery* 79,17%, Waktu kontak dan amplitudo pada proses ultrasonikasi tidak berpengaruh signifikan ( $p > 0,05$ ) terhadap FFA, angka peroksida dan angka anisidin. Bekatul yang digunakan adalah Bekatul-04 yang setelah diautoklaf memiliki kadar air 4,25%; kadar minyak 20,96%; kadar FFA 2,04. Kondisi optimum ekstraksi minyak bekatul diperoleh pada rasio minyak terhadap surfaktan adalah 1 : 3,947, amplitudo ultrasonikasi 79,48%, dan waktu kontak ultrasonikasi 23,94 menit. Penambahan *nanosize lipid carrier* (NLC) minyak bekatul dalam sistem model minuman sari apel dan sari jeruk komersial berpengaruh signifikan ( $p \leq 0,05$ ) terhadap karakteristik sensoris. Laju penurunan asam askorbat selama penyimpanan untuk sari apel dengan penambahan NLC minyak bekatul dan kontrol secara berurutan 0,0178 ppm/Minggu dan 0,0179 ppm/Minggu. Untuk sari jeruk dengan penambahan NLC minyak bekatul dan kontrol secara berurutan 0,0348 mg/mL/Minggu dan 0,037 mg/mL/Minggu. Fotooksidasi berpengaruh signifikan terhadap pengujian model minuman sari buah apel dan sari jeruk dengan perlakuan kontrol dan penambahan NLC minyak bekatul serta disimpan pada kotak pencahayaan selama 2 jam, memiliki persamaan garis  $Y = - 0,8394x + 2055,3$  ( $R^2 = 0,9442$ ). Berdasarkan pengujian slope secara statistik menunjukkan bahwa pada kondisi tersebut terjadi degradasi asam askorbat pada 0,84 ppm/menit. Pada sistem model minuman sari buah apel dan sari jeruk kontrol terjadi penurunan parameter nilai  $a^*(redness)$  mencapai 75% selama fotooksidasi 30 menit pertama.

**Keywords:** Ekstraksi minyak, minyak bekatul, surfaktan, *ultrasound*, *response surface methods*, dan NLC.

## ABSTRACT

Oil extraction assisted by surfactant and ultrasound are used as environmentally friendly alternative methods. This study introduced oil extraction in rice bran using 2 types of nonionic surfactants, namely Tween 80 and Ecosurf EH3 as an alternative method to replace the more commonly used hexane solvent extraction. This research includes the following stages: (I) The first phase of this research aims to study the extraction of bran oil assisted by surfactants and *ultrasound*. (ii) The second stage of this research aimed to determine the optimum oil extraction using response surface methods (RSM) box behnken design (BBD). (iii) The third stage of this research aimed to determine the effect of NLC rice bran oil applied to commercial apple and orange juice drink models

The results showed that the extraction of rice bran oil with ecosurf EH3 was more effective than tween 80 with oil recovery of 97,47%. Meanwhile, Tween 80 has a recovery of 79,17%, However, Tween 80 was considered for its food grade and was commonly used on an industrial scale. Contact time and amplitude in the ultrasonication process did not significantly affect ( $p > 0,05$ ) on FFA, peroxide value and anisidin number. The bran used was the Bekatul-04 variety which passed the stabilization stage with a moisture content of 4,25%; oil content 20,96%; FFA content 2,04. Optimum conditions for extracting rice bran oil obtained at the ratio of oil to surfactant were 1 : 3,947, ultrasonication amplitude 79,48%, and ultrasonication contact time 23,94 minutes. The addition of rice bran oil NLC in the model system of commercial apple cider and orange juice drinks had a significant effect ( $p \leq 0,05$ ) on sensory characteristics. The rate of decrease in ascorbic acid during storage for apple cider with the addition of NLC rice bran oil and control was 0,0178 ppm/week and 0,0179 ppm/week, respectively. For orange juice with the addition of NLC rice bran oil and control, respectively 0,0348 mg/mL/week and 0,037 mg/mL/week. Photooxidation has a significant effect on testing the model of apple cider and orange juice drinks with control treatment and the addition of NLC rice bran oil and stored in a lighting box for 2 hours, has the equation  $Y = - 0,8394x + 2055,3$  ( $R^2 = 0,9442$ ) . From the results of the slope test statistically, it was shown that under these conditions there was degradation of ascorbic acid at 0.84 ppm/minute. In the control model system of apple cider and orange juice, there was a decrease in the  $a^*$ (redness) value parameter of up to 75% during the first 30 minutes of photooxidation.

**Keywords:** Oil extraction, rice bran oil, surfactant, ultrasounds, response surface methods, and NLC