KARAKTERISASI MINYAK ATSIRI BIJI PALA (*MYRISTICA FRAGRANS* HOUTT.) DARI HASIL EKSTRAKSI MENGGUNAKAN METODE *WATER STEAM DISTILLATION*, *SUPERCRITICAL FLUID EXTRACTION*, DAN *PRESSURIZED LIQUID EXTRACTION*

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Karakterisasi Minyak Atsiri Biji Pala (*Myristica fragrans* Houtt.) dari Hasil Ekstraksi Menggunakan Metode *Water Steam Distillation, Supercritical Fluid Extraction,* dan *Pressurized Liquid Extraction*

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ABSTRAK

Minyak atsiri biji pala memiliki nilai ekonomi tinggi dan beragam manfaat, terutama dalam industri pangan, farmasi, dan kosmetik. Penelitian ini bertujuan untuk membandingkan rendemen minyak atsiri yang dihasilkan dari tiga metode ekstraksi berbeda, yaitu *water steam distillation* (WSD), *supercritical fluid extraction* (SFE), dan *pressurized liquid extraction* (PLE). Pengamatan dilakukan terhadap karakteristik minyak pala meliputi analisis rendemen, keadaan fisik (warna dan aroma), berat jenis, indeks bias, tingkat kelarutan dalam etanol, jumlah zat sisa penguapan, profil atsiri, gugus fungsi, serta aktivitas antioksidan minyak atsiri biji pala. Hasil penelitian menunjukkan bahwa setiap metode memiliki karakteristik rendemen yang berbeda. WSD 24 jam (3,20%), WSD 36 jam (3,50%), WSD 48 jam (2,63%), SFE (2,43%), dan PLE (21,52%). Dari hasil analisis FTIR terlihat adanya perbedaan gugus fungsi pada metode PLE. Selain itu, juga diperoleh persentase senyawa *myristicin* yang berbeda dari hasil analisis GC-MS pada metode SFE (40,80%), WSD 36 jam (24,91%) dan PLE (21,05%). Aktivitas antioksidan minyak atsiri biji pala yang diperoleh juga bervariasi, dengan metode WSD 36 jam sebesar 41,81%, SFE 83,82%, dan PLE 88,81%. Perbedaan ini dipengaruhi oleh variasi suhu, tekanan, dan jenis pelarut yang digunakan. Penelitian lanjutan mengenai analisis total fenolik serta bioaktivitas minyak atsiri biji pala, seperti aktivitas antibakteri perlu dilakukan untuk memperluas pemahaman terhadap potensi fungsionalnya.

Kata kunci: minyak atsiri biji pala, metode ekstraksi, *Myristicin*

Characterization of Nutmeg (Myristica fragrans Houtt.) Essential Oil Extracted Using Water Steam Distillation, Supercritical Fluid Extraction, and Pressurized Liquid Extraction Methods

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ABSTRACT

Nutmeg essential oil has high economic value and various benefits, especially in the food, pharmaceutical, and cosmetic industries. This study aims to compare the yield of essential oil produced from three different extraction methods, namely water steam distillation (WSD), supercritical fluid extraction (SFE), and pressurized liquid extraction (PLE). Observations were made on the characteristics of nutmeg oil including yield analysis, physical condition (color and aroma), specific gravity, refractive index, solubility in ethanol, amount of evaporation residue, essential profile, functional groups, and antioxidant activity of nutmeg essential oil. The results showed that each method has different yield characteristics. 24-hour WSD (3.20%), 36-hour WSD (3.50%), 48-hour WSD (2.63%), SFE (2.43%), and PLE (21.52%). From the results of FTIR analysis, there are differences in functional groups in the PLE method. In addition, different percentages of myristicin compounds were also obtained from the GC-MS analysis results in the SFE (40.80%), 36-hour WSD (24.91%) and PLE (21.05%) methods. The antioxidant activity of nutmeg seed essential oil obtained also varied, with the 36-hour WSD method amounting to 41.81%, SFE 83.82%, and PLE 88.81%. This difference is influenced by variations in temperature, pressure, and type of solvent used. Further research on the analysis of total phenolics as well as the bioactivity of nutmeg essential oil, such as antibacterial activity, needs to be done to expand the understanding of its functional potential.

Keywords: Nutmeg essential oil, Exctraction method, Myristicin