

**ISOLASI MINYAK ATSIRI LIMBAH TANAMAN LADA
(*Piper Nigrum L.*) DARI PULAU BANGKA DENGAN METODE
DISTILASI UAP**

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INTISARI

Isolasi minyak atsiri limbah tanaman lada (*Piper nigrum L.*) dari Pulau Bangka dengan metode distilasi uap telah dilakukan. Penelitian ini bertujuan untuk mengetahui jenis metode distilasi uap, menentukan kondisi proses yang optimal, serta menganalisis komposisi minyak atsiri yang dihasilkan dari proses isolasi limbah tanaman lada. Analisis minyak atsiri dilakukan menggunakan Kromatografi Gas-Spektrometri Massa.

Sampel limbah tanaman lada yang digunakan dalam penelitian ini meliputi batang lada, daun lada, dan lada jatuh. Jenis metode distilasi yang dikaji yaitu distilasi uap dan distilasi uap-air. Penelitian diawali dengan melakukan isolasi minyak atsiri sampel batang lada, daun lada, dan lada jatuh pada variasi waktu distilasi yaitu 1, 2, 3, 4, dan 5 jam untuk mendapatkan waktu optimal dan memvariasikan metode distilasi, yaitu distilasi uap dan distilasi uap-air untuk mendapatkan metode distilasi optimal. Selain itu, terhadap metode distilasi uap dilakukan isolasi minyak atsiri limbah lada dengan variasi tekanan 0,2; 0,4; 0,6; dan 0,8 bar untuk mendapatkan tekanan optimal. Minyak atsiri dari limbah tanaman lada yang telah diisolasi dengan optimal kemudian dianalisis komposisinya dengan GC-MS.

Hasil penelitian menunjukkan bahwa waktu isolasi optimum minyak atsiri sampel batang lada adalah 2 jam, daun lada adalah 5 jam dan lada jatuh adalah 3 jam. Metode isolasi optimal untuk sampel batang lada, daun lada, lada jatuh adalah metode distilasi uap-air. Tekanan optimal metode distilasi uap untuk sampel batang adalah 0,4 bar dan lada jatuh adalah 0,6 bar. Berdasarkan luas % area terdapat tiga senyawa dengan kelimpahan tertinggi dalam minyak atsiri batang lada adalah *trans-caryophyllene* (31,93%), *δ-3-carene* (24,48%), dan *(-)-caryophyllene oxide* (18,30%), pada minyak atsiri daun lada yaitu *δ-elemene* (24,59%), *(+)-spathulenol* (13,20%), dan *aromadrendene* (8,92%), sedangkan pada minyak atsiri lada jatuh yaitu *(-)-caryophyllene oxide* (31,37%), *1-limonene* (18,29%), dan *β-caryophyllene* (11,61%).

Kata Kunci: batang lada, daun lada, distilasi uap, GC-MS, lada jatuh

ISOLATION OF ESSENTIAL OIL FROM WASTE OF PEPPER PLANT (*Piper nigrum L.*) FROM BANGKA ISLAND USING STEAM DISTILLATION METHOD

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ABSTRACT

The isolation of essential oil from waste of pepper plant (*Piper nigrum L.*) in Bangka Island using distillation methods was investigated in this study. This study aimed to determine the appropriate type of steam distillation method, identify the optimum process conditions, and analyse the composition of the essential oils obtained from the isolation process of pepper plant waste. The essential oils were analysed using Gas Chromatography–Mass Spectrometry (GC–MS).

The pepper plants waste samples used in this study included pepper stems, leaves and fallen pepper fruits. The distillation methods investigated were steam distillation and steam–water distillation. The study began with the isolation of essential oils from pepper stems, pepper leaves, and fallen pepper samples at various distillation times of 1, 2, 3, 4, and 5 hours to determine the optimum distillation time. In addition, the distillation methods, namely steam distillation and steam–water distillation, were varied to obtain the optimum distillation method. Furthermore, steam distillation was carried out at pressure variations of 0.2, 0.4, 0.6, and 0.8 bar to determine the optimum pressure conditions. The essential oils isolated under optimum conditions were subsequently analysed using GC–MS.

The results showed that the optimum isolation time for essential oils from pepper stems was 2 hours, pepper leaves 5 hours, and fallen pepper fruits 3 hours. The optimum isolation method for pepper stem, pepper leaf, and fallen pepper samples was steam–water distillation. The optimum pressure for the steam distillation method was 0.4 bar for pepper stem samples and 0.6 bar for fallen pepper samples. Based on the percentage area obtained there are three compounds with the highest abundance in pepper stem essential oil samples were *trans-caryophyllene* (31.93%), *δ-3-carene* (24.48%), and *(-)-caryophyllene oxide* (18.30%), in pepper leaf essential oil were *δ-elemene* (24.59%), *(+)-spathulenol* (13.20%), and *aromadendrene* (8.92%), whereas the major compounds in fallen pepper essential oil were *(-)-caryophyllene oxide* (31.37%), *1-limonene* (18.29%), and *β-caryophyllene* (11.61%).

Keywords: fallen pepper fruits, GC-MS, pepper stem, pepper leaves, steam distillation