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Nutmeg's (*Myristica fragrans* Houtt) Oleoresin: Effect of Heating to Chemical Compositions and Antifungal Properties

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Abstract

The aim of the study was to evaluate the effect of heating on the chemical compositions and antifungal properties of nutmeg's oleoresin. Nutmeg's oleoresin was obtained by two steps, distillation followed by maceration. The nutmeg's oleoresin was heated at 100°C, 120°C and 180°C. The chemical compositions were determined by GC-MS, and the antifungal properties by giant colony method. The result of the study showed that yield was 13.6%±0.2% and 24 components were identified. The nutmeg's oleoresin at 100°C, 120°C and 180 °C identified 25, 21 and 20 components. Indeed, heating treatment on nutmeg's oleoresin did not decrease the antifungal properties.

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INTRODUCTION

Nutmeg (*Myristica fragrans* Houtt) is one of the commodities which highly economic value, Indonesia is a major producer and supplier needs nutmeg and mace nutmeg. 80% of the world nutmeg from Indonesia, 20% from Grenada and the rest from Sri Lanka, Trinidad and Tobago [7]. However the reality Indonesian nutmeg commodity prices is quite low, because the low quality of nutmeg, about 55% of the seeds with the quality of BWP (Broken Wormy Punky) and mace with Broken II quality that reaches 77%. Efforts to increase the sale value of BWP quality nutmeg can be done by processing nutmeg into essential oils, nutmeg's oleoresin, and nutmeg butter.

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Oleoresin is a mixture of resins and essential oils which obtained through extraction of various spices. Oleoresin has characteristics flavor and aroma of spices which are the same as the original [1]. Oleoresin contains essential oils that make up the aroma, oleoresin also contains resins and compounds that did not volatile determine the characteristic flavor of spices. Oleoresin extraction is generally done with organic solvents, such as ethylene diklorida, acetone, ethanol, methanol, hexane [20], ether and isopropyl alcohol [8]. The choice of solvent affects the quality and quantity of oleoresin obtained. Oleoresin were used in food processing safer extracted using ethanol solvent [9]. Extraction with polar solvents such as ethanol will be produced oleoresin with a low fat content [13]. According Rismunandar [16] nutmeg's oleoresin extraction with gradual extraction of oleoresin were will result in much more than the direct extraction. In the gradual extraction of nutmeg's essential oils is taken beforehand through steam and water distillation, then the waste is dried and followed by extraction of the percolation or maceration, Oleoresin obtained was a mixture of resins and essential oils. Extraction oleoresin was done after distillation of essential oils which will suppress the loss of essential oils contained in the oleoresin during solvent evaporation process [1].

In the food processing, nutmeg's oleoresin are often added as a flavor. Food products were usually added oleoresin or nutmeg's essential oil was products such as meat and fish, pickles, sauces, soups, biscuits and bread or cake [16, 11] These products are often damaged because of bacteria, yeast and fungi. Fungi often damage foods such as *Aspergillus*, *Fusarium*, *Rhizopus*, *Mucor*, *Penicillium*, *Cladosporium*, *Eurotium*, *Alternaria* [6, 15, 21] . One attempt to maintain the shelf life of these products is to add a component were could inhibit microbial activity. Some recent studies showed that the active substances contained in various types of spices extracts known to inhibit some pathogenic microbes or microbial food destroyer [5].

In the nutmeg's oleoresin contained essential oils, the main component of nutmeg essential oil was a hydrocarbon monoterpenes (61-88% as α -pinene, β -pinene, sabinene) monoterpenes acid (5-15%), and aromatic ether (2-18% such as myristicin, elemicin, safrole) [4]. According to Rahman, nutmeg oil has 37 components and 31.3% was terpinen-4-ol, reported that nutmeg oil has antifungal activity [14].

According previous researcher, the effect of cooking or food processing on the potential antimicrobial spices largely unknown, food processing at high temperature will damage the effect of antimicrobial (antifungal and antibacterial) of some spices [2]. Some of the reasons underlying the need for research is to determine the effect of heating on food processing temperature (100 ° C, 120 ° C and 180 ° C) on the chemical composition of nutmeg's oleoresin and a heating effect on the antimicrobial properties antifungal properties. The aim of the study was to evaluate the effect of heating on the chemical compositions and antifungal properties of nutmeg's oleoresin

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