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The Effects of Processing Time and Temperature on the Characteristics of Candlenut Oil using the Rendering Process Method

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ABSTRACT

Hazelnut (Aleurits moluccana), contains nutrients and non-nutrition. Non-nutritional substances in hazelnut, for example, saponins, falvonoids, and polyphenols. In this research, the hot extraction process was carried out for candlenut raw materials, as well as product analysis for candlenut oil. The purpose of this study was to process hazelnut seeds into hazelnut oil using the rendering process method and to determine the effect of the process on the composition of the chemical compounds contained in hazelnut oil. The process parameters used were temperature and extraction process time of 65 ℃, 70 ℃ and 75 ℃ with various extraction times of 75, 100, 125 and 150 minutes. The results showed that the yield of hazelnut oil using the rendering method obtained a yield of 23.57% at an extraction time of 150 minutes and a temperature of 75℃ with a density of 0.9241 gr/ml. Analysis using Gas Chromatography Mass Spectrometry (GC-MS) in the rendering process there are five main components Margaric acid methyl ester at 8.98%, Linoleic Acid, 32.66% , Linolenic 22.31% Oleic at 33.39%. acid, Nonanoic acid of 2.66 %

Keywords: *Hazelnut Oil, Randering, Methode*

1. INTRODUCTION

1.1. Background

Hazelnut is a very important source of raw material in the future as a source of highly applicable and multifunctional organic compound production. Candlenut seeds (kernels) contain very high fat estimated between 45-65%. Various production process technologies have been developed in processing hazelnut to produce various natural products, for example, hot or cold processing of hazelnut oil to produce high quality hazelnut oil so that it becomes the main commercial product and is widely sold in cosmetics industry.

Figure 1 inti kemiri

Hazelnut oil obtained from the pecan fruit can be processed through an extraction or press process. Candlenut oil can be used to make a fat substitute for margarine when mixed with palm oil stearin and contains omega-3 and omega-6 essential fats. To obtain oil or fat from oil-containing materials, it can be done by rendering, namely the

material is heated using water vapor or without water (roasted or oven) which aims to agglomerate the protein, reduce the water content and break the oil cells.

1.2. Hazelnut Oil Making Process with Rendering Process

The hazelnut seeds were washed and then mashed using a blender, adding enough water. Next, it is cooked and allowed to boil. The squeezed hazelnut oil is put into bottles and ready to be packaged and marketed.

2. RESEARCH OBJECTIVE

3. This study aimed to determine the effect of temperature and processing time of candlenut seeds on the characteristics of candlenut oil produced by the rendering process.

4. RESEARCH METHODS

3.1. Place and Time

The research was conducted at the Chemical Engineering Laboratory, Malikussaleh University, Aceh Indonesia. This research was conducted from July 2022 to December 2022.

3.2. Material and Tool

The raw material used is candlenut seeds which are obtained from community plantations in the North Aceh Regency, Indonesia.

3.3. Research Methods

In this study, the heat extraction process was carried out for the raw materials, followed by an analysis of the per cent yield and an analysis of the specific gravity of the resulting cassava oil. Candlenut Seed Raw Materials with a rendering process processed into essential oil for health and beauty. Process variables Temperature and processing time The variation of hot extraction time of candlenut seeds at temperatures of 65 ℃, 70 ℃, and 75 ℃ with extraction times varied 85 minutes, 115 minutes, and 145 minutes.

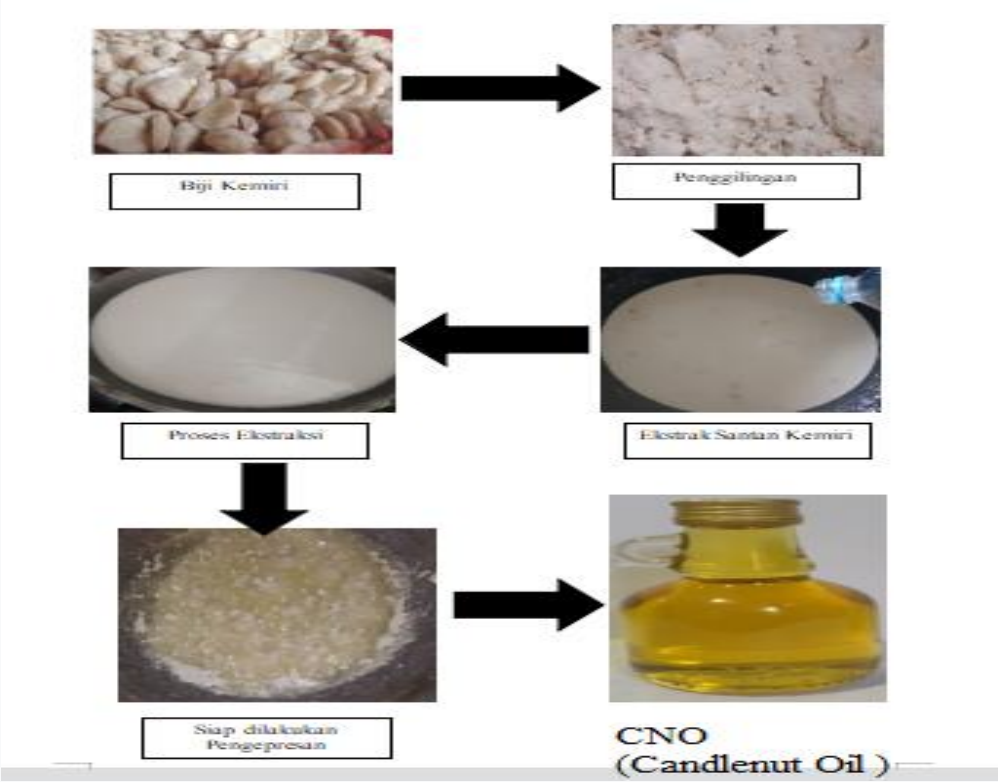

Figure 2. Extraction process

4. RESULTS AND DISCUSSION

The results obtained in the research on making hazelnut oil with the roasting method are as follows:

4.1. The relationship of Time and Temperature to % Yield of Hazelnut Oil

The Effect of Extraction Time and Solvent Volume on the Percent of Candlenut Oil Yield From Figure 5 shows that the hot extraction time and temperature significantly affect the % yield of oil produced.

This can be explained by the fact that the heat extraction time is longer; the more extended contact between the hazelnut and the solvent causes the mass transfer of hazelnut oil to be more excellent so that the oil content to e extracted to the maximum. The longer the hot extraction time, the longer the extraction time, the resulting candlenut oil content increases to optimum conditions and the mass transfer of oil decreases.
Relationship of Time and Temperature to % Yield of hazelnut oil

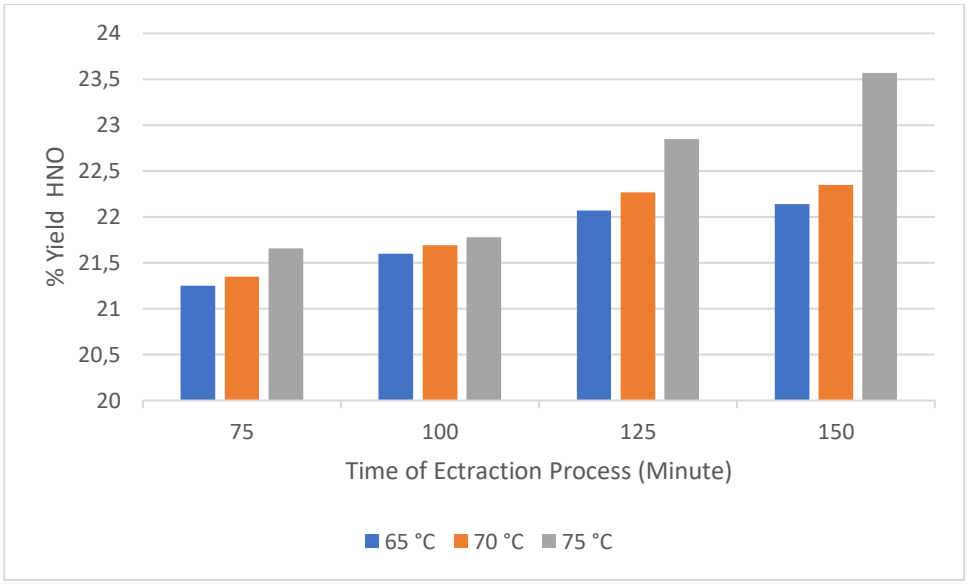

Figure 3 Graph of the relationship between processing time and temperature to the % yield HNO (Hazelnut Oil) produced. In the rendering process

The physico-chemical properties of hazelnut oil from the rendering process are to determine the specific gravity of the candlenut oil resulting from the rendering process at the extraction temperature conditions of 65 ℃, 70 ℃ and 75 ℃ with various extraction times of 75, 100, 125 and 150 minutes.

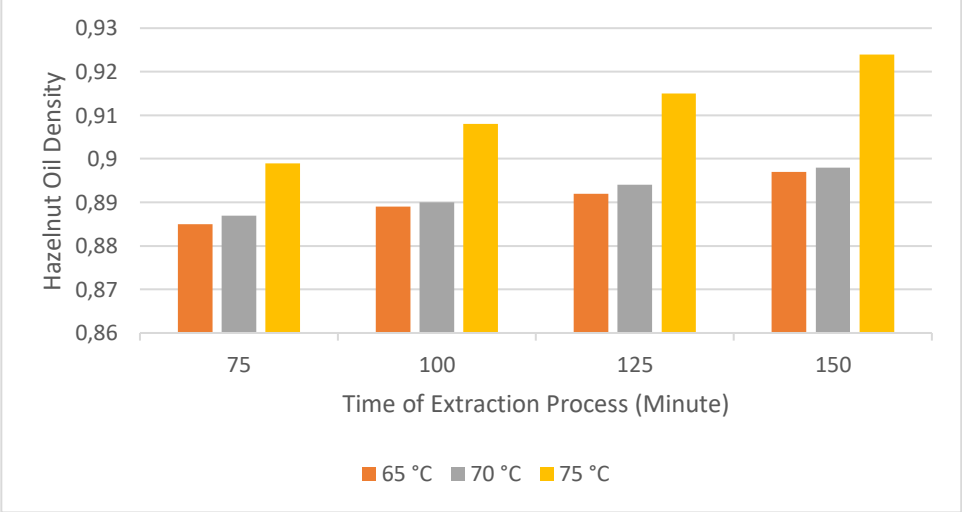

Figure 4 Graph of the relationship between processing time and pH

At the extraction temperature process of 65℃ the lowest density is at 0.885 gr/ml and the maximum density is 0.897 gr/ml while at a temperature of .70℃ the maximum density occurs at a temperature of 70 C and during extraction the density value is 0.898 while at the maximum temperature the extraction process conditions are 75 ℃ and extraction time of 150 minutes with a minimum density value of 0.899 and a maximum density value of 0.9241 gr/ml. The best condition for producing hazelnut oil with a density according to SNI is at a temperature of 150 ℃ and an extraction time of 150 minutes in the rendering process.

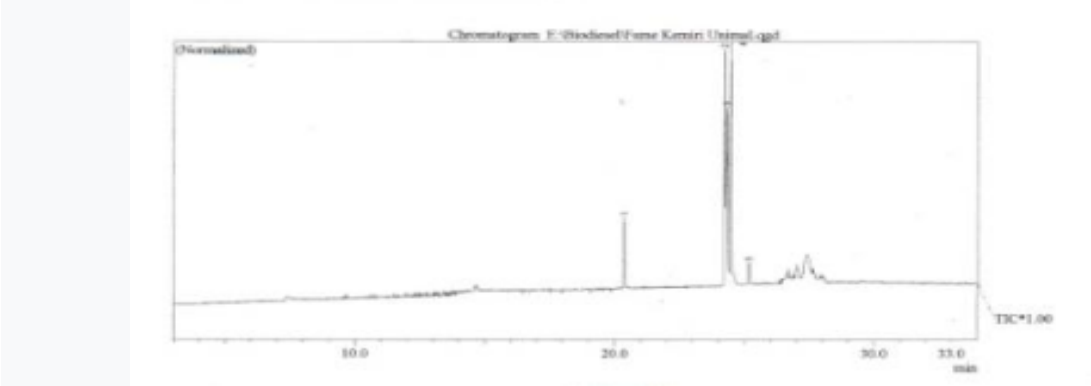

Figure 5 Analysis of the composition of candlenut oil using the rendering method with the GC-MS

Analysis of the composition of candlenut oil using the rendering method with the GC-MS (Gas Chromatography Mass Spectrophotometry) tool shows the composition of candlenut oil compounds can be seen in Table 1. Graph of gc-ms Test Analysis Gas Chromatography Mass Spectrophotometry functions to determine the content of candlenut oil. Identification of the components candlenut using Gas Chromatography Mass Spectrometry (GC-MS) in the rendering process which can be seen in Fig. 6. The GC-MS results of the five main components in candlenut oil, obtained Margaric acid of 5.51% in Linoleic Acid, 32.66%, Linolenic acid of 20.84 Oleic acid by 34.95%, palmitic acid by 3.09%.

5. CONCLUSION

1. The results showed that the yield of hazelnut oil using the rendering method obtained a yield of 23.57% at an extraction time of 150 minutes and a temperature of 75℃ with a density of 0.9241 gr/ml.

2. Analysis using Gas Chromatography Mass Spectrometry (GC-MS) in the rendering process there are five main components Margaric acid methyl ester at 8.98%, Linoleic Acid, 32.66% , Linolenic 22.31% Oleic at 33.39%. acid, Nonanoic acid of 2.66 %.

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