

**IDENTIFICATION OF RUBBER SEED OIL CONTENT**  
*(Havea Brasiliensis)*

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**Abstract**

*Rubber (Havea brasiliensis) is one of the many plantation communities in Indonesia, especially in South Kalimantan. Most rubber plant farming communities only use rubber sap as their source of income, even though there are still other than rubber sap that can be used, namely rubber seeds that contain around 40%-50% vegetable oil. The high oil content in rubber seeds can be used as cooking oil. The purpose of this study is to analyze how rubber seed oil processing works simply. This research method is the processing of rubber seed oil by adopting a simple method of making coconut oil, namely from the start of collecting rubber seeds, splitting rubber seeds from rubber seed meat, roasting, drying and drying, crushing and grinding, boiling / heating, oil separation, oil heating for oil purification, Oil output from rubber seeds.*

**Keywords:** Rubber Seeds, Oil, Simple Processing

**1. INTRODUCTION**

Today, rubber plants are one of the most common crops in Indonesia. According to the 2020 Central Bureau of Statistics (BPS), Indonesia is the world's second largest country in rubber production, only behind Thailand. Indonesia's rubber plantation area is huge. Due to their ability to survive for many years, rubber plants are referred to as perennial plants (Husaini et al., 2023). Many other parts of the rubber plant are not fully utilized, but the latex is the most frequently used and profitable. Annual rubber seed production ranges from 136 to 2000 kilograms per ha, making it a popular by-product in rubber plantations (Zhu et al., 2014).

Rubber (*Havea brasiliensis*) is one of the best plantation crops in Indonesia and around the world. Indonesia's rubber production outperforms other countries. Rubber plants are one of the most important plantation commodities for Indonesia as a source of non-oil and gas foreign exchange. The contribution of smallholder rubber plantations to national natural rubber production was 87.73% (3.1 million ha) of Indonesia's rubber area in 2018 (Dewi & Siahaan, 2021). To find out how high the percentage of rubber seed oil is, it is necessary to reduce the size of the rubber seeds. This is done by injuring the tissues and cells of the rubber seed, which makes its surface wider, which produces more oil. In addition, higher temperatures will have an impact on the oil produced. The high nutritional content of rubber seeds allows rubber oil to be used as a raw material for food oil (Hakim & Mukhtadi, 2018).

Most rubber farmers only produce sap or latex from their plants, but rubber seeds are another source of income from rubber sap. Rubber seed oil contains 40% to 50% vegetable oil, which can be used to make cooking oil. The effect of acid number on oil:

higher acid number increases oil deterioration, lower acid number decreases oil quality; conversely, lower acid number decreases oil quality. The oil produced from rubber seeds must be refined to match the cooking oil (Hakim & Mukhtadi, 2018).

So far, rubber seeds are only used as generative seeds of rubber trees and have almost no economic value. This happens even though rubber seeds have a high vegetable oil content (around 45.63%) (Sindi, 2023). In addition to the main product of rubber plantations, which is rubber sap or latex, rubber seeds contain about 40% to 50% by weight of edible oil, with oleic acid and linoleic acid predominant. Paminic acid, stearic acid, arachidic acid, and other fatty acids account for the rest (Erfarina et al., 2020). Due to the topography and proper land conditions, Sijunjung Regency has the potential for rubber plant development, according to the West Sumatra Plantation Office (2014). Sijunjung Regency's rubber plantation area increased to 33,668 ha, with a production of 19,035.2 tons. The rubber plantation area amounted to 2,925 ha in 2012, rising to 2,976 ha in 2013 (BPS Kabupaten Sijunjung, 2014).

The people of Sijunjung Regency in West Sumatra depend on rubber farming. The rubber land area of Sijunjung Regency is 33,598 ha, with rubber production of 31,113 tons in 2014 (Saputra et al., 2022). However, the use of rubber seeds in the community has not received greater attention. So far, rubber seeds are only used as generative seeds of rubber trees because people do not know how to process rubber seeds, even though their high oil content allows people to produce products with added value (Hakim & Mukhtadi, 2018). Rubber seeds are only used as generative seeds of rubber trees and have almost no economic value today. Most rubber seeds are wasted, even though the edible oil content of rubber seeds is about 40% to 50%. Thus, research on processing rubber seeds into oil can be done. The Sijunjung community itself only utilizes latex or rubber seed sap because it has economic value and is the livelihood of most people.

However, the community has not fully utilized the benefits of rubber plants. Many people do not know about the benefits of rubber seeds, which can be used as a substitute for cooking oil and if produced will generate economic value. The purpose of this research is to process vegetable oil from rubber seeds (rubber seed meat) in a traditional way, namely burning, drying (drying), pulverizing. Furthermore, the processing process will be carried out by entering the fine rubber seed powder into boiling water and then the final stage is heating the previous results so that it becomes vegetable oil. Based on the above background, the authors are interested in researching rubber seeds to be used as an alternative to cooking oil.

## 2. RESEARCH METHODS

This research is quantitative research using an experimental approach. This approach comes from a theoretical framework, the ideas of experts, or the understanding of researchers based on their experience, then developed into problems and their solutions which are proposed to obtain justification in the form of empirical data support in the field or in other words, quantitative research comes from a theoretical paradigm towards data and ends in acceptance or rejection of the theory used.

## 2.1. Rubber Seed Oil Manufacturing

The procedure for making oil simply from rubber seeds (*Hevea brasiliensis* Muell. Arg) is carried out in several stages. The stage is the preparation of tools and materials to be used. Rubber seeds are obtained from people's rubber plantations in Sijunjung Regency. Rubber seeds first start collecting rubber seeds, breaking rubber seeds from rubber seed meat, roasting, drying and drying, pounding and pulverizing, boiling / heating, oil separation, heating oil for oil purification, oil results from rubber seeds. The following stages of making rubber seed oil are as follows:

### a. Rubber Seed Collection

The initial stage starts from collecting rubber seeds which will be used as research samples. Where the rubber seeds used are rubber seeds that have just fallen or are still fresh, because later the quality of the rubber seeds will affect the oil content produced.

### b. Crushing of Rubber Seeds from Rubber Seed Flesh



**Figure 1. Crushing of Rubber Seeds from Rubber Seed Flesh**

Rubber seeds are broken down from the skin or rubber seed meat using a stone. Where researchers only take rubber seed meat for research. In this process researchers can be able to sort out wholesome rubber seeds and rubber seeds that are less good.

### c. Roasting



**Figure 2. Roasting Process**

The collected rubber seed meat will then be roasted at 85.5°C for 6 hours. This roasting aims to release the oil from the rubber seed meat.

## d. Drying and Sunning

**Figure 3. Drying and Sunning Process**

Drying is done to ensure that the rubber seed meat is completely dry and drying is carried out for 2 hours. Furthermore, the drying process continues under the sun or outdoors, the drying process is carried out until the rubber seed meat is crispy or easily destroyed during the mashing or crushing process. Drying is done so that the water content contained in the rubber seed meat is lost or reduced.

## e. Pounding and Smoothing

**Figure 4. Pounding and Smoothing**

Where rubber seeds that have been completely dried will be ground until they become powder and filtered like until they become powder.

## f. Boiling/Heating

**Figure 5. Boiling/Heating Process**

Where rubber seed powder is put into water (100 ml) which boils 100 degrees Celsius and then stirred until the oil lumps come out.

g. Oil Separation



**Figure 6. Oil Separation**

Next, the separation of oil lumps little by little is put in a container until it is finished.

h. Heating Oil for Oil Purification



**Figure 7. Heating Oil for Oil Purification Process**

After getting a lump of oil from the previous stage, it is heated again so that the oil becomes clear and clean.

### 3. RESULTS AND DISCUSSION

#### 3.1. Research Results



**Figure 8. Rubber Seed Oil Yield**

a. Oil Content

Rubber seeds consist of 40-50% hard brown skin, and 50-60% yellowish white kernel. Rubber seed kernels consist of 45.63% oil, 2.71% ash, 3.71% water, 22.17% protein and 24.21% carbohydrate, so rubber seeds have the potential to be used as a source of oil. The large water content in rubber seeds triggers the hydrolysis of triglycerides into fatty acids. So rubber seeds are dried and pressed for oil (Ikwuagwu et al., 2000). The fatty acid composition of rubber seed oil can be seen in Table 1.

**Table 1. Fatty Acid Composition of Rubber Seed Oil**

Composition	Percentage (%-b)
Palmitic acid	13,11
Stearic acid	12,66
Arachidic acid	0,54
Oleic acid	39,45
Linoleic acid	33,12
Other fatty acids	1,12

Source: Setyawardani et al (2013).

Oleic, linoleic and linolenic acids are very beneficial for health, as a source of omega 3, 6 and 9 fatty acids, while palmitic and stearic acids have the potential to be used as good quality biodiesel fuel. Fatty acids in rubber seeds can be obtained by hydrolysis of the oil (Setyawardani et al., 2013). In general, oil is composed of three fatty acid molecules combined with one molecule of glycerin, so it is often called a triglyceride. A triglyceride can contain only one kind of fatty acid or two to three kinds of fatty acids. Oil can be derived from animals and plants, oil taken from plants is called vegetable oil.

Ripe rubber seeds consist of 70% fruit skin and 30% rubber seeds. Rubber seeds consist of  $\pm$  40% shell and 60% shell pulp, where the variation in the proportion of shell and pulp depends on the freshness of the seeds. Fresh rubber seeds have high oil content and low water content. However, rubber seeds that are stored for too long will contain high water content, resulting in poor quality oil. Fresh seeds consist of 34.1% skin, 41.2% content and 24.4% water, while rubber seeds that have been dried in the sun for two days consist of 41.6% skin, 8% water, 15.3% oil and 35.1% dry matter. Rubber seeds contain 40% to 50% oil consisting of 17% to 22% saturated fatty acids and 77% to 82%

unsaturated fatty acids (Swern, 1964). The quality of oil derived from seeds, especially rubber seeds, is influenced by several factors, namely (Larrañaga et al., 2016):

- 1) Quality and purity of raw materials. The presence of foreign materials or poor quality seeds mixed in the raw materials in the process will cause the oil to deteriorate quickly and smell.
- 2) Seed age. Rubber seeds that are old enough will produce oil that is better in quantity and quality than younger rubber seeds.
- 3) Moisture content contained in rubber seeds. Rubber seeds that are stored for too long will contain high water content, so they can produce oil with poor quality.
- 4) Treatment of raw materials during processing and post-processing (for example: the fineness of the chopping results, the selection of solvents, the storage of processed oil, and so on).

#### 4. CONCLUSION

Rubber seed oil (*Hevea brasiliensis*) is a type of drying oil with significant fatty acid content, including oleic, linoleic, and linolenic acids, which are beneficial to health as a source of omega 3, 6, and 9 fatty acids. The rubber seed oil production process involves collecting, separating, and heating rubber seeds to produce an oil deposit which is then reheated to obtain clear oil. This oil contains about 45-50% oil with a composition of 17-22% saturated fatty acids and 77-82% unsaturated fatty acids. The chemical composition of rubber seeds consists of 45.63% oil, 2.71% ash, 3.71% water, 22.17% protein, and 24.21% carbohydrate, indicating the potential of rubber seeds as a valuable source of vegetable oil. Saturated fatty acids such as palmitic and stearic acids in rubber seed oil have the potential to be used as a good quality biodiesel fuel.

The quality of rubber seed oil is influenced by several factors, including the quality and purity of the raw materials, the age of the seeds, the moisture content in the seeds, and the treatment of the raw materials during the production process. Fresh rubber seeds with high oil content produce better quality oil, while seeds that are stored for too long can produce poor quality oil. Proper treatment during processing and post-processing also plays an important role in determining the final quality of rubber seed oil. Overall, rubber seeds have great potential as a source of edible oil that is beneficial for both health and industrial purposes, but require proper handling to ensure the quality and quantity of the oil produced.

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