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Analysis of the Results of the Reduction of Cyanide Acid Content in *Hevea brasiliensis* Seeds

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Abstract

Rubber seeds (*Hevea brasiliens*is) are part of rubber plants that have not been utilized optimaly. The content contained in rubber seeds is sufficient, including fat content of 68.53 g/100 g, proteins 17.41 g/100 g, and carbohydratees 6.99 g/100 g. However, the obstacle faced is the presence of toxic compounds found in rubber seeds namely cyanide acid (HCN) which is very dangerous if it enters the body. The purpose of this study is to find out the right treatment to reduce the content of cyanide acid so that the rubber seeds can be utilized. The research method uses experimental comparative. The variation used in the reduction process is to soak the rubber seeds respectively for 12, 24, and 36 hours by replacing the immersion water once every 2 hours, then boil the rubber seeds into 2 liters of water for 2 hours by replacing the boiled water for 1 hour. The results showed that the greatest decrease in cyanide acid content occurred during soaking for 36 hours with boiling for 2 hours.

Keywords: reduction, cyanide acid, rubber seeds

1. Introduction

Indonesia is one of the largest rubber producing countries in the world, with plantations reaching 3.43 million hectares (ha). Based on data obtained from the Indonesian plantation statistics body in 2017 the island that has the highest land area and rubber production in Indonesia is the island of Sumatra, precisely in the province of South Sumatra with an area of 845,167 hectares (ha) with a production yield of 1,344 kg / ha.

Utilization of rubber plants is still limited to the collection of latex (latex) contained in the rubber stem organ, while other parts of the rubber plant cannot be utilized optimally. Rubber seed is one part of a rubber plant that can be utilized.

So far the use of rubber seeds is limited to the use of generative seeds as a substitute for

old rubber plants. Whereas in 1 ha of rubber plantations can produce a minimum of 5000 rubber seeds (Indrawan, 2013) while the rubber seeds that are used as generative seeds are only about 20% according to Rifai, et al (2015). Apart from that the rubber seeds are wasted.

Rubber seeds have a high nutritional content, especially carbohydrates, proteins and fats that can be used as food (Eka et al, 2010). According to Setyawardhani, et al (2011) rubber seed meat per 100 grams contains carbohydrates by 15.9%, protein 27%, fat 32.3%, and ash by 3.96%. In addition (Murni et al. 2008) suggested that rubber seeds contain 21% protein, but has the disadvantage of containing 330mg / 100 g HCN and other substances such as saponins, trypsin inhibitors, pythate, and tannins.

Utilization of rubber seeds has not been able to be carried out to the fullest even though it is known that rubber seeds have a content that is good enough to be utilized, this is because rubber seeds have a substance that is poisonous and dangerous when consumed, the substance is commonly known as cyanide acid (HCN). HCN content in rubber is 330mg / 100g (Murni et al, 2008).

Cyanide acid is a substance that when consumed or enters the body can cause symptoms of poisoning, including headaches, nausea and vomiting, even in serious cases that can cause death (Setyawardhani et al, 2013). Cyanide acid levels that can be tolerated by the body do not exceed 1 mg per kilogram of body weight per day (National Center for Poisoning Information BPOM, 2010). Therefore we need a technique to reduce HCN levels in rubber seeds to make it safer to use and consume.

Previous research on the technique of reducing HCN or reducing HCN content in kater seeds was done by Ningsih et al. (2015), soaking rubber seeds with the addition of activated charcoal and NaCl, then by Yatno et al. (2015), by steaming rubber seed flour, as well as research conducted by Syamsunarno and Sunarno (2014), i.e. by means of rubber seed meat marinated in salt water at a dose of 10 g / 100 ml of water for 12 hours and followed by boiling open for 30 minutes.

The content of HCN has water soluble properties. This of course can be the basis for reducing or reducing the HCN content in rubber seeds with treatments such as immersion in running water, drying, boiling and other treatments. In this research, the reduction technique is carried out in a simpler way that is a combination of soaking and boiling with a certain time. From some of these treatments, it is expected that the HCN content contained in the rubber seeds can decrease so that the rubber seeds can be utilized optimally.

2. Experiments Procedure

The initial stage of the research is to choose rubber seeds that are still good, rubber seeds that are still good are seeds whose flesh is white and filled. The next step is to separate the rubber seed meat from the shell by splitting it using a hammer. The next step is to reduce the level of HCN content in rubber seeds.

At the reduction stage in this study conducted with 2 cycles. The first cycle is to use 3 variations of the experiment, among others: P1 is a rubber seed that is soaked for 12 hours by replacing the water every 2 hours then boiling in 2 liters of water for 2 hours with a 1 hour water replacement. While the reduction process at P2 and P3 is also carried out with the same process, but the variation of the immersion is done for 24 and 36 hours. While in the second cycle stage, each rubber seed P1, P2 and P3 after the first cycle was washed and then soaked for 5 hours and boiled again for 1 hour.

After the reduction process of the first cycle and the second cycle has been completed, each rubber seed is washed and then ready for drying.

3. Results and Discussion

Rubber seeds used for research are expected to be utilized after a process of reduction of cyanide acid content by two methods, namely immersion and boiling. The results of the analysis of cyanide acid reduction in rubber seeds can be seen in Tables 1 and 2.

Table 1. Results of stage 1 cyanide reduction

No	Test Sample	Treat HCN reduction	HCN reduction results
1	Dried Seed (P_1)	Soaking 12 hours, boiling 2 hours	The water is dark and murky
2	Dried Seed (P_2)	Soaking 24 hours, boiling 2 hours	The water is dark and murky
3	Dried Seed (P_3)	Soaking 36 hours, boiling 2 hours	The water is dark and murky

Table 2. Results of stage 2 cyanide reduction

No	Test Sample	Treat HCN reduction	HCN reduction results
1	Dried Seed (P_1)	Soaking 12 hours, boiling 2 hours	Brownish water
2	Dried Seed (P_2)	Soaking 24 hours, boiling 2 hours	Light colored water
3	Dried Seed (P_3)	Soaking 36 hours, boiling 2 hours	Bright colored water

The results of the analysis of cyanide acid content (HCN) showed that the process of reduction through immersion and boiling can reduce HCN levels in rubber seeds. In the first cycle, soaking for 12 hours and boiling for 2 hours found that the water produced was dark and turbid. While the results of reduction with soaking for 24 and 36 hours also showed almost the same results, namely dark and murky water. However, the reduction cycle of the second cycle on immersion for 5 hours with boiling for 1 hour only produced significant results shown by the change in color of the water to be brighter.

HCN reduction in rubber seeds is caused by the HCN hydrolysis process that occurs through a process of soaking and boiling. Immersion carried out for 24 hours with periodic water replacement every 2 hours aims to remove the turbid immersion water and eliminate the pungent aroma. Turbid color and sharp aroma in the rubber seed soaking water is HCN dissolved in water. This is because HCN which has physical properties is easily dissolved in water (Cereda and Mattos, 1996). Based on this opinion, it can be seen that the more turbid water produced by the reduction process, the greater the content of HCN dissolved in water immersion.

The duration of the soaking and boiling process has an influence on HCN levels in rubber seeds. Jamarun and Herawati (2001) suggested that the higher the temperature and the longer the heating time the more the decrease in HCN content in rubber seeds. Based on the results of phase 2 reduction it is known that the longer the immersion time the water produced is getting brighter. So in the process of soaking for 36 hours and boiling for 2 hours can reduce the content of cyanide acid (HCN) the best.

4. Conclusions

Based on the results of this study concluded that boiling and soaking on rubber seeds can reduce HCN content. The most optimal result of reducing HCN content in this study was when it was soaking for 36 hours with boiling for 2 hours.

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