CHAPTER I

INTRODUCTION

1.1. Background of Research

Indonesia was the second largest producer of seaweed carrageenan in the world after Philipines (Parenrengi & Sulaeman, 2007). Seaweed processing industry needs to be developed considering the potential of seaweed in Indonesia is quite large. The potential land or waters that are suitable for cultivation reached 2.1 million hectares (Putri, et al., 2015). Production volume of fisheries cultivation of seaweed was 1,944,800 tons or 55.07% of total fisheries product. The production was ranked first in total fisheries production of fish, shrimp and other commodities (Hamid & Kamisi, 2011).

Seaweed is one of the aquaculture commodities which is currently promoted by the government to increase foreign exchange. Generally, the diversity of seaweed species in Indonesian waters has been widely used by coastal communities as food and traditional medicine but did not contribute much to their economy. This is because the seaweed is less processed into products that have more value such as agar-agar, carrageenan and alginate, which more than 80% of local needs are still obtained from imports (Rosalita, et al., 2018).

Seaweed jelly is a product with a chewy texture. This texture is formed due to the presence of gel, which is gelatin added to the manufacturing process. Gelatin with its extensive use in the food and pharmaceutical industries has always been a becoming pivotal issue. Gelatin production in the world reaches 326,000 tons/year in detail. The production of gelatin that comes from pork skin is the highest (46%), followed by cows skin (29.4%), beef bone (23.1%) and other sources (1.5%) (Suptijah, et al., 2013).

Islam emphasizes the Moslem to earnestly pay attention to the foods and beverages that will be consumed. In addition to good quality, food must also be of the halal type. The use of gelatin in seaweed jelly still raises

concerns about its halal status, because of the possibility of using animal gelatin which is forbidden as a pork skin in the process of making jelly (Rismandari, et al., 2017). In a hadith, the Prophet Muhammad. said:

إِنَّ الْحَلَالَ بَيِّنٌ وَإِنَّ الْحَرَامَ بَيِّنٌ وَبَيْنَهُمَا أُمُورٌ مُشْتَبِهَاتٌ لَا يَعْلَمُهُنَّ كَثِيرٌ مِنْ النَّاسِ فَمَنْ اتَّقَى الشُّبُهَاتِ فَقَدْ اسْتَبْرَأَ لِدِينِهِ وَعِرْضِهِ وَمَنْ وَقَعَ فِي الشُّبُهَاتِ وَقَعَ فِي الْحَرَامِ كَالرَّاعِي يَرْعَى حَوْلَ الْحِمَى يُوشِكُ أَنْ يَرْتَعَ فِيهِ أَلَا وَإِنَّ لِكُلِّ مَلِكٍ حِمًى أَلَا وَإِنَّ حِمَى اللَّهِ مَحَارِمُهُ أَلَا وَإِنَّ فِي الْجَسَدِ مُضْغَةً إِذَا صَلَحَتْ صَلَحَ الْجَسَدُ كُلُّهُ وَإِذَا فَسَدَتْ فَسَدَ الْجَسَدُ كُلُّهُ أَلَا وَهِيَ الْقَلْبُ».

> Meaning: *"That which is lawful is clear and that which is unlawful is clear, and between the two of them are doubtful matters about which many people do not know. Thus he who avoids doubtful matters clears himself in regard to his religion and his honour, but he who falls into doubtful matters [eventually] falls into that which is unlawful, like the shepherd who pastures around a sanctuary, all but grazing therein. Truly every king has a sanctuary, and truly Allah's sanctuary is His prohibitions. Truly in the body, there is a morsel of flesh, which, if it is whole, all the body is whole, and which, if it is diseased, all of [the body] is diseased. Truly, it is the heart."* [Bukhari & Muslim]

Seaweed jelly is made with a method of boiling for quite a long time, the boiling process aims to inactivate the enzyme and reduce the number of microbes. In the other hand, this process can also affect the levels of fibre and vitamin C in seaweed. Vitamin C is easily degraded, either by temperature, light and surrounding air (Rahayu & Pribadi, 2012). Boiling seaweed with a temperature of 90^{O}C for 5 minutes, is known to reduce total dietary fibre by 3.8%, soluble food fibres by 5.0%, crude fibre by 0.85% (Chrystiawan, 2015). It also reduce levels of vitamin A 64.87%, vitamin B1 was 65.38% and vitamin E was 4.75% (Luthfiyah, 2015).

The anatomy of citrus fruit is consist of pulps, fruit peel and seeds. The part of citrus widely used is the fruit pulps, while the peel of this fruit is neglected and becomes waste. The production of pomelo in Indonesia

reaches 511 ton/ year, this production produced the amount of pomelo peel of 208 ton. During these, almost 50% of the pomelo peel has not been fully utilized, the amount of pomelo peel that is underutilized requires an effort to use it. Thus, it is necessary to handle pomelo peel waste which can later be utilized as a food ingredient, especially utilizing the compounds contained in pomelo peel which can be antioxidant (Rafsanjani, et al., 2015).

Pomelo albedo contains vitamin C and pectin quite high compared to other types of citrus. Pectin in the pomelo albedo has the ability to form a gel. The ability of gel formation from pectin due to acid addition and the heating treatment which help in forming elasticity in the resulting products (Octaviana, et al., 2013).

Seaweed jelly in this study is made from seaweed substituted with pomelo albedo as a source of pectin to replace gelatin which commonly used as a gel-forming material, the main source of concern about jelly halal status as an effort to provide the tranquillity of consumers in consuming jelly. The substitution of seaweed jelly with pomelo albedo is also expected to increase the nutritional value of the production of jelly so that foods with high nutritional value are obtained. Jelly with the substitution of pomelo albedo is also made as an alternative business of food products to increase the economic value of seaweed and pomelo albedo that can be made in home-level production and in this experiment will be analyzed dietary fibre, vitamin C and texture property of the product.

1.2. Formulation of Research Problems

Based on the background stated, the problem can be formulated as follows:

a. Does the addition of pomelo albedo (*Citrus maxima*) affect the level of dietary fibre in seaweed jelly (*Eucheuma cottonii*)?
b. Does the addition of pomelo albedo (*Citrus maxima*) affect the level of vitamin C in seaweed jelly (*Eucheuma cottonii*)?
c. Does the addition of pomelo albedo (*Citrus maxima*) affect the level of texture property in seaweed jelly (*Eucheuma cottonii*)?

1.3. Objective of Research

1.3.1. General Objective

The general objective of this study was to analyze dietary fibre content, vitamin C and the texture property of seaweed jelly (*Eucheuma cottonii*) with pomelo albedo (*Citrus maxima*) substitution.

1.3.2. Specific Objective

The specific objective of this research is:

a. To analyze the levels of dietary fibre in seaweed jelly (*Eucheuma cottonii*) with pomelo albedo (*Citrus maxima*) substitution.
b. To analyze the levels of vitamin C in seaweed jelly (*Eucheuma cottonii*) with pomelo albedo (*Citrus maxima*) substitution.
c. To analyze the texture property of seaweed jelly (*Eucheuma cottonii*) with pomelo albedo (*Citrus maxima*) substitution.

1.4. Benefits of Research

1.4.1. Benefits For Society

This research is expected to contribute for people to increase their knowledge about the variation in the processing of seaweed and pomelo albedo into jelly as a food with a high nutritional and economic value.

1.4.2. Benefits For Institutions

The results of this research are expected to contribute knowledge about the variation in the processing of seaweed and analysis of dietary fibre, vitamin C and texture property of seaweed jelly (*Eucheuma cottonii*) with pomelo albedo (*Citrus maxima*) substitution.

1.4.3. Benefits For Researchers

This research is expected to provide additional insight or information and experience for a researcher in the variation of seaweed processing and analysis of dietary fibre, vitamin C and texture property

of seaweed jelly (*Eucheuma cottonii*) with pomelo albedo substitutions (*Citrus maxima*).

1.5. Authenticity and Formers Research

Research that discussed the variation of seaweed jelly with the substitution of pomelo albedo is still not available. Previous research was a study that discusses the manufacture of seaweed jelly or jelly pomelo albedo separately. This research is a compliment and previous research continuation listed in *Table 1* :

Table 1. Authenticity and Formers Research

No	Title	Variable and design	Result	Difference
1	The effect of immersion with orange acid and rice water to organoleptic quality of seaweed pudding (*Eucheuma cottonii*) (Rosalita, Husain Syam, & Ratnawaty Fadhilah. 2018).	Dependent variable: Organoleptic quality of seaweed pudding. Independent variable: moisture content, ammonia, proteins, carbohydrates, and ash levels content contained in seaweed pudding. Design: Randomized Complete Design (RAL).	The colour, taste, aroma, texture most preferred by panellists with was long immersion 36 hours, with the value of each of the colour of 5.56%, 5.59% aroma, flavour 5.56% and texture 5.86%. Treatment was long immersion 36 hours with orange acid has ammonia content 0.003%, water content 84.4%, protein content 0.111%, carbohydrate content 13.063% and ash content 9.62%.	The research only uses seaweed to make jelly without substitution with other ingredients and this study is using seaweed jelly with a substitution of pomelo albedo. The independent variable does not discuss texture, micronutrients and fibre but this study discusses fibre content, vitamin c content and the texture of the seaweed jelly with pomelo albedo substitution.

No	Title	Variable and design	Result	Difference
2	Quality of Grapefruit Albedo (*Citrus grandis L. Osbeck*) and Roselle (*Hibiscus sabdariffa* L.) Jelly Candies with the Addition of Sorbitol (Putri Octaviana, Ekawati Purwijantiningsih & Sinung Pranata. 2013).	Dependent variable: jelly candy quality from *citrus grandis* albedo. Independent variable: proximate test, texture test, microbiological test and organoleptic test. Design: Randomized Complete Design (RAL).	The results obtained in this study is a product of roselle-orange albedo jelly candy made with a water content of 6.25%-6.84%, ash content 0.14% - 0.16%, reducing sugar content 21.17% - 23.65%, vitamin C 2.4053 – 3.4907 mg, texture 516.00 N / mm2 - 719.83 N / mm2, as well as microbiological tests which include calculation of numbers total plate (ALT) and yeast mold numbers that have met the SNI jelly candy standard. 120:80 combination provides the best quality in terms of chemical and organoleptic properties.	The research only uses a citrus albedo jelly and rosella without substitution with seaweed and this study is using seaweed jelly with a substitution of pomelo albedo. There is no treatment to remove the bitter taste of albedo in the formulation but this study is trying to remove the bitter taste. The variable does not discuss micronutrients and fibre and for this study is to discuss fibre content, vitamin c content and the texture of the seaweed jelly

3	The Influence Of Different Types Of Sugar Against The Quality Of Seaweed Jelly Candy (*Eucheuma cottonii*) (Marwita Sari Putri, Retty Ninsix & Aulia Gustina Sari. 2015).	Dependent variable: Effect of different types of sugar against the quality of seaweed jelly candy. Independent variable: Reduced sugar levels, water content, microbial total test, and organoleptic test. Design: Randomized Complete Design (RAL).	The best type of sugar in making seaweed jelly candy (*Eucheuma cottonii*) type sucrose sugar with a sweet and slight taste acidity, and clear pink and texture that is elastic and elastic with moisture content and sugar content high reduction and the number of microbes during storage of room t emperature doesnot exceed the specified SNI (2008) of a maximum of 5 × 104 cells/gram.	The research is using different types of sugar and this study just using the best type of sugar from the result. The research only uses a seaweed without substitution with other ingredients and this study is using seaweed jelly with a pomelo albedo substitution. The independent variable does not discuss micronutrients and fibre and for this study is to discuss fibre content, vitamin c content and the texture of the seaweed jelly.

4	The Chemical and Organoleptic Properties of Seaweed Jelly Candy (Angcivioletta Moniharapon. 2016).	Dependent variable: Chemical and organoleptic properties of seaweed jelly candy. Independent variable: Moisture content, ash content, reduced-sugar, sucrose content and heavy metals test. Design: Descriptive method.	The chemical properties of seaweed jelly candy that is treated with and without gelatin produce seaweed jelly candy that not meets the SNI standards of jelly candy.	The research only uses a seaweed without substitution with other ingredients and this study is using seaweed jelly with a pomelo albedo substitution. The variable does not discuss micronutrients and fibre and for this study is to discuss fibre content, vitamin c content and the texture of the seaweed jelly. The design used in this study is a descriptive method but this study id using the experimental method.