

CHAPTER II

LITERATURE RIVIEW

2.1 Ingredients Review

2.1.1 Lotus Seeds

Lotus seed is one of the lotus parts of the lotus plant which has many benefits and has widely used as substitute for rice as a source of carbohydrates. This plant has many health benefits, because the leaves, flowers, seeds, and roots of this plant contain antioxidants that are equivalent to vitamin C, which can ward off free radicals.



Figure 1. Lotus Seed

Lotus seed contains lots of vitamins and nutrients needed by the body, not only macronutrients, but also contain most minerals such as phosphorus, calcium, magnesium, iron, and several other vitamins). Not only does it contain amino acids and unsaturated fats, but lotus seeds also contain polysaccharides, superoxide dismutase (SOD), and polyphenols.

The calorie content in lotus seed is also lower than number calories in soybeans. In 100g of lotus seeds, there is around 211,18 kcal, in soybean, there is 471 kcal (fatsecret.co.id). This can also make one

of the advantages of lotus seeds as a substitute for soybean in making tempeh. The finished tempeh is also similar because the texture of soybeans, it is just that using lotus seeds has a distinctive smell when the tempeh is made.

2.1.2 Mocaf Flour

Cassava is a sweet potato that is easy to find in markets. The price of cassava is also relatively affordable. In ancient times, sweet potatoes were a substitute for rice as a staple food. Along with the development of the times and the increase the knowledge, cassava, which was previously only processed by steaming or frying, can now be made into flour. Mocaf flour is usually used as a substitute for wheat flour and is suitable for consumption by people who avoid gluten-containing foods.



Figure 2. Mocaf Flour

This mocaf flour seems to be different from cassava flour in general. One of the different is that the process of making cassava flour does not go through a fermentation process, whereas to make mocaf flour, cassava is first fermented using the principle of modifying cassava cells using lactic acid bacteria (Amanda, 2021). Cassava fermentation aims to change its characteristic by increasing viscosity, gelation ability, hydration power, and solubility. The protein content in mocaf flour is also lower than that in ordinary cassava flour (Amanda, 2021). Storage of finished mocaf flour can last more than 12 months.

Mocaf flour has a relatively higher fiber and mineral (calcium) content than rice and wheat. Mocaf flour is also has lower calories compared to wheat flour. Mocaf flour is also an alternative for people who avoid gluten because mocaf flour is gluten-free. The protein content in mocaf flour is lower than that in mocaf flour, and the carbohydrate content is higher than in wheat in flour (Amanda, 2021).

2.2 Product Review

2.2.1 Crackers

Crackers are one of the delicious snacks that can be taken anywhere while enjoying them, the crunchy and sweet taste makes people need more than just one or two slices. Nowadays, many types of flavor variations are used in making crackers. Crackers are a snack suitable for all ages, from children to the elderly, but unfortunately, most of the crackers sold in the market tend to be high in sugar and low in nutrients such as calcium and protein content.



Figure 3. Stick Crackers

Gluten-free crackers are one of the most popular snacks on the market, but the high sugar and low protein content are a problem.

Tempeh stick crackers, is a healthy snack made with the essential ingredients of tempeh and mocaflour, is a snack that can be a good choice. Not only is it a gluten-free snack, but the protein content in these crackers is also relatively high because it uses a vegetable protein source in the form of tempeh.

2.2.2 Tempeh

Tempeh is one of the original fermented foods from Indonesia. Most tempeh usually made from soybean seed which are soaked overnight, cleaned, and boiled. Tempeh takes less than 48 hours to solidify, formed by the molds *Rhizopus oligosporus* and *Rhizopus oryzae*. Later, the fungus or mold will turn into hyphae. Hyphae are fine threads that make tempeh solid and white (Septi Laila, Tara Puri, 2022). Tempeh uses lotus seeds, one of the innovations in making tempeh. The high antioxidant content make lotus seeds one of the best choices for making tempeh replaced soybeans seeds. Tempeh made from lotus seeds also has a fragrance similar to that of tape (fermented cassava that has been steamed) and is different from the smell the tempeh in general. The taste of lotus seed tempeh itself is similar to tempeh. The process of making tempeh in general, except that in the process of making this tempeh, the rice flour, which is usually used as a mixture of tempeh yeast, is replaced with mocaflour, the aim is to ensure that tempeh produced remains in the category gluten-free food.

2.2.3 Gluten free

Gluten-free food is a food is declared free of gluten protein content. Many gluten-free products are the target of Indonesian people. Gluten-free is a protein contained in starch which is usually included in wheat flour (Rayesa, 2022). Gluten-free foods have great potential because they are one of the healthiest foods. Gluten-free food does not use wheat or sereal-based ingredients at all and instead uses local raw materials such as tubers and sorghum (Rayesa, 2022).

2.3 Process Review

2.3.1 Tempeh Fermentation

The process of making lotus seed tempeh from start to finish the product takes about three days. The first step in the tempeh-making process is soaking, where the dried lotus seeds are soaked overnight or for at least 10 hours. The purpose of the soaking is the formation of organic acids such as lactic acid and acetic acid (Septi Laila and Tara Puri, 2020).

After going through the soaking process, the lotus seeds will expand and be easier to divide into two parts. The next process is where the inside of the lotus seeds must be removed because it will make the tempeh bitter. Wash the lotus seeds until the water looks clean. The following process is boiling, which kills bacteria that can cause tempeh to rot when fermented. The method of boiling lotus seeds is about 30 minutes until its soft, then they are roughly chopped to maximize the fermentation process. Then let the lotus seeds cool and also dry. Mix mocaf flour with tempeh yeast in a 1:1 ratio, the sprinkle evenly over all parts of the lotus seeds. Lotus seed that have been perfectly covered will be wrapped in plastic, pierces using a toothpick, and stored in a secure place for less than 48 hours. The fungus *Rhizopus oryzae* work at 0-12 hours and is optimal at 12 hours. Meanwhile, the fungus *Rhizopus oligosporus* works from 12-24 hours (Septi Laila, Tara Puri, 2020).

2.3.2 Crackers Process

Making crackers from lotus seed tempeh is to mash the tempeh using a chopper and add the milk according to the measure, then add the all dry ingredients in the form of mocaf flour, salt, palm sugar, and baking soda then stir using a spatula until it blended. Lastly, add butter, stir until evenly distributed, and put it in the piping bag. Use a syringe so the dough can be shaped like a stick. Bake the dough using 200°C for 20-30 minutes. While waiting for the dough, melt the dark chocolate using bain-marie