CHAPTER II

LITERATURE REVIEW

2.1 Ingredients Review

2.1.1 Pumpkin

Pumpkin is a woody shrub and belong in the *Cucurbitaeceae* family. Pumpkin has high nutritional value, it contains vitamin C, vitamin K, vitamin B3, and fiber. It is also rich of beta-carotene that is obtained in the yellow color of the fruits and functions as provitamin-A which is good for eyes, growth, and maintenance for body tissue (Halimah & Rahmawati, 2021).

a Labu parang | b Butternut | c Kabocha

Figure 2.1 Three pumpkin variety

There are the three yellow pumpkin *(Cucurbita sp)* variety, labu parang, butternut, and kabocha. The three variety have different characteristics. Labu parang is large, weigh around 4-5 kilograms, has a green hard skin, and thick orange yellowish fruit flesh (Sudarman & Meiranty, 2018). Butternut or also known in Indonesia as labu madu, it grows on a creeper, has a orange brown skin, long oval shape with many grooves (Ariyanti & Suminar, 2021). Kabocha is a Japanese term for pumpkin, it has a similar physical appearance as labu parang, the difference is kabocha has a orange

flesh and smaller in size. Kabocha also commonly known as golden parang because of its striking colour (Lestari, 2019). The price range for three of pumpkin variety is quite different. Based on market and e-commerce, Kabocha have the highest price for Rp. 25.000 / kg, followed by Butternut Rp. 18.500 / kg, and labu parang Rp. 12.000 / kg. Labu parang have the cheapest price per kilograms among the three variety, this can be an advantage in terms of economy.

Making pumpkin as flour will certainly go through a process that can reduce the value in the fresh pumpkin fruits. Madiah *et al,* have researched Proximate Composition of Three Varieties of Pumpkin Flour (*Cucurbita Sp*) and get a result as listed below

Table 2. 1 Proximate Composition of Three Varieties of Pumpkin Flour (Cucurbita sp)

Parameters (unit)	Parang	Butternut	Kabocha
Water content (%)	14.18	13.28	11.02
Ash content (%)	8.05	8.88	10.04
Fat content (%)	4.51	1.55	1.58
Protein content (%)	11.56	7.32	14.74
Carbohydrate content (%)	61.71	68.97	62.62
Energy (kcal / 100 g)	333.64	319.12	323.61

Source : (Madiah *et al.,* 2020)

From the Table 2.1, labu parang is high in water content, fat content, and energy, butternut is high in carbohydrate content, kabocha is high in ash content and protein content. It can be seen that labu parang and butternut proximate composition is not much different, and labu parang protein content is higher by 4.24% than butternut.

By the research above, labu parang is chosen to be made into flour among the three pumpkin variety because of the cheapest price that is good in terms of economy and the second high in protein.

Pumpkin flour is a pumpkin fruit flesh that is dried and grounded until it become powder. Processing pumpkin as a flour has many advantages such as a flexible material for the food industry, longer shelf life due to the lower water content, can be used as a source for carbohydrate, vitamin, and protein (Dharmapadni *et al*, 2016).

2.1.2 Mocaf (Modified Cassava Flour)

Mocaf or Modified Cassava Flour is a cassava flour that is modified using fermentation that involve bacteria and fungi. The bacteria that usually used is Lactic Acid Bacteria (LAB) species Lactobacillus Plantarum. The fermentation process last for 32-74 hours, resulting an increase in the protein content of mocaf flour (Asmoro, 2021). Mocaf flour is rich in fiber and carbohydrate that makes it possible to replace wheat flour. Nutritional value per 100 g mocaf contains 350 kcal energy, 1.20 g protein, 0.60 g fat, 6 g fiber, 85 g carbohydrate.

2.2 Product Review

The reason in making this brownies product is to reduce the use of imported wheat flour and replace it with local ingredients in Indonesia. The reason of using pumpkin flour is because of the nutrition that rich in beta-carotene, carbohydrate, protein, and vitamin. Besides, also because of the abundant production of pumpkin in Indonesia, while the consumption is still very low (Ghifarie & Rahmawati, 2022). Mocaf flour have a high nutritional value, high in carbohydrate and can replace the use of wheat flour (Ihromi *et al*, 2018). This product does not contain gluten, this is become one of the advantages of the product because people who have gluten allergy and coeliac disease can enjoy it. Apart from that, using substitution of pumpkin flour and mocaf combination makes this brownies high in carbohydrates and

fiber. The lack of this product is it has a slight smell and taste of pumpkin flour.

2.3 Process Review

In making fresh pumpkin fruit into flour, it goes through a drying process. The purpose of drying is to reduce the water content to inhibit microbial growth and unwanted reactions. In the drying process, the nutrients in the pumpkin will definitely be reduced due to the heat exposure. Too high temperature can damage some of the vitamins contained inside the pumpkin. Therefore, it is necessary to maintain the right temperature. The commonly used process is usually using sun dry method where the fruits will be cut thinly and dried in open space using sun heat, but it take a lot of time around 5-7 days until it completely dry and depends on the weather. So to avoid the uncertain weather and to speed up the process, the pumpkin will be dried using sun dry and oven dry. Drying using oven must use the right temperature. Temperature that are too low will cause failure in drying which results in spoilage of the material. Meanwhile, temperature that are too high cause browning of the material due to caramelization. Dharmapadni *et al,* have researched the right temperature in drying pumpkin by conducting pumpkin drying experiments with four different temperatures (50˚, 60˚, 70˚, 80˚) using an oven for 12 hour and getting the result that the best temperature treatment is 60˚ with characteristic of yield 22.00%, moisture content 14,51%, ash content 5.79%, protein content 11.07%, fat content 1.19%, carbohydrate content 62.02%, beta-carotene content 2295,81µg/100g.