

CHAPTER 2

LITERATURE REVIEW

2.1 Ingredients Review

2.1.1 Kepok Banana



Figure 2.1 Kepok Banana Fruit

Banana (*Musa sp.*) is a widely grown and consumed tropical fruit. One of the major Asian producers of bananas is Indonesia. This is due to the fact that Indonesia produces 50% of the bananas consumed in Asia, and that production is growing annually (Immanuel *et al.*, 2021). According to data from the Directorate General of Horticulture and the Central Bureau of Statistics (2018), Indonesia produced up to 7 million tons of bananas in 2016, 7.16 million tons in 2017 and 7.26 million tons more in 2018. According to BPS statistics from 2018, East Java produces highest amount of banana which are 2,059,923 tons (Immanuel *et al.*, 2021).

Banana is one of the fruit that has high carbohydrates content and mostly consist of starch (Suloi, 2019). Banana (*Musa Sp.*) is classified into 2 major groups: banana and plantain. According to Marta *et al.* (2022),

“banana” is used to describe fruit that can be consumed directly, meanwhile “plantain” is used to describe starchy banana and need to be processed before consumed. Cultivars for “banana” are generally AA or AAA, meanwhile plantains are AAB, ABB, or BBB (Marta *et al.* 2022). According to Erniawati *et al.* (2021), kepok banana (*Musa Paradisiaca* fa. *typica*) cultivar is ABB and considered plantain because of the high starch content. Kepok banana used in this product can be seen in **Figure 2.1**.

The highest amount of starch in banana is when the banana is still raw. Unripe banana pulp has lower moisture level and higher carbohydrate content than ripe banana pulp (Marta *et al.*, 2022). Throughout the stages of development, the chemical composition of bananas changes: the starch content decreases and the sugar concentration rises (Marta *et al.*, 2022). Marta *et al.* (2019) stated that starch granules of Kapas cultivars are elongated shape, while granules of Kepok, Ambon, and Nangka cultivars are mostly round shape. Among other cultivars, Kepok flour and starch showed the highest whiteness and colour values (Marta *et al.*, 2019). The Kepok cultivar's low phenolic content is probably to cause of the highest whiteness value (Marta *et al.*, 2019). Kepok banana starch contains 6.83% moisture, 0.06% lipid, 1.01% protein, 82.69% total starch, and 40.88% amylose content (Marta *et al.*, 2019). Kepok banana has the highest amylose content than Kapas, Ambon, and Nangka (Marta *et al.*, 2019). High quantities of amylose make them a viable source alternative for producing resistant starch (Suloi 2019).

A portion of starch known as resistant starch can still be fermented by intestinal microflora even though it cannot be broken down by digestive enzymes (such as amylase) in the human small intestine (Nairfana *et al.* 2022). According to Suloi (2019) Kepok banana has a starch marinade of 22.01% and a resistant starch content of 27.70%. Kepok banana starch has

a greater resistant starch percentage than aracca starch (17.5%), cassava starch (1.8%), and taro starch (13.8%) (Marta *et al.* 2022). Native banana starch has a great resistance to hydrolysis by amylase, which results in a low glycemic index and benefits diabetes patients (Marta *et al.*, 2022). Bananas are among the foods that are easiest to digest and can help manage diabetes since they have a high starch content and a high amylose-to-amylopectin ratio. (Kaur *et al.* 2018).

2.1.2 Mackerel



Figure 2.2 Spanish Mackerel

Spanish mackerel (*scomberomorus commerson*) belongs in the *Scomberomorus* clan in the *Scombridae* tribe (Akbar, 2021). Spanish mackerel is categorized as pelagic fish and live in shallow waters with low salinity (Asri *et al.*, 2019). This giant pelagic fish loves to cluster, therefore its distribution in water is not equally (Nabilah, 2019). High-quality protein and micronutrients found in mackerel meat are particularly beneficial for growth and stamina (Akbar, 2021). Spanish mackerel has roughly 18% to 22% protein, 0.2% to 5% fat, less than 5% carbs, and 60% to 80% water (Kristanto, 2018). According to Kartika *et al.* (2019) Mackerel is one of the marine fish that are in high demand. The Ministry of Maritime Affairs and Fisheries noted that mackerel production in Indonesia reach 203,759.46 tons in 2021. Teggiri fish are widely distributed and can be found in all

Indonesian waters as well as those of the Indo-Pacific, the Bay of Bengal, the Gulf of Siam, the South China Sea, the hot waters of Australia, East Africa, and Japan (Nabilah, 2019). The meat of mackerel fish has a thicker texture, easier to find while it's fresh, and the aroma of the fish is still extremely strong. Spanish mackerel used in this product can be seen in **Figure 2.2**.

2.2 Product Review

Pempek is one of the traditional dish from Palembang, South Sumatra, Indonesia. Pempek is a fried fish-based snack that is generally served with cuko, diced cucumber, and noodle. Cuko is a dark pempek sauce made from brown sugar, tamarind, and vinegar as main ingredient. The flavor of cuko is sweet and sour. Cuko can also be made spicy by adding chili.

The primary components of pempek are mashed or crushed fish meat (belida, snakehead, mackerel, or snapper), tapioca flour, water, and seasonings to improve flavor. Then it's cooked via boiling, steaming, frying or baking (Kartika *et al.* 2019). Kartika *et al.* (2019) stated that there are 18 types of pempek and 9 types of derivative pempek. Type of pempek used in this product is pempek lenjer. Pempek Lenjer is a cylinder shape pempek with no filling. Variants and types of pempek can be seen in **Table 2.1**.

Table 2.1 Variants and Types of Pempek

Variants of Pempek	Types of Pempek
Big Pempek	Pempek Lenjer Pempek Kapal Selam
Small Pempek	Pempek Lenjer kecil Pempek Telur kecil Pempek Keriting Pempek Pistel Pempek Adaan Pempek Tahu Pempek Kulit
Pempek Dos (No fish)	Pempek Dos Lenjer Pempek Belah Pempek Dos Telur kecil Pempek Dos Pistel Pempek Dos with Shrimp Pempek Dos with Rice
Roast Pempek	Pempek Panggang Pempek Lenggang Otak-Otak
Derivative of Pempek	Rujak Mie Model Tekwan Laksan Celimpungan Fried Kemplang Roast Kemplang Kemplang Tunu

Starch that's commonly used for pempek are tapioca starch or sago starch. The function of starch in pempek is to add chewiness. This product is using starch extracted from raw kepok banana. Kepok banana starch has a greater resistant starch percentage than aracca starch (17.5%), cassava starch (1.8%), and taro starch (13.8%) (Marta *et al.* 2022). Marta *et al.* (2022) stated that Native banana starch has a great resistance to hydrolysis by amylase, which results in a low glycemic index and benefits diabetes patients.

2.3 Process Review

2.3.1 Isolating Starch and Drying Method for Making Kepok Banana Starch

Extraction process is needed to obtain starch from fruit. Raw kepok bananas are peeled and sliced. Then, add water with a ratio of banana and water 1:2. Then blend bananas and water with a blender until smooth. After that, filter the liquid using a filter cloth and squeeze the juice. Repeat this step until the residue is dry and the juice starts to run clear. Then precipitate the starch essence for 24 hours. After 24 hours, strain using a filter cloth and take the banana starch. Then spread the starch thinly on the tray and dry the starch in the sun to dry for 24 hours. Then chop the starch with a food processor and sieve with mesh 80. Then store it in airtight container.

There have been reported on a number of methods for isolating starch, including water, alkaline, and enzyme extraction (Harni *et al.*, 2022). Water-based starch extraction is an excellent and secure solvent for removing food components that is economical, safe, and environmentally acceptable (Harni *et al.*, 2022). Meanwhile alkaline extraction, NaOH solvents are utilized to provide purer extract results because NaOH is a powerful base that can degrade proteins (Harni *et al.*, 2022). Enzyme extraction is considered a green method that is safe for the environment and uses less energy (Harni *et al.*, 2022).

Drying method is used after the starch paste is contained. Drying can be done using a dehydrator at 60° C-70° C or use sun drying method. The disadvantage of sun drying method is the longer drying time compared to using a dehydrator. The goal of drying method is to reduce the moisture content (Phetpan *et al.*, 2019).

2.3.2 Boiling and Frying Method for Making Pempek

The process of making pempek begins with fileting and grinding the mackerel meat and garlic. Then the meat is mixed with water and egg until homogenized. Then add seasoning and mix to combine. Then add the starch and mix it carefully. Shape the pempek dough to make cylinder shape and boil the pempek. After boiling, fry the pempek until golden brown. To make cuko, prepare roast ebi, grind garlic and chili, and sliced brown sugar. Then boil all the ingredient and adjust the taste. After boiling, chill overnight in refrigerator to develop the flavor. Serve the pempek with cuko, diced cucumber, and noodle.