

CHAPTER 2 PRODUCT OVERVIEW

2.1 The Ingredients

2.1.1 Kecombrang



Figure 1. Kecombrang

Kecombrang (*Etilangira Elatior*) or often called honje is one kind of many plants from the Zingiberaceae family used in medicine ranging from rhizomes, fruits and flowers. The Kecombrang has been around for a long time traditionally used by the community in a variety of food preparations, as well as spice and flavor in food.

Making crackers with addition of kecombrang flowers is expected to increase the value of crackers nutrition such as protein and mineral. The essential oil contained in flowers kecombrang is expected to give a distinctive aroma to the resulting crackers, the color that is more interesting because of the presence of carotene and a better taste as well.

2.1.2 Corncobs



Figure 2. Corncobs

Corncobs are a very large amount of waste (Amin, 2016). Corncobs are obtained when the corn kernels are separated from the fruit so that corn seeds are obtained (Rohmiyatul, 2014 (as cited in Mirnawati., 2020). The nutritional content in corncobs includes water content of 29.54%, dry matter 70.45% and crude protein 2.67% and crude fiber 46.52% in 100 dry matters (BK) (Wardhani and Nurfaini, 2015 (as cited in Mirnawati., 2020).

Corncobs are hard textured, dull white in color, have a fairly light weight and usually have a sweet taste that is characteristic of corn which allows it to be used as corn flour. This modified corn flour from corncobs as a substitute for wheat flour into a food product. Corncobs is made from corncobs waste by adding microbes to improve the quality of the corn flour produced, such as adding bacteria belonging to the lactic acid group such as *Lactobacillus casei* (Gerez et al, 2006 (as cited in Mirnawati., 2020).

These corncobs will be modified by fermentation method using tape yeast. Modification of starch or flour has been widely carried out in research because it can improve its physical and chemical properties.

Modification of corn flour by spontaneous fermentation produces flour with a chemical composition close to wheat flour. Aini's 2009 study (as cited in Mirnawati., 2020), has also modified white corn grits using the spontaneous fermentation method to improve whiteness and increase water absorption capacity of modified flour.

2.1.3 Tape Yeast



Figure 3. Tape Yeast

Tape yeast is a starter used to make tape, in it contains microorganisms belonging to lactic acid bacteria such as *Lactobacillus casei* (Ganzle, 2008 (as cited in Amanah, Faizatul., 2022)). Production of lactic acid from the process fermentation of the bacterium *Lactobacillus casei* has advantages over yeast (Khasanah, 2014 (as cited in Mirnawati., 2020)). The resulting production has a high purity of about 97%. Making corn flour from corncobs waste with addition of starter yeast tape which serves to improve the quality of corn flour.

2.1.4 Tapioca Flour



Figure 4. Tapioca Flour

Tapioca is a starch that is extracted from cassava. Tapioca has high amylopectin levels, so products made with tapioca flour tends to have a crunchy texture, usually water soluble used as a filler and binder that produces a nice texture plastic, and compact in industry food like in dodol making.

Basic material the manufacture of crackers is starch with amylopectin content determine the strength of crackers. The higher the content amylopectin starch for crackers generated will have growing power large (Praptiningsih, et al., 2003 (as cited in Hakim, Luqmanul., 2020)).

Tapioca has the main content of starch which will affect the gelatinization process. The higher the starch in the dough, the higher the product development (Mulyana, et al., 2014 (as cited in Hakim, Luqmanul., 2020)). In addition, crackers made from tapioca flour will affect the texture of the crackers to be crispier (Despita et al., 2015 (as cited in Hakim, Luqmanul., 2020)). This flour is a low protein flour with the main content of carbohydrates, the nutritional content of tapioca flour per 100 grams is 362 cal, 0.59% protein, 3.39% fat, 12.9% water

and 6.99% carbohydrates. This flour also has several vitamins and minerals. Tapioca flour from cassava extract can be an alternative for people who are on a gluten-free diet and contain resistant starch which is good for health.

2.1.5 Garlic



Figure 5. Garlic

Garlic (*Allium sativum* L.) is a root vegetable which is widely grown in various countries in the world. Society in general only takes advantage of only part of the tuber, mainly only as a spice in the kitchen. The results of the research Experts point out that garlic has potential as a raw material medicine to cure various diseases.

Garlic contains several important nutrients and is low in calories. One raw garlic clove contains manganese, Vitamin C, selenium, and small amounts of fiber, calcium, copper, phosphorus, iron, Vitamin B1, Vitamin B6, and potassium which can treat colds, boost the immune system, lower blood pressure, and control blood sugar levels.

Garlic serves as a giver of aroma and flavor of onions in crackers (Purwanti's 2011 study (as cited in Marsigit, et al., 2017)). Garlic has antimicrobial, antithrombotic, hypolipidemic, antiarthritis, lipoglycemic, and antitumor properties. In addition, garlic can act as an antioxidant in the presence of sulfenic acid which is formed from the decomposition of

allicin contained in it (Anandika's 2011 study (as cited in Marsigit, et al., 2017).

2.1.6 Shallot



Figure 6. Shallot

Shallot (*Allium cepa* L.) is an annual plant like grass, have short stems, have fibrous roots, and have thick leaves long. Shallots are mostly grown for consumption as a spice cooking seasoning. Shallot contain flavonoids, polyphenols, and organosulfur compounds have strong antioxidant benefits that can prevent free radicals and anti-inflammatory that helps prevent diseases such as anti-inflammatory diabetes, anti-diarrhea, anti-allergy.

Shallots contain nutrients, such as vitamins, minerals, allicin, flavonoids, polyphenols, calories, fiber, protein, potassium, calcium, phosphorus, iron, niacin, and essential fatty acids. After being traced, it turns out that shallots are a source of vitamin A, vitamin B, vitamin C, and carbohydrates. Shallots are used in the seasoning for making kecombrang crackers as an added flavor.

2.1.7 Red Chili Pepper



Figure 7. Red Chili Pepper

Chili (*Capsicum annum* L) is one of the commodities vegetables that are widely cultivated by farmers in Indonesia because has a high selling price and has several health benefits, one of which is the substance capsaicin which functions in control cancer. In addition, the vitamin C content high enough in chili can meet the daily needs of every people, but should be consumed in moderation to avoid pain stomach. Red chili is used in making kecombrang crackers to add a spicy taste.

2.1.8 Salt



Figure 8. Salt

The addition of salt in food processing serves as a flavor enhancer. Salt can also increase the sweetness of sugar and reduce the sour taste of some types of acid. In making kecombrang crackers, salt serves to give a savory taste and to strengthen the taste of the resulting crackers.

Salt is one of the most important ingredients in food processing. Processed food will have a taste if it contains at least 0.3% salt and will taste bland if the amount of salt added is less than that. Salt added in making snacks serves as a flavor enhancer. In addition, salt acts as a product coating on the outside so that the effect of taste is quickly felt. Salt also functions as an excellent ingredient used for the distribution of micro-ingredients evenly from several components such as flavors, vitamins, and antioxidants. Where the results will be seen in the overall final product.

2.1.9 White Pepper



Figure 9. White Pepper

Pepper plants are plants that come from the piperaceae family. Pepper plants are plants that have stems woody, segmented and has the property of propagating using roots attached to climbing posts or creeping on the ground, pepper plants have taproot with single, alternate, and scattered leaves. Pepper leaves have an ovoid shape, and have round fruit, seeds hard, and soft skin.

Piperine It has many therapeutic benefits, including as a central nervous system depressant and anticonvulsant, anti-inflammatory, antiarthritic, antioxidants. Black pepper in making crackers adds aroma and taste.

Pepper is divided into 2 types, namely black pepper and black pepper and white pepper, the difference is only in the way it is made. Black pepper is processed from green or raw pepper through the drying process which had previously been cured. From the drying process will black pepper fruit is obtained. While White pepper is processed from peppers that are almost ripe, through a process of soaking, peeling the skin of the fruit and the drying process to obtain a pepper that is colored white.

2.1.10 Baking Powder



Figure 10. Baking Powder

Baking powder is baking soda mixed with one or two more acidic salts, such as monocalcium phosphate monohydrate, dicalcium dihydrate, sodium aluminum sulfate, or sodium aluminum phosphate (Wolke, 2005). Baking powder is a mixture of ingredients which when added to water and heated will produce carbon dioxide gas. The gas causes the material to expand when baked (Gaman and Sherrington, 1992).

The Improver commonly used is baking powder because it relatively does not affect the taste, while the use of baking soda salt residue results in a bitter taste (Bennion, 1980). The use of baking powder in principle produce CO₂ gas so that the crackers will expand when fried (Wiriano, 1998).

2.1.11 Sodium Acid Pyrophosphate



Figure 11. Sodium Acid Pyrophosphate

SAPP is a crunchy ingredient for deep-fried foods. Use of this material will make the fried food crispy and dry (Yashila's 2013 study (as cited in Allisan, Siddik., 2019)). Dose the required usage will depend on the food baked/fried. Usually, good formulations use 1-3% sodium bicarbonate, and the use of appropriate SAPP is usually less than 4% (IFAC, 2002)

2.1.12 Water



Figure 12. Water

Water is an important component in foodstuffs. Water can affect the appearance, texture, and taste of the product produced. In dry foods such as dried fruit, flour, and seeds also contain a certain amount of water. In making kecombrang crackers, water is added in the mixing process. The addition of water must be sufficient for complete gelatinization. If the amount of water added is not enough, the dough will not mix perfectly, and the resulting cracker will be loose. On the

other hand, if too much water is added, the dough will become soft and difficult to print.

2.1.13 Oil



Figure 13. Oil

Oil is a triglyceride which is composed of three acid units fat, liquid at room temperature (25 °C) and more contains unsaturated fatty acids so it is easy to oxidation. Solid oils are known as fats. Oils can be sourced from plants, for example olive oil, corn oil, coconut oil, and sunflower oil. Oil can also be sourced from animals, such as sardines' oil, whales and others. Oil can be used as a medium material frying. In frying, oil serves as a medium heat conductor, adds savory taste and calories ingredient.

2.2 The Utensils

2.2.1 Food Dehydrator



Figure 14. Food Dehydrator

A food dehydrator is a device that removes moisture from food to aid in its preservation. Food drying is a method of preserving fruit, vegetables and meats that has been practiced since antiquity. The dehydrator is used to dry corncobs and crackers.

2.2.2 Food Grinder



Figure 15. Food Grinder

A food grinder is a kitchen tool with a variety of uses. It can be used to turn whole foods into meat-and-vegetable mixtures for burgers, meatloaves, and other dishes. Or it can be used to make breadcrumbs, to grind coffee beans, or to make homemade baby food. This grinder is used to crush corncobs into flour.

2.2.3 Blender



Figure 16. Blender

A blender is a kitchen and laboratory appliance used to mix, crush, purée or emulsify food and other substances. A stationary blender consists of a blender container with a rotating metal blade at the bottom, powered by an electric motor that is in the base. The blender is used to grind corn flour and grind the spices for the cracker mixture.

2.2.4 Sifter



Figure 17. Sifter

A sifter is a tool that is used to separate, aerate and break up particles or clumps of different sizes in dry ingredients such as flour, before finally combining all the uniform particles together. This tool is used to sift dry ingredients such as corncob flour and tapioca until there are no lumps.

2.2.5 Large Bowl



Figure 18. Large Bowl

The large bowl is used to wash the ingredients in making kecombrang crackers, a bowl for fermenting corncob flour. It is also used to mix all the ingredients together later on.

2.2.6 Stove



Figure 19. Stove

A stove is a device that burns fuel or uses electricity to generate heat inside or on top of the apparatus. It has seen many developments over time and serves the main purpose of cooking food. A stove is used to cook the crackers.

2.2.7 Baking Pan



Figure 20. Baking Pan

Baking pans are used to hold runny batters, such as cake batter and thick solid masses of food, such as savory hot dish recipes. This pan is used to put the mixture of crackers and cook it in the steamer.

2.2.8 Steamer



Figure 21. Steamer

A type of cookware consisting of inserts or layers with perforations in the bottom, that are assembled and used to cook food with the use of steam. The steamer is made to position foods above, not in, water that is boiling or hot enough to produce steam to cook foods with a moist hot air. Steaming enables foods to keep their natural flavor, color, shape, and nutritious value better than when boiled or simmered in water. The steamer is used to cook the crackers.

2.2.9 Spoon



Figure 22. Spoon

A spoon is a utensil consisting of a small shallow bowl (also known as a head), oval or round, at the end of a handle. It is used primarily for transferring food to the mouth. Spoons are also used in food preparation to measure, mix, stir and toss ingredients and for serving food. Spoon is used to mix the ingredients.

2.2.10 Cutting Board



Figure 23. Cutting Board

A cutting board (or chopping board) is a durable board on which to place material for cutting. The kitchen cutting board is commonly used in preparing food. Kitchen cutting boards are often made of wood or plastic and come in various widths and sizes. A cutting board is used to cut the spices.

2.2.11 Knife



Figure 24. Knife

A utensil that has a handle and a blade that may or may not be sharp-edged. Available in a wide variety of different types and sizes, a knife is used for cutting, chopping, dicing, slicing, mincing, peeling, separating, and other kitchen tasks where the thin metal shaft of a blade is of value for food preparation. Special purpose knives such as boning, carving, mincing, slicing, deveining, and paring knives are available as well specific food knives for butter, cheese, chestnuts, clams, filets, grapefruit, oysters, tomatoes, and steak. Knife is used to cut the kecombrang and other ingredients.

2.2.12 Deep Frying Pan



Figure 25. Deep Frying Pan

A deep fryer is an appliance designed specifically for this kind of cooking and holds a significant amount of oil and features a basket and a lid. Deep Frying Pan is used to frying the kecombrang Crackers.

2.2.13 Skimmer



Figure 26. Skimmer

A skimmer is a round utensil that varies in size from 3 to 9 inches in diameter, perforated with holes. The skimmer is used to skim off the foam that forms on the surface of cooking liquid. It can also be used to drain foods that are prepared in liquid. This tool is used to drain the kecombrang cracker oil.

2.2.14 Wooden Spatula



Figure 27. Wodden Spatula

A wooden spatula can help you to perform various kitchen and cooking tasks. The three core functions of a wooden spatula include stirring, turning/flipping and scraping ingredients in a pan or wok. A wooden spatula can also be used to mix ingredients, stir sauces, and cook flavorful foods. A long wooden spatula is needed to stir the spices during the cooking process.

2.3 Approved and Revised Recipe

2.3.1 Approved Recipe

Recipe Name : Kecombrang Crackers Made From Corn Cobs

Yield : 10 portion (100 gr each)

Main Ingredients : 55 gr Corn Cobs Flour

Ingredients :

Spice

- 45 gr Kecombrang
- 3 Cloves Garlic
- 4-5 Cloves Shallot
- 2 pc Lime Leaf
- 30 ml Water
- 1 tsp Salt
- 1 tsp Totole
- ½ tsp White Pepper
- 2 pc Red chili
- 55 gr Corn Cobs Flour
- 55 gr Tapioka Flour
- 350 ml Water
- 1 tsp Lime Juice
- 1 tsp Baking Soda
- 1 tsp Xanthan Gum
- 1 tsp Sodium Tripolyphosphate

Method :

1. Divide the Corncobs into 2, then dry in a dehydrator at 60°C for 36 hours. After the Corncobs are dry, crush them with a mortar until they become small grains. Blender and sieve until it becomes flour.
2. For the Crackers mixture, blend the spices until smooth then mix all the other ingredients, mix well then pour into a 20x20 pan and steam for 1 hour.
3. After cooked, cut and dry the Crackers for 24 hours.
4. Coat the Dried Crackers in oil then cook in the airfryer at 200°C for 12 minutes.
5. Store Crackers in an airtight container.

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RECIPE BACKGROUND (50-100 WORDS)

Corn Cobs are one of the ingredients that are not used for cooking, usually Corn Cobs are only used for animal feed. Though Corn Cobs itself has a lot of nutrition. Therefore, I use Corn Cobs as a basic ingredients in making Kecombrang Crackers. Kecombrang itself also has a unique and interesting taste too. The Crackers that I make are gluten free and cooked in an airfryer.

APPROVAL TABLE (filled by advisor)

CHECK LIST	POINTS	APPROVAL
WASTE MANAGEMENT	20	✓
PROCESSING METHOD	20	✓
UNIQUE INGREDIENTS	20	✓
PRODUCT OUTLOOK	20	✓
HEALTH & NUTRITION	15	X
NEW MODIFICATION	5	✓
TOTAL		85

*approval min. 50 points

NOTES (filled by advisor)

approve

2.3.2 Revised Recipe

Recipe Name : Kecombrang Crackers (Crackers from Kecombrang, Corncobs and Tapioca Flour)

Yield : 2 Pouch (35 gr each)

Main Ingredients : 28 gr Kecombrang

Ingredients :

Spice

- 28 gr Kecombrang
- 6 gr Garlic
- 20 gr Shallot
- 5 gr Red Chili
- 40 ml Water
- 1,5 gr Salt
- 0.5 gr White Pepper

Dry Ingredients

- 50 gr Tapioca
- 5 gr Ferment Corn Cobs Starch
- 0.3 gr SA 99 (Baking Powder)
- 0.3 gr Puron (Sodium Acid Pyrophosphate)
- 60 ml Water

Method :

1. Divide the Corncobs into 2, then dry in a dehydrator at 60 °C for 24 hours. After the Corncobs are dry, crush them with a grinder until they become small grains. Blender and sieve until it become flour.

2. FERMENTATION: The Corncobs flour is then deposited with a solution of tape yeast with a total of 3% of flour for 2 hours. After that, it is dried for 24 hours and ground into flour.
3. For the Crackers mixture, blend the spices until smooth then cook the spices until dry.
4. Sift the Tapioca, Ferment Corncobs Starch, SA99, Puro with Sieve 40 mesh and mix all the other ingredients, mix well then strain and pour into a 21x11 pan and steam for 45 minutes.
5. After cooked, cut and dry the Crackers for 24 hours.
6. Deep fry the Crackers.
7. Put the crackers into standing pouch.

2.3.3 Reason for Revision

The reason for revising the recipe is because the mixture of ingredients that contain a lot of corncobs can't be set, so it can't be shaped and cut. Then when the crackers are fried they do not expand and have a very bitter taste. Little corncobs really affect the taste of the crackers covering the main ingredient, kecombrang. Therefore, in the revised corncobs recipe, only 5 grams are used.

2.4 Product Processing Sequence Using Flowchart

2.4.1 The Process of Making Fermented Corncobs Starch

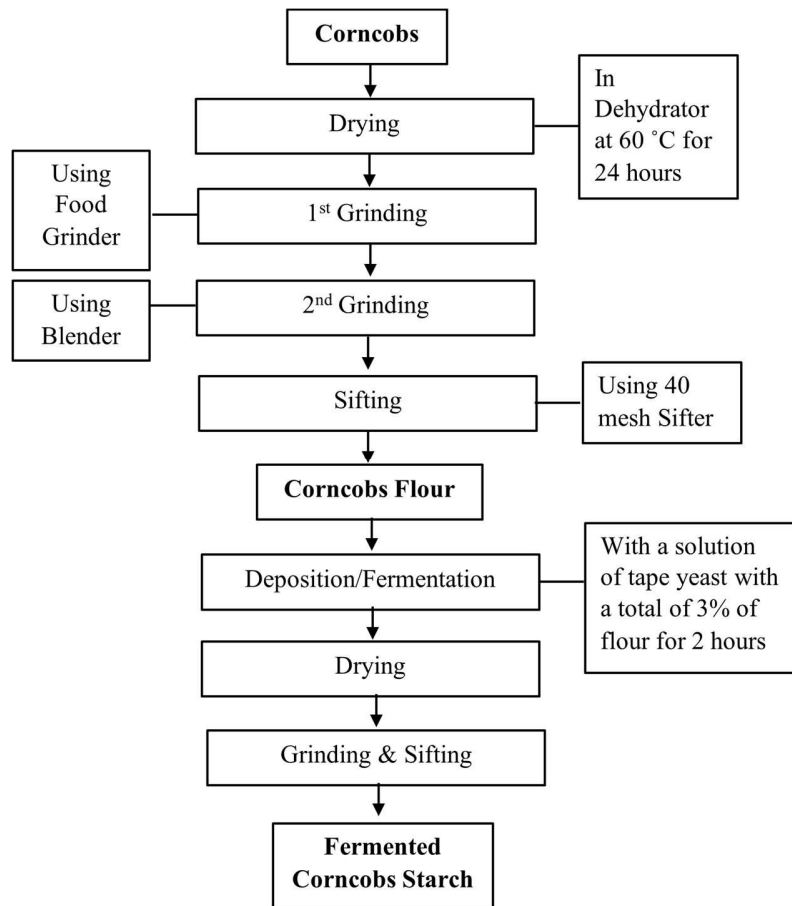


Figure 28. The Flowchart of Making Fermented Corncobs Starch

The cleaned corncobs were divided into 2 parts and then dried in a dehydrator at 60 °C for 24 hours. After the corn cobs are completely dry, the first grinding will be done using a food grinder until they become coarse grains. The coarse grains will be followed by a second grinding using a blender until they become fine grains. Next will be sifted using a 40-mesh sieve until there are no lumps and become corn

cobs flour. This corncobs flour is then deposited (fermentation process) with a mixture of tape yeast with a composition of 3% by weight of corncob flour for 2 hours. The fermentation process can reduce the crude fiber content of a material food. Use of Lactic Acid Bacteria (BAL) including *L. casei* can accelerate the hydrolysis of crude fiber into simpler compounds that can be digested by the body. The use of lactic acid bacteria in the fermentation process can improve food palatability and improve food quality namely increased availability of protein and vitamins. After being deposited, it will be re-dried in a dehydrator for 24 hours at the same temperature as before. After drying, it will be crushed and sifted into fermented corncobs starch.

2.4.2 The Process of Making Kecombrang Crackers

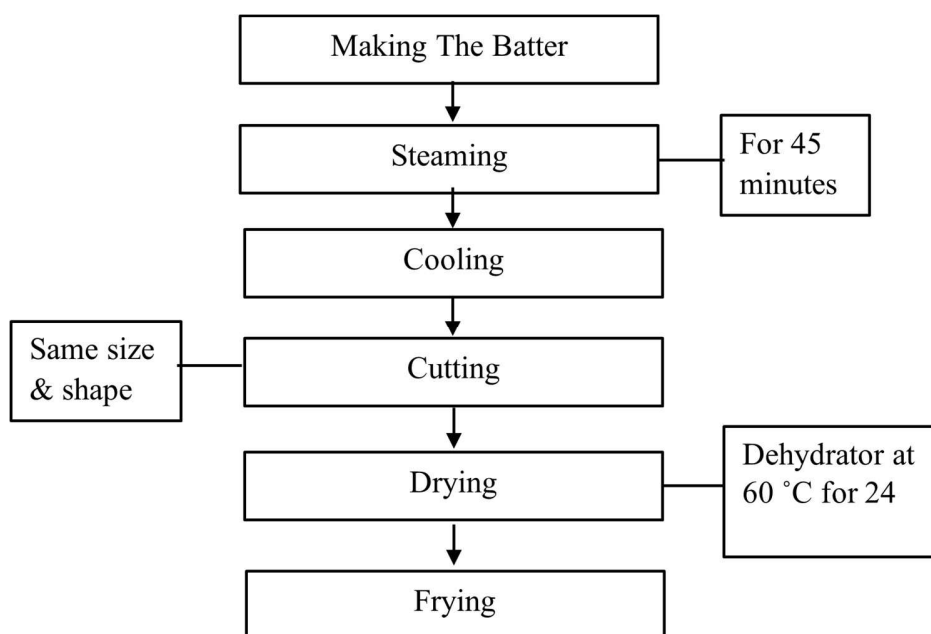


Figure 29. The Flowchart of Making Kecombrang Crackers

1. Making The Batter

The batter making stage is a very important initial stage. Factors that need to be considered in making the dough is the homogeneity of the dough. The kneading affects the cracking power of the crackers, which is related to air and gas. Mixing the spices that have been blended including kecombrang, garlic, onion, chili, and seasoning into tapioca flour and corncobs starch then stirred until evenly distributed and poured into a baking pan.

2. Steaming

Steaming is often interpreted as cooking carried out through hot steam media at a temperature of about 90 for a certain time. During the steaming process heat is transferred to the product by convection. Steaming is an important stage because at this stage the starch gelatinization process occurs which is closely related to the development of crackers when fried. Steaming for too long will cause too much water trapped by the starch gel, so that the drying and frying process is not perfect. The dough that has been cooked is characterized by all parts being clear and having a chewy texture. The length of time for steaming kecombrang crackers is 45 minutes.

3. Cooling

Cooling is intended to reduce the initial moisture content so that the dough becomes denser and facilitates slicing. Cooling aims to compact the cracker dough so that it is easy to cut or slice, otherwise if the dough is still hot it will be difficult to cut because it is sticky. Kecombrang cracker dough is cooled for approximately 2 hours.

4. Cutting

Crackers that have been cooled then go to the next process, namely cutting crackers. By cutting these crackers, it aims to uniform the shape of the crackers. The kecombrang cracker dough that will be cut is coated with tapioca flour first and cut with a knife with an even rectangular shape.

5. Drying

Drying is a way to remove or remove most of the water from a material by absorbing it using heat energy. Usually, the water content of the material is reduced to a certain limit where microbes can no longer grow. The process of drying raw crackers aims to produce materials with a certain moisture content. The water content contained in raw crackers will affect the quality and development capacity of crackers in the subsequent frying process. A certain level of dryness is required for raw crackers to produce maximum steam pressure in the frying process so that the cracker starch gel can expand. Slices of crackers are placed evenly in the dehydrator tray and dried for 24 hours at a temperature of 60 °C. Drying of crackers is carried out until the water content becomes 9-12%. The signs when the crackers are dry are that they break easily.

6. Frying

Frying is a process of cooking food using fat and oil. The optimal frying temperature is around 161 °C – 191 °C. While the function of cooking oil is as a heat conductor, a savory taste enhancer and an increase in calories for food. Frying kecombrang crackers directly in preheated oil for about 30 seconds. The resulting fried crackers have a flat surface or are slightly curved and crunchy.

2.5 Product Processing Method with Picture



Figure 30. Corncobs in Dehydrator, Grinding Process, Corncobs Flour

1. Divide the corncobs into 2, then dry in a dehydrator at 60 °C for 24 hours. After the corncobs are dry, do the first and second grinding. Sift until becomes flour.



Figure 31. Deposited Corncobs, Corncobs in Dehydrator, Corncobs Starch

2. The corncobs is then deposited with a solution of tape yeast with a total of 3% of flour for 2 hours. After that, it is dried for 24 hours and ground into flour.



Figure 32. Spices, Spices in Blender, Cooked Spices

3. For the Kecombrang Crackers, prepare all the ingredients. Cut the kecombrang, garlic and shallot and put in the blender with water and seasoning. Blend until smooth then cook the spices until dry.



Figure 33. Mixed Ingredients, Steaming

4. Sift the tapioca flour, ferment corncobs starch, SA 99, Puron with sieve 40 mesh and mix all the other ingredients, mix well then strain and pour into a 21x11 pan and steam for 45 minutes.



Figure 34. Cooked Crackers, Cutting

5. After cooked, cool the crackers and coat with tapioca flour, and then cut into rectangle shape.



Figure 35. Crackers in Dehydrator

6. Dry the crackers in dehydrator at 60 °C for 24 hours.



Figure 36. Frying

7. Heat the oil then deep fry the crackers for a while, drain the oil and wait for it to cool.



Figure 37. Kecombrang Crackers

8. Pack the crackers into a standing pouch.