Effect of Shelf Life on the Quality of Fried Sambal (Condiments of Instant Uduk Rice)

Asrul Bahar¹ and Dwi Kristiastuti Suwardiah²

¹Lecturer of Home Economic, Universitas Negeri Surabaya, Kampus Ketintang A3, Surabaya, 60231, Indonesia
²Lecturer of Home Economic, Universitas Negeri Surabaya, Kampus Ketintang A3, Surabaya, 60231, Indonesia

Abstract. Preserved food products in the packaging often found on the market, but very few types of preserved food based on traditional Indonesian food. The addition of sugar and tamarind solutions of tamarind is expected to dry fried sambal products have a long shelf life and be complementary rice uduk instant in one package, so that these products can be manufactured into a superior product business. The purpose of this study: 1) to determine the shelf life of dry fried sambal potato; and 2) microbacteria test. Dry fried sambal potato there are 3 kinds of treatment in the use of packaging that is plastic packaging, aluminum foil and without packaged. Type of experimental research with two-factor research design, the amount of sugar and solutions of tamarind. The results showed that storage with aluminum foil packaging of crispness level was crisp enough for 8 weeks of storage and bacteria contaminant amount 5.3 x 10³. It is concluded that dry fried sambal potatoes packing with aluminum foil is safe to consume and feasible.

1. Introduction

Packaging food products are often found in the market but very few types of preserved food are based on traditional Indonesian food. The research conducted was experimental research with the aim of producing products in the form of preserved dishes as condiments or complementing instant uduk rice dishes. Instant rice is a product that has been produced through research conducted in 2013 to 2016, with the aim of presenting a more practical and fast food product (3 minutes). To complete the product that has been produced (Instant Uduk Rice) another product is needed which can be used as a condiment / complement dish so that the resulting product is more complete in terms of serving which includes the content and amount of nutrition for each dish. Instant uduk rice and condiment / complementary offerings are expected to be used as a practical food unity to be presented and easily packaged so that it is also easy to be used as a provision for traveling activities both domestically and abroad, as well as food in emergency conditions such as natural disasters. The condiment / complement of instant uduk rice can be in the form of various dishes in a group of side dishes with a variety of chili sauce and in dry conditions.

The research carried out is to make side dishes in the form of dry fried sambal potato ebi, which will accompany or as a condiment for instant uduk rice products that have been produced in previous studies, namely 2013 and 2016, dry fried sambal potato ebi made as instant uduk rice condiment so that it is equipped the expected condition of flavor and nutrition of instant uduk rice products is getting better and increasing so that it can increase the economic value if it will be used as a community business or UKM.
Addition of the amount of sugar and the concentration of tamarind solution in the process of making dry fried sambal potato ebi, in addition to giving a taste to the product as well as other ingredients as a spice binder, as well as a natural preservative in the product. With the addition of sugar and tamarind solution, it is expected that dry fried chilli products have a long shelf life and can be coupled with instant uduk rice in one package, so that this product can be produced into a business and can be a superior product. The aim of this study are 1) to find out the level of chrunchy of products dry fried sambal potato ebi; 2) knowing amount of microbial bacteria during storage.

2. Material and Methods

2.1 Definition of Dry fried Sambal
Dry fried sambal is a group of side dishes of chili sauce in classifying Indonesian dishes. Sambal is a dish or dish with the main ingredients being lombok or chilli, so that chili sauce will have a spicy flavor from lombok or chilli. Sambal side dishes are grouped into several groups, namely: (1). Sambal mentah, (2). Sambal matang, and (3). Sambal goreng. Sambal mentah is chili made from all ingredients in raw or not cooked condition, cooking sauce instead of raw chili sauce which is made from ingredients which are cooked in advance such as: boiled, baked, steamed, fried and fried. While fried chilli is a technique of cooking all ingredients and seasonings by sautéing or frying first, the ingredients and chili seasoning are mashed or sliced first.

Based on the consistency, the sauce can be grouped into sambal goreng goreng and dry fried sambal. As for the criteria for wet fried chilli, which is a little soup, the contents are intact (for example: Eggs, tofu, tempeh and crackers), the red color comes from red chili and is slightly oily. The criteria for dry fried chilli are crispy and dry contents, the ingredients with one another stick together this is due to the addition of sugar and tamarind solution. The color of the fried chilli is the same as the sambal goreng goreng which is the same red color that comes from the use of red chili.

2.2 Ingredients of dry fried sambal potato ebi
The basic ingredients of dried potato chili sauce consist of: potatoes, ebi, spices (brown sugar, tamarind solution, puree of red chillies and salt). The description of each ingredient of fried chili can be described as follows

2.2.1 Potato
Potato plants or in scientific terms Solanum tuberosum L. is a vegetable plant consumed by cassava. Potatoes are ranked third in the world consumed after rice and wheat [1]. Potatoes have high carbohydrate and water content, sources of vitamin C, and B1, as well as some minerals such as phosphorus, potassium, and iron. Potatoes contain high carbohydrates compared to corn, rice and wheat, so potatoes have the prospect of being developed as industrial food where potatoes were previously only used as a vegetable or side dish [2]. The ever-increasing population and diversification of food programs make potato consumption continue to increase both as staple foods, vegetables and food industry processed raw materials.

2.2.2 Ebi
Ebi comes from Japanese word, which means shrimp, which is small dried shrimp. Ebi is one form of shrimp preservation that is processed by permeation and drying, many shrimps are made in the traditional way, namely drying using sunlight. Ebi is used for flavoring in vegetable dishes, for example fried chili sauce, pickles, etc., and can be stored for months. Ebi contains protein, fat, carbohydrates, calcium, phosphorus, iron, and water [3].

2.2.3 Brown Sugar
Sugar is a simple carbohydrate that is a major source of energy and trading commodities. Sugar is most widely traded in the form of solid sucrose crystals. Sugar is used to change the taste of sweetness in food or drink. Simple sugars, such as glucose (which are produced from sucrose with enzymes or acid
hydrolysis), store energy that will be used by cells. Sugar as sucrose is obtained from sugar cane juice, sugar beet, or sugar palm. Sugar has a different shape, aroma and function.

Several types of sugar to facilitate the proper processing and use, namely: granulated sugar, crystallized sugar, castor sugar, powdered sugar (icing sugar or confectioner sugar ), sugar donuts, diced sugar (cube sugar), brown sugar, palm sugar, palm sugar, palm sugar, sugar cane, sugar cubes, maltose sugar, caramel, and jelly sugar (jelly mallow). Red sugar or often known as Javanese sugar is sugar that has a solid form with a reddish brown to dark brown color. According to the Indonesian National Standard (SNI 01-3743-1995) brown sugar or palm sugar is the sugar produced from the processing of palm palms, namely palm sugar (Arenga pinnata Merr),nipah (Nypafruticans), siwalan (Borassus flabellifera Linn), and coconut (Cocos nucifera Linn). Red sugar is usually sold in half elliptical shapes printed using coconut shells, or cylindrical in shape using bamboo [4].

2.2.4 Tamarind (Tamarindus indica L)
Tamarind which is scientifically named Tamarindus indica L. is a tropical plant and includes pods. Acidic tree trunks that are hard enough to grow large and leafy. Long-stemmed tamarind tree, about 17 cm long and even finned, and the flowers are reddish yellow and the pods are brown and of course taste is acidic. Usually in fruit pods there are also seeds ranging from 2-5 that are flat in a slightly blackish brown color. Tamarind (Tamarindus indica L.) belongs to the family of legumes (Caesalpiniceae) originating from East Africa, including tropical plants which are fruiting plants throughout the year. In Indonesia these plants grow partly wild as in savanna forests.

Tamarind fruit meat contains 8-14% tartaric acid, 30-40% sugar, and a small amount of citric acid and potassium bitaetrat so it feels very sour. The original color of sour meat is brownish yellow. As a result of processing effects, the color changes to blackish. Cooked sour fruit pulp contains water around 63.3-68.6%, total solid material 31.3-36.6%, protein 1.6-3.1%, fat 0.27-0.69%, sucrose 0.1-0.8%, cellulose 2.0-3.4%, and ash 1.2-1.6%. Ash from the acidic plant is composed of potassium, silicon, sodium, phosphorus, and calcium. Tartaric acid is the most important acid component in pulp. The acid content in acid pulp ranges from 8-16%, while the other acids total only about 3% of the pulp weight [6]

The tamarind fruit that cooks on the tree includes calorie values of 239 cal / 100 grams, 2.8 grams / 100 grams of protein, 0.6 grams / 100 grams of fat, 62.5 grams / 100 grams of charcoal, 74 milligrams of calcium / 100 grams, phosphorus 113 milligrams / 100 grams, iron 0.6 milligrams / 100 grams, vitamin A 30 milligrams / 100 grams, vitamin B1 0.34 milligrams / 100 grams, vitamin C 2 milligrams / 100 grams. The most important active ingredient of tamarind fruit is as follows:

| No. | Food competition | Content |
|-----|------------------|---------|
| 1   | Calories (cal)   | 239.00  |
| 2   | Protein (g)      | 2.80    |
| 3   | Fat (g)          | 0.60    |
| 4   | Carbohydrates (g)| 62.50   |
| 5   | Calcium (mg)     | 74.00   |
| 6   | Zink (mg)        | 0.60    |
| 7   | Vitamin A (SI)   | 30.00   |
| 8   | Vitamin B (mg)   | 0.34    |
| 9   | Vitamin C (mg)   | 2.00    |
| 10  | Water (g)        | 31.40   |
| 11  | Phosphorus (mg)  | 113.00  |
| 12  | Edible parts %   | 48.00   |

Almost all parts of the tamarind plant can be used for various purposes so that this plant is called a multipurpose plant. Leaves are used as cooking ingredients, medicinal ingredients, and cosmetics. The flower is an important source of honey for the development of honey bee cultivation.
2.2.5 Red Chili
Red chili (Capsicum annum L.) is one type of chili that has high adaptability [2]. This plant can grow and develop both in the lowlands and highlands, in paddy fields and dry fields. This characteristic causes chili plants to be found in almost all regions. Red peppers come from Mexico, before the 15th century this species was more widely known in Central and South America. Around 1513 Columbus brought and distributed red pepper and was thought to have entered Indonesia through traders from Persia when he stopped in Aceh. Chilli plants contain lots of vitamin A and vitamin C and contain essential oils of capsaicin, which cause spicy taste and provide warmth when used for spices (kitchen spices).

2.2.6 Salt
Salt / sea salt is made through evaporation of sea water, with a simple process, and leaves a number of minerals and other elements (depending on the water source). The amount of minerals that does not significantly add flavour and colour to sea salt. So, the texture of sea salt on the market is more varied. Some of them are more rough, but some are more subtle. This type of salt contains ± 0.0016% iodine.

![Figure 1. Method of fried sambal](image)

2.3 Method of Collecting Data
In this research data collection method uses observation method and checklist to assess product quality. Observation method is done by crispness test and microbial test to determine shelf life. The shelf life test is carried out to determine the contamination of microbial or fungus which is damaging to food so that the shelf life is not long.

2.4 Data Analysis Techniques
Data analysis techniques in this study were carried out using the results of the assessment of the value of crispness of fried chilli products dried ebi potatoes and the results of microbial tests [7, 8, 9, 10].

3. Results and Discussion

3.1 Results of Crunchy Test
The results of the crunchy test of dry fried sambal potato ebi were carried out with 3 packages, namely plastic packaging, aluminum packaging, and without packaging. This was done to determine the level of crunchy of dry fried sambal potato ebi products that were still crunchy for 8 weeks of storage. The results are presented in Table 2.

Table 2. The level of crunchy of dry fried sambal potato ebi

| Week  | Plastic packaging | Aluminium foil packaging | Without packaging |
|-------|-------------------|--------------------------|-------------------|
|       | VC    | C    | QC  | NC  | VC   | C    | QC  | NC  | VC  | C   | QC  | NC  |
| Week-1| ✓     | ✓    | ✓   | ✓   | ✓    | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
| Week-2| ✓     | ✓    | ✓   | ✓   | ✓    | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
| Week-3| ✓     | ✓    | ✓   | ✓   | ✓    | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
| Week-4| ✓     | ✓    | ✓   | ✓   | ✓    | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
| Week-5| ✓     | ✓    | ✓   | ✓   | ✓    | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
| Week-6| ✓     | ✓    | ✓   | ✓   | ✓    | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
| Week-7| ✓     | ✓    | ✓   | ✓   | ✓    | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |
| Week-8| ✓     | ✓    | ✓   | ✓   | ✓    | ✓    | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |

VC: very crunchy; C: crunchy; QC: quite crunchy; NC: not crunchy

The results of the crunchy test were carried out by using 3 types of storage, namely plastic, aluminum and without packaged (ordinary jars). The results on plastic packaging the first week the level of crunchy is very crunchy. The second week the crunchy level is very crunchy. The third week the level of crunchy is very crunchy. The fourth week the crunchy level is crunchy. The fifth week the level of crunchy is crunchy. The sixth week the crunchy level is quite crunchy. The seventh week the crunchy level is quite crunchy. The eighth week the crunchy level is not crunchy.

The results of crunchy test are packed with aluminum in the first week the crunchy level is very crunchy. The second week the crunchy level is very crunchy. The third week the level of crunchy is very crunchy. The fourth week the crunchy level is crunchy. The fifth week the level of crunchy is crunchy. The sixth week the level of crunchy is quite crunchy. The seventh week the crunchy level is quite crunchy. The eighth week the crunchy level was quite crunchy.

Chrunchy test results without being packed in the first week the crunchy level is very crunchy. The second week the crunchy level is very crunchy. The third week the level of crunchy is crunchy. The fourth week the crunchy level is crunchy. The fifth week the crunchy level is crunchy. The sixth week the level of crunchy is quite crunchy. The seventh week the crunchy level is quite crunchy. The eighth week the crunchy level is not crunchy.

2.5 Results of Microbial Test

The results of the total bacterial contamination test lab are fried sambal goreng with 3 types of packaging, namely: aluminum, plastic and without packaging. The number of calorie bacteria per kal / gr. The results are presented in Table 3. There are 3 types of packaging used for 8 weeks. Plastic packaging in the first week the amount of bacterial contamination 310 calories / gram. The second week the number of bacteria contamination was 1,800 calories / gram. The third week the amount of bacterial contamination was 2,100 calories / gram. The fourth week of 2,600 calories / gram of bacterial contamination. The fifth week the number of bacteria contamination is 3,700 calories / gram. The sixth week is the amount of 4,500 bacteria per gram of contamination. The seventh week the amount of bacterial contamination is 23,000 calories / gram. The eighth week the amount of bacterial contamination was 32,000 calories / gram.
Table 3. Microbial Test of Dry Fried Sambal Potato Ebi

| Week  | Plastic packaging | Aluminum foil packaging | Without packaging (jars) |
|-------|-------------------|-------------------------|--------------------------|
| Week - 1 | 3.1 x 10^2        | 1.3 x 10^2              | 2.0 x 10^2               |
| Week - 2 | 1.8 x 10^3        | 1.6 x 10^2              | 2.1 x 10^2               |
| Week - 3 | 2.1 x 10^3        | 2.3 x 10^2              | 2.2 x 10^3               |
| Week - 4 | 2.6 x 10^3        | 2.4 x 10^3              | 2.5 x 10^3               |
| Week - 5 | 3.7 x 10^3        | 4.0 x 10^3              | 3.6 x 10^3               |
| Week - 6 | 4.5 x 10^3        | 5.1 x 10^3              | 5.3 x 10^3               |
| Week - 7 | 2.3 x 10^4        | 3.8 x 10^4              | 6.1 x 10^4               |
| Week - 8 | 3.2 x 10^4        | 5.3 x 10^4              | 8.2 x 10^4               |

Bacterial contamination in aluminum foil packaging in the first week the amount of bacterial contamination was 130 calories / gram. The second week the number of bacteria contamination was 160 calories / gram. The third week the number of bacteria contamination was 230 calories / gram. The fourth week of 2,400 calories / gram of bacteria contamination. The fifth week the amount of bacterial contamination is 4,000 calories / gram. The sixth week the amount of contamination of bacteria is 5,100 calories / gram. The seventh week the amount of bacterial contamination is 38,000 calories / gram. Eighth week the amount of bacterial contamination was 53,000 calories / gram.

Contaminated bacteria without packaging in the first week the amount of bacteria contamination 200 calories / gram. The second week the amount of bacterial contamination was 210 calories / gram. The third week of 2,200 calories / gram of bacterial contamination. The fourth week the number of bacteria contamination is 2,500 calories / gram. The fifth week the amount of bacterial contamination is 3,600 calories / gram. The sixth week the amount of contamination of bacteria is 5,300 calories / gram. The seventh week the amount of bacterial contamination is 61,000 calories / gram. Eighth week the amount of bacterial contamination is 82,000 calories / gram.

Overall, both plastic, aluminum packaging and without packaging based on the amount of calorie / gram bacteria contamination is still declared safe. Because the amount of bacterial contamination is not reaches 1010 calories / gram.

4. Conclusions
The results of microbial test and chrunchy test it can be concluded that the amount of bacterial contamination in the threshold can still be consumed with a fairly crisp crispness level for 8 weeks analyzed using aluminum packaging. eight weeks the amount of microbial contamination 53,000 calories / gram with level of chruncy is chruncy and worth consuming. The products of dry fried sambal potato ebi, in addition to condiments of uduk rice or seasoned rice, can also be served as side dishes without seasoned rice, this product can be packaged alone and can be used as a long-lasting dry food business opportunity. dry fried sambal potato ebi can also be varied with other ingredients such as dried anchovies, rebon shrimp or with various nuts.

References
[1]. Adawiyah, Dede, 2009. Evaluasi Sensoris Produk Pangan (Buku ajar), Bogor : Fak Teknologi Pertanian-IPB
[2]. Arikunto Suharsimi, 2010. Manajemen Penelitian, Jakarta : Rineka Cipta
[3]. Buckle,K.A, dkk, 1987. Ilmu Pangan, Jakarta : UI-PRESS
[4]. Effendi, Samsueroi. 1993. Ensiklopedi Tumbuh-tumbuhan. Surabaya: Karya Anda.
[5]. Tuti Latif. 2010. Resep-resep Hidangan Nasi. Jakarta: Balai Pustaka
[6]. Kristiastuti, Dwi. 2015. Modul Bahan Ajar Pengelolaan Makanan Nusantara. Unesa
[7]. George, Susan. (terj. Sandria Komalasari). 2007. Pangan dari Penindasan sampai ke Ketahanan Pangan. Yogyakarta: Insist.
[8]. Rewthong, O., S. Soponronarit, C. Taechapairoj, P. Tungtrakul and S. Prachayawarakorn. 2011. Effect Of Cooking, Drying And Pretreatment Methods On Texture And Starch Digestibility Of Rice Instan. J Food Eng 103: 258-264.

[9]. Hubeis, M. 1984. Pengembangan Metode Uji Kepulenan Nasi. Tesis, Pascasarjana IPB, Bogor.

[10]. Suyitno et al. 1989. Rekayasa Pangan (Petunjuk Laboratorium), Yogyakarta : PAU UGM