



EFFECT OF DRYING TIMES AND TEMPERATURES ON THE QUALITY OF TRADITIONAL SPICY SAUCE CUBE

(Kesan Masa dan Suhu Pengeringan Terhadap Kualiti Kiub Sambal Tradisional)

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Abstract

Food drying is a food preservation method to inhibit bacterial, yeast and mold growth through the water removal technique. This study aims to analyze the effects of different drying temperatures and durations on the traditional spicy sauce cubes' qualities (moisture content, water activity, texture, color, disintegration time and sensory analysis). Different drying temperatures for the cubes consisted of three different stages temperatures were used to compare with the control cube's quality. The production of traditional spicy sauce cubes involved the preparation of fresh ingredients, cooked into a paste, drying, grinding the paste into powder and compacted into a cube mold (3.3×1.5 cm). It was found that the cubes with high initial temperature had lower moisture content than those with low initial temperature. The three-stage temperature cubes exhibited a lower water activity compared to other cubes and had higher hardness and lower fracturability but their color is still retained. All the traditional cubes had a disintegration time below 60 seconds which indicated the good quality of cubes. The different cyclic temperatures regime showed no significant difference to the aftertaste and overall acceptance among all prepared cubes. Overall, the significant differences in cubes' qualities were affected by varying the cyclic drying temperatures.

Keywords: traditional spicy sauce cube, cyclic drying temperatures, drying times

Abstrak

Pengeringan makanan adalah satu kaedah pegawetan makanan untuk mencegah pertumbuhan bakteria, ragi dan kulat melalui teknik penyingkiran air. Kajian ini bertujuan untuk menganalisis kesan suhu dan jangka masa pengeringan yang berbeza terhadap kualiti kiub sambal tradisional (kandungan kelembapan, aktiviti air, tekstur, warna, masa perlarutan dan penilaian sensori). Suhu pengeringan untuk kiub sambal tradisional yang terdiri daripada tiga tahap yang berbeza telah dibandingkan dengan kualiti kiub kawalan. Penghasilan kiub sambal tradisional merangkumi penyediaan bahan-bahan segar, dimasak menjadi pes, pengeringan dan pengisaran pes menjadi serbuk dan dipadatkan ke dalam acuan kiub (3.3×1.5 cm). Kiub sambal tradisional dengan suhu awal pengeringan yang tinggi didapati mempunyai kandungan kelembapan yang lebih rendah daripada suhu awal pengeringan yang rendah. Kiub dengan suhu tiga-tahap menunjukkan aktiviti air yang lebih rendah berbanding dengan kiub-kiub lain serta lebih keras dan tidak mudah pecah, tetapi warnanya masih dapat dikekalkan. Semua kiub sambal tradisional mempunyai masa perlarutan di bawah 60 saat yang membuktikan kualiti kiub yang baik. Kitaran suhu pengeringan yang berbeza menunjukkan tiada perbezaan

yang signifikan terhadap kesan rasa dan penerimaan keseluruhan antara semua kiub sambal tradisional yang disediakan. Kesimpulannya, perbezaan ketara kualiti kiub sambal tradisional telah dipengaruhi oleh pelbagai kitaran suhu pengeringan.

Kata kunci: kiub sambal tradisional, kitaran suhu pengeringan, masa pengeringan

Introduction

Spicy sauce or known as *sambal* is an Indonesian chili sauce or paste usually made from a combination of a variety of secondary ingredients such as shrimp paste, garlic, ginger, shallot, scallion, palm sugar, and lime juice from a variety of chili peppers. In Malaysia, the spicy sauce had been known as one of the compulsory foods that were often served alongside the main meal such as *nasi lemak*, *nasi ayam*, and *asam pedas* [1]. The hot, sweet or a combination exhibited by chili or spicy sauce may differ from hot sauce in that many sweet or mild varieties exist, usually lacking in hot sauces. However, Malaysians also have their own interest in making the spicy sauce with spiciness or sweetness to be served in their meal. In contrast to hot sauces, the chili sauce can have a thicker texture and viscosity, while chili paste commonly refers to a paste where the chili pepper is the main ingredient. Some are used chili paste as a cooking ingredient, and some are used after preparation to season a sauce.

In this sophisticated era, the making of spicy sauce may be troublesome for certain individuals especially working spouses or individuals as its conventional cooking process is time-consuming which could affect their busy schedule. This is because the ingredients preparation and cooking process of chili paste requires expertise and reliability particularly, in flavor adjustment. In addition, this modern world had established bouillon cubes that growing consumers' demand in the market. These cubes have some beneficial factors such as convenient, easy-to-use, long shelf life without refrigeration storage, instantly add flavor and can balance almost any dish or soup for a short time. However, to the best of our knowledge, there is no standard method available in preparation of the cube that could mimic the original physical properties and sensory. Thus, this research is conducted to obtain the optimal physical and sensory characteristics of traditional spicy sauce cube.

For food products, it is important to ensure the drying rate is eligible as it can affect food quality. This is supported to a research conducted by Heldman and Hartel, that found the drying temperature, air velocity, relative humidity, pressure and features of food products (concentration and composition) are the key factors that may influence the drying process [2]. Moreover, based on the drying kinetics of tomato paste researched by Jumah et al., the increase in the temperature of the inlet air in the 60-100 °C range greatly increased the drying rate of tomato paste [3]. This indicates that the drying time would be decreased as the air temperature increased. For that reason, the drying time should be properly adjusted according to the air temperature to keep the good quality and nutritional composition of food products. Besides that, it has been reported that improving drying energy efficiency by only 1% could result in a profit increase of up to 10% [4]. The process of food dehydration corresponds to reduce the food moisture to low levels by adding one or more types of energy to the food can prolong the shelf life. This can be concluded that a good quality of product can be achieved with a reasonable drying period and lower consumption of energy. Hence, the factors of drying time and temperatures were highlighted in this study as they can be significant factors in the production of the best spicy sauce cube product.

In this study, the effect of drying times and temperatures in the process of making traditional spicy sauce cube were evaluated to provide the best solution in the product drying process which induced the optimal result of physical properties. The physical properties that were being conducted consist of moisture content, water activity, texture, color and disintegration time which these properties were related to the ability of cubes to withstand the environmental impact from the surroundings. Besides that, the sensory analysis will be conducted to evaluate the most consumer acceptance among the different samples. Based on the sensory analysis, the quality attributes entailing taste, aroma,

appearance and texture are the most important aspects in the products to meet the requirements or demands of the consumer.

Materials and Methods

Materials

The fresh ingredients which consisted of dried chilies, onions, garlic and anchovies were purchased from L&L Mini Market, Pagoh Jaya, Johor while the commercial bouillon cube was bought from Green Apple Store, Pagoh, Johor. The preservative (sodium benzoate) was purchased from Tong Sheng Food Technology Sendirian Berhad, Pulau Pinang while the potato starch was bought from TF Value-Mart, Muar, Johor. All the ingredients used have been food grade acquired from local sources.

Production of traditional spicy sauce paste and cube

For the initial step, the preparation of fresh ingredients was started by cleaning dried chilies, fresh onion, garlic and anchovies to remove unwanted waste and excess dirt. The amount of the ingredients used is shown in Table 1. After that, the dried chilies were sliced to remove the seeds to ensure the smooth chili paste was produced as well as to reduce the spiciness of chilies. Next, the sliced chilies were soaked in hot water (100 °C) for 10 minutes. This process is to soften the chilies and facilitate the blending process. The dried chilies with the addition of 350 mL of water were blended thoroughly by using a kitchen blender (Toshiba, BL-

60PHNMY, Japan) for about five (5) minutes at medium speed until forming a smooth chili paste. The minced onion, garlic and anchovies were blended by a kitchen blender. The cooking process of spicy sauce paste started with the addition of cooking oil into a frying pan and was heated at medium temperature (70-80 °C). Then, the chili pastes and the blended ingredients (onion, garlic and anchovies) were added to the same frying pan and stir-fried for 10 minutes. Next, the water was added to the mixture, slowly stirred and continues cooked for another 15 minutes. Lastly, the starch and sodium benzoate (preservative) were added to the paste. The amount of ingredients used has produced approximately 400 g of spicy sauce paste without the removal of oil.

Prior to drying, the paste was spread on the baking paper which formed a thin layer to deliver the efficiency of paste drying in the food dehydrator (Yisino, SX-770, Malaysia). Thus, the paste had been dried until the moisture content below 12% as it is significant to produce the cubes with low moisture content. The low moisture content of the cubes led to adequate textural properties as it induced higher hardness and lower fracturability [5]. Next, the dried paste was grounded into a smaller size using the dry blender (Panasonic, MX-SM1031, Japan) and molded into cubes form by using a 3.3×1.5×1.0 cm (long × width × thickness) mold.

Table 1. Ingredients used in the production of the traditional spicy sauce cube

Ingredients	Amount
Dried chilies	27 g
Fresh onion	260 g
Garlic	19 g
Anchovies	10 g
Starch	10 g
Sodium benzoate	0.1 g
Chilli paste	83 g
Cooking oil	15 mL