Original Research Article

Product Development of Dried Marinated SpicyTilanggit

ABSTRACT

The study on product development of spicy tilanggit was conducted at Shared Service Facility (SSF) Center of SPAMAST Main Campus Malita, Davao Occidental, Philippines. This study determine the effects of different ratio of chili to the microbiological characteristics and sensory quality of tilanggit, and was carried out using experimental design with four treatments replicated three (3) times. The data obtained from sensory evaluation were analyzed using Analysis of Variance (ANOVA) to determine the significant difference of every treatment used.

Result revealed significant difference in terms of flavor and odor while no significant difference observed in the texture, color and microbial count of the product. Furthermore, the general acceptability ratings of spicy tilanggit added with 15% were statistically significant and rated like very much by the panelists. However, the conduct of nutritional analysis of the spicy tilanggit product, cost analysis for possible commercialization and consumer's survey to validate the acceptability of the product were recommended in the said study.

Keywords:Tilanggit, Spicy, Product Development.

1. INTRODUCTION

Tilanggit dried marinated tilapia sometimes known as tilapiangdinanggit(*Oreochromis niloticus*), was inspired by the Visayan danggit(Rabbitfish). It is manufactured in the same way as danggit, where in the fish are split open, cleaned, marinated, and was place on the machine for 2-3 days to achieve the desired moisture content. One of its distinguishing features is that it is meatier than danggit. Research and development efforts are on track since the new product is considered as having a large commercial potential [3,4].

Chilies are commonly consumed raw or powder as spice or colorant. The fruits come in a variety of colors, ranging from green to yellow to orange, and each color represents a particular level of maturation and ability to synthesize carotenoids or chlorophylls, with its fiery taste characteristics. This vegetable's flavor ranges from sweet (non-pungent) variations like paprika to fiery species like chilies or cayenne pepper [5,7].

Moreover, chilies are rich in bioactive chemicals that have health benefits for consumers, such as vitamins C and E, provitamin A, carotenoids, and phenolic compounds, in addition to their sensory characteristics such as pungency, scent, and color[26], because the content of these phytochemicals changes as a result of metabolic and chemical processes, sampling and storage conditions (temperature 7.5 oC, 70% relative humidity, oxygen deficiency, and lack of light) should be carefully monitored in order to obtain high-quality plant material for characterization and further use.

The chili-derived substances could be employed as additives or ingredients with antioxidant and antibacterial activity, in addition to being used as a condiment, offering characteristic pungency, color, and flavor[9]. The locale views tilanggit production as a viable alternative source of income with new value-adding techniques available [2,15].

To develop unique and promising value-added products of Tilanggit or dried marinated tilapia, more research on establishing procedures, sensory acceptability, and additional nutrients must be conducted. With the diverse preference of the consumers, treatments with respect to the percentage of chili powder to use must be given consideration. Hence, the study is needed to describe the acceptance rate of the product using different treatments and to assess the effect of chilli spice incorporation on the nutrient and sensory characteristics of tilanggit.

2. MATERIALS AND METHODS

2.1. Research Locale

The study was conducted at Southern Philippines Agri-Business and Marine and Aquatic School of Technology (SPAMAST)-Shared Service Facilities (SSF) Center, Barangay Poblacion, Malita, Davao Occidental, Philippines since it is the first facility with enough equipment for processing of spicy marinated tilanggit.

2.2 Procurement of Raw Materials

One (1) kg fresh Tilapia was procured from Malita, Davao Occidental. Chili and other ingredients were purchased from the local market. Moreover, the average tilapia weighs roughly 680.39 grams. A thin layer of darker meat beneath the skin is frequently removed when is filleted, but purchasing tilapia whole is recommended.

2.3 Experimental Design and Treatments

The study on the product development of spicy tilanggit used a Completely Randomized Design (CRD). Five treatment varying amount of spices were used in spicy Tilanggit. Each treatment is replicated three times. Moreover,1kg of tilapia was soaked into approximately 2,800ml of marinated mixture.

The different treatments were as follows:

Table 1. The varying treatments of marinated spicy tilanggit.

Treatment	Ratio
T0	Traditional marinated tilanggit (control)
T1	5% minced fresh chili + marinate mixture
T2	10% minced fresh chili + marinate mixture
T3	15% minced fresh chili + marinate mixture
T4	20% minced fresh chili + marinate mixture

2.4 Product Preparation and Production Flow Chart

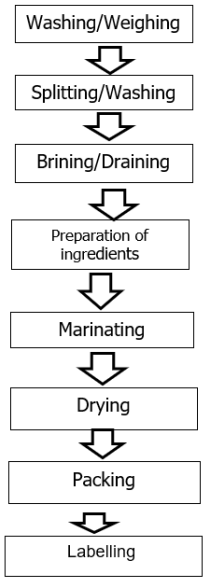

Fig 1. Flow chart of processed dried marinated spicy Tilanggit

Washing of Tilapia was done with washing in added water, while holding it by the tail on a flat surface, using a cutting board. Then, use a knife or spoon in your other hand and scrape the scales off from the tail to the head.

Splitting was done by holding the fish's tail, stabbing the fish's upper side from the tail end with a sharp knife. Then, cutting a slit from the tail passing through the dorsal fin. Finally, stop when you get to the end of the upper mouth of the fish, with your fingers, open the body of the fish and eviscerate.

Brining was done by preparing 225g salt and 2250ml water solution, where the fish was soaked for one (1) hour as a method for pre- cooking of the fish.

The preparation of ingredients was done by preparing for other ingredients such as lemon juice, vinegar etc. mixing it all together to make a marinate mixture.

The tilapia was soaked and cleaned into marinate mixture for 12 hours.

Using a solar dryer, the marinated tilapia was place on the machine for 2 – 3 days to achieve the

desired moisture content.

Packing the dried fish according to desired weight into a plastic container/bag**.**

The product was labeled with its name, ingredients, nutritional components and direction for cooking.

2.5 Sensory Evaluation

The sensory quality evaluation of spicy Tilanggit using different amount of spice sample was carried out by a 30 randomly selected respondents comprising SPAMAST faculty, staff and students for three trials. The respondents were given coded sample of the product and scoresheet for sensory evaluation of spicy Tilanggit on the basis of taste, color, texture and general acceptability according to the descriptive sensory method[8,15-16].

2.6 Microbial Content

The initial microbial counting on the study was conducted right away to evaluate the product's microbial quality and to ascertain the trend of microbial count across the various treatments.

2.7 Statistical Tools

The study was carried out using experimental design with four treatments repeated three times. Data obtained from sensory evaluation was analyzed using Analysis of Variance (ANOVA) to determine the significant difference of every treatment used. In addition, Levene, Dunn and other tools were also used to establish significant difference among treatments.

3. RESULTSANDDISCUSSION

3.1 Sensory Evaluation

A total of five attributes were tested for sensory evaluation, namely: flavor, odor, texture, color and general acceptability. Sensory evaluation was done using the *descriptive* and the *hedonic* scale ratings. General acceptability of the spicy tilanggit was also determined using nine points hedonic scale.

Table 2. Descriptive mean sensory score of spicy tilanggit for flavor, odor, texture, color and general acceptability.

	SENSORY ATTRIBUTES				
TREATMENT	FLAVOR	ODOR	TEXTURE	COLOR	GENERAL ACCEPTABILITY
To	2.23[b]	3.06[b]	2.83[a]	2.93[a]	7.23[b]
T1	2.60[b]	3.07[b]	3.13[a]	2.86[a]	7.86[b]
T2	2.66[b]	2.83[b]	2.90[a]	2.76[a]	7.30[b]
T3	2.86[a]	3.26[a]	3.00[a]	3.06[a]	8.23[a]

3.1.1. Flavor

The results showed the different ratio of spiciness (0 to 15%) revealed significant effect on flavor of the spicy tilanggit. Control three (3) (2.86) obtained the highest score followed by control two (2) (2.66), control one (1) (2.60) and control zero (0) got the lowest score (2.23). In terms of descriptive score on all control, zero (0), one (1), two (2), and three (3) were described to be slightly spicy though in terms of general acceptability control zero (0), one (1), and two (2) are liked moderately by the panelists; and the control four (4) has the highest ratio of chili and found to be liked very much by the panelists.

Moreover, it revealed not significant in flavor and overall acceptance scores of products ($p<0.05$). It showed that the panelists preferred more chili on tilanggit. Chillis are high in vitamins A and C and the volatile chemical capsaincin, which can produce a spicy, and hot flavour when used as a cooking spice [10]. A person's personal taste can strongly influence food's flavor, as people enjoy food with a spicy flavour[1,17,19]. Therefore, it is possible that using the treatment 3 the production of the spicy tilanggit can be adapted to adjust people's tastes in general.

3.1.2.Odor

As to odor of marinated spicy tilanggit, the result revealed that Treatment 3 (M=3.26) obtained the highest sensory score followed by Treatment 1 (M=3.07), Treatment 0 (3.06) and the lowest is Treatment 2 (2.83). Based on the general acceptability treatment 0, and 2 were rated as like moderately while treatment 1 and 3 was rated liked very much by the panels. In terms of descriptive score 3 treatments were described moderately fresh odor, while treatment 2 were described to be slightly off odor. Statistically, there is a significant difference was observed.

Chili contains capsaicin, which causes heat and chills when it comes into contact in the nose. Due to the high chili content, treatment 3 is rated the highest among treatments in terms of odor. This study indicated that the ratio of chili to marinated tilanggit among treatments has a significant effect on the sensory properties of odor.

The element of capsaicin contributes significantly to the pungent aroma of chili food [13]. The higher the capsaicin level, the stronger the pungency fragrance released. Increased spicy scents due to increased capsaicin levels may affect consumer disapproval of the product [20,21,27]. The scent of dried fish emerges after the heating effect process when the substances and moisture of fish partially evaporate and leave a distinct odour[10].

3.1.3.Texture

As to texture, Treatment 1 got the highest mean score 3.13 which described firm, followed by Treatment 3 of 3.00 which described firm, Treatment 2 with the mean score of 2.90 that described neither soft nor rough, and Treatment 0 with a mean score of 2.83 was the lowest. Two (2) of the treatments falls in descriptive category of “firm” which is the treatment 1 and 3 while treatment 0 and 2 was described to be neither soft nor rough.

Result showed that the different ratio of chili added on marinated tilanggit has no significant difference on the texture of the different treatments of the product. Panelists average texture assessment value ranged from 2.90 to 3.19. The treatment 3 (15%) with the highest texture average was categorized as having a " firm/crunchy" texture. The firmness texture may be influenced by the addition of chili powder in the processing of spicy tilanggit products. Dried fish processed with the addition of cayenne pepper and soaked in liquid smoke immersion has a crunchy texture[10,22]. Chili pectin content is easily hydrolysed into water-soluble components, thereby creating changes in food texture[13]. This demonstrates how significantly the fresh spice infusion affected the textural characteristics of the product. Reduced texture during the process may be caused by compound hydrolysis and fermentation [12].

3.1.4.Color

In terms of color Treatment 3 (3.06) got the highest score followed by Treatment 0 (2.93) and Treatment 1 (2.86) and the lowest was Treatment 2 (2.76). Three (3) treatments 0, 1, and 2 were evaluated as like light brown by panelist and the other treatment which is the treatment 3 with 15% of chili added were described to be brown. Statistically, the different amount of chili did not give significant change on the color of marinated spicy tilanggit ($p>0.5$).

Color is a critical factor in judging the quality of food goods [14]. Food colors that are pleasing to the eye are more likely to attract consumers. According to the study's primary source, the economic value of chili powder is impacted by the spice's color's brightness and intensity[11,23]. Color additives are commonly employed in the food business to enhance the flavor, appeal, and look of food, and this includes the usage of chili. However, it has no significant difference in the color of tilanggit added with different amount of chili and therefore it is comparable among all treatments.

3.1.5. General Acceptability

In terms of the general acceptability, the study revealed that Treatment 3 got the highest mean score (8.23) which means panelist liked very much. Followed by Treatment 2 (7.86), Treatment 1 (7.30) and Treatment 0 (7.23) which described like moderately. Thus, statistical analysis showed that different ratio of chili had significant effect on the general acceptability of marinated tilanggit.

The result shown in Table 3 implicates that there was a significant difference between treatments and tests evaluated which chili ratio effect on the sensory evaluation, the panelists preferred greater amount of chili. Compared to the other treatments, the average value of treatment 3 (15%) is significantly higher than other treatments. The results showed that it can be inferred that people prefer dried fish with chili. It is consistent with the argument that people prefer spicy foods in terms of appetite. It seems that consuming chili in meals at gradually higher levels is sufficient to create preferences[1,24].

3.2. Microbial Count

The microbial counting of the study was conducted after the 12, 24, 36 hours to evaluate the products' microbial quality and to ascertain the trend of microbial count across the treatments. It shown to have a lower microbial count than spicy tilanggit added with 15% chili and there was no statistically significant difference between the treatments. Despite of the outcome, the anti-microbial ability of chili should be blamed for the treated groups.

Table. 3. Data on treatment means of microbial count ($1X10^3$) on the days of storage

TREATMENT	Days of Storage			
	DAY 1^{ns}	DAY 2^{ns}	DAY 3^{ns}	Mean
T0	36, 000	36, 000	28, 000	33, 333
T1	32, 000	32, 000	24, 000	29, 333
T2	28, 000	28, 000	20, 000	25, 333
T3	32,000	24, 000	25, 000	27, 000
AVERAGE				28.750

In terms of chili concentration, chili compared to other ingredients included in the product, capsaicin, a compound found in chili, showed an antibacterial impact[18,24]. Purification of the extracts is required in studies to identify the compounds in the chili pepper that give it its antimicrobial properties.

The result of study in terms of the microbial count implies no significant difference. Therefore, chili does not affect the microbial growth among treatments. However, increased in chili concentration might affect the growth of pathogen [6,25].

3.3 Moisture Content

The study included four treatments with varying ratio of chili in tilanggit. The result of moisture content in marinated spicy tilanggit utilizing different concentrations of chili are presented in Table 4.

Table 4. Moisture Content of Marinated Tilanggit added with different ratio of chilli.

PARTICULAR	INITIAL WEIGHT (GRAM)	FINAL WEIGHT (GRAM)	MOISTURE CONTENT (%)
T0	1000g	750g	25%
T1	1000g	735g	26.5%
T2	1000g	760g	24%

T3	1000g	780g	22%

The infrared method was used to determine the moisture content of spicy tilanggit. Four samples were tested with different ratio of chili ranging from 0 to 15%.

4. CONCLUSION

Based on the results of the study, it can be concluded that the addition of 15% chili to the tilanggit product significantly enhances its sensory attributes, making it highly favorable among respondents. Specifically, the addition of 15% chili was found to be particularly effective in improving the flavor and odor of the spicy tilanggit, with panelists rating it as "like very much." Moreover, the incorporation of chili in the range of 5% to 15% yielded comparable effects on the color and texture, indicating that even lower percentages of chili can positively influence these attributes.

Furthermore, the overall acceptability of the spicy tilanggit with 15% chili addition was statistically significant, garnering high ratings from the panelists. This suggests that the optimal chili concentration for enhancing the sensory quality and consumer preference for tilanggit is 15%. These findings highlight the potential of chili as a valuable ingredient in developing appealing and flavorful tilanggit products.

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