The Quality and Acceptability of 'Bakasi' (*Anguilla japonica*) Cookies

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Abstract

The study determined the quality and acceptability of 'Bakasi' (*Anguilla japonica*) Cookies. This sought to answer these objectives: find out bakasi powder formulation to enhance cookies and analyze the acceptability of *bakasi* cookies in terms of color, aroma, taste and texture. The study used the experimental research design in order to determine which of the three treatments representing different concentration levels of bakasi powder (120 grams, 90 grams, and 60 grams) produced better quality cookies. Sensory evaluation using 9 point Hedonic Rating Scale assessed the sensory qualities of the powder under study. Several trials were conducted using three treatments replicated thrice. The results of the study showed that the treatment 2 (Treatment 2) having a concentration mixture of 90 grams bakasi powder was considered to be the most acceptable compared with other treatments. The Quality and Acceptability of 'Bakasi' (*Anguilla japonica*) ingredients contributed to the cookie production business. Processing Bakasi cookies added to the realization of the new thrust in the country's educational system to help the people in enhancing their knowledge and skills in the effective use of bakasi as one of the local raw materials and other resources in the community

Keywords: Bakasi, fish powder, treatment formulation, sensory qualities

Introduction

People in different walks of life strive hard to survive using the immediate resources in the environment as a means of living. They engage in various forms of production in agriculture and in industries to provide the basic economic needs. Productivity is one of the objectives of the economic program of the Philippines. By engaging in fish processing, it has an impact to the financial status of the townsfolks elsewhere among the rural communities in different regions of the country. Using what is available in

the local environment, a booming business can help support the daily needs of the family. Each family is challenged to produce quality food products using nutritious ingredients. As people getting financially stable and more health conscious; the demand for quality foods increases eventually and the availability of the supply of limited resources affects the state of its inadequacy of supply.

Poverty alleviation of the living conditions of poor households is one of the key priorities of the national government, as contained in various development plans. The promotion of small enterprise throughout the country is the government's main thrust. Small businesses greatly contribute to the generation of jobs and income for many Filipinos. Thus, finding a new innovation to ascertain her growth is the reason why this study is conducted. Filipinos love delicacies. Every region or province in the Philippines has one recognized delicacy and consider this as a part of the 'One Town, One Product Policy' (OTOP) of a certain town or municipality, which is recognized by the government through the Department of Trade and Industry (DTI) (Seguerra, Inocian Pacaña, 2008). Carcar is known because of her *chicharon* (cracklings), Argao is known because of her *torta* (butter cake), Talisay is known because of her *lechon* (whole roasted pork), Mandaue is known because of her *bibingka* (rice cake), and Liloan is known because of her *rosquillos* (cookies). These are few among the many examples of local delicacies, which are associated to specific towns and cities in the Philippines, as a vibrant legacy of her food heritage lists.

In the Philippines, breads, cookies and pastries are not just for eating; but these are considered as the country's cultural tradition. Oftentimes, Filipinos share these breads and pastries with their loved ones, bring them home as *pasalubong* or gifts, and eat them together with family and friends during special occasions like anniversaries, birthdays, weddings, wakes, and beach parties for a cohesive social bonding. Filipino foods may not be as famous as that of our Thai and Vietnamese neighbors. But with more than 7,000 islands with a colorful history, the archipelago has produced delicious dishes of its own. Blessed with an abundance of seafood, tropical fruits, herbs, spices, and vegetables, there is more to Filipino dishes/desserts that the Filipinos can be proud of. In fact travelers visiting to the Philippines cannot just afford to leave the country without partaking the country's chow staples. Some foreign tourists wishing to experience the authentic Filipino cuisines must at least have tasted samples of these dishes before leaving the Philippines.

Cookie is one of the traditional foods fondly eaten among many Filipino locals. These are most commonly baked until it becomes crispy or just long enough that these remain softened and chewy. Cookies are made in a wide variety of styles, using an array of ingredients. Community resources

like farm products can be a good ingredient that can be utilized as basis for skills development training in fish processing. Bakasi (*Anguilla japonica*) is a small 8-12 inch saltwater eel known throughout the island of Cebu in Central Philippines (Rosaroso, Dayagbil, Abao, Macan, Pogoy, and Cardillo, 2013) and (Flores, Mata, Parinasan, Inocian, and De la Torre, 2016). As one of the known eels, *bakasi* is more active during the warm season than the cold season (Bouchereau, Marques, Pereira, Guelorget, and Vergne, 2009).

The Philippines, being a tropical country, is characterized with a high temperature becomes an ideal habitat of the *bakasi*. This is abundant in the island of Cordova particularly in the shore of Barangay Buagsong. This is due to the "muddy" seabed which is the common habitat of the *bakasi*. This belongs to the *muraenidae* family. Nowadays, studies of different fish recipes are done in order to improve its taste. *Bakasi* is used in food processing technology for enhancing bakery products like cookies in a range of formulation.

Since people's lifestyle is changing every now and then and due to their heavy workloads, working men and women opt for a healthy version of foodstuffs, which are enriched with seafood, vegetable and fruits. The utilization of *bakasi* powder in bakery products provides housewives additional income. This study answers the recommendation of Risto and Risto (2015) for the recognition of organic food to be processed in a traditional way, as an opportunity for greater development of agro-tourism. Food product innovation using *bakasi* powder in bakery products is the main concern why this study is conducted. Another reason why this study is pursued is to respond on the recommendation of Salvacion (2014) to try several other recipes to be invented in order to respond to the malnutrition problem in the Philippines.

Related Literatures

The innovation of the locally known fruits, herbs, spices, crops, and animals shapes the culture of the inhabitants of the different villages in the region. This becomes the hallmark of their cultural identity that speaks the human psyche-the collective ethos, the lifeblood of our civilization. Related studies that promote this premise rekindle the revitalization and enhancement of our endangered identity that needs to be revitalized, because of the lures of global attractions that affect our indigenous worldview.

In the study of Ocampo and Usita (2015), they conclude that "Lubeg fruit preserves, Jam and jelly can be best used as fillers to baked products when mixed with pineapple jam". They say that Lubeg as a locally grown fruit in the province of Apayao has contributed to the economic production of jam, wines, and cake fillings in the region and recommends other natural elements like fruits and herbs to improve the quality of lubeg products.

Likewise, Cosido, Urtola, Ponce, Inocian, and Cabras (2015) conclude that the chicharon as a delicacy has contributed to bustling business of Carcar's small scale industry, which contributes to the socio-economic development of the city. This conclusion shows viability of the use of pork rind as local resources, similar to the use of *bakasi* powder in baking cookies. The town of Carcar is also known with their bocarillos, which are actually made of the shredded young coconuts colored, sweetened, and hardened for deserts after a regular meal. No one can also resist Carcar's crunchy *ampaw*, which is made primarily of sweetened rice mixed with peanuts, ideal for an afternoon treat or an evening snack.

Another similar product registered in the OTOP is the *torta* of the town of Argao, Cebu. This also utilizes the town's local resources like that of the eggs of native chicken (*Gallus domesticus*), the pork oil, and *lina* or sweetened coconut wine (Flores, et al, 2016). The popularity of this delicacy contributes to the creation of the town's known festival the "La Torta Dance Festival", which is annually celebrated in honor to Saint Michael Archangel, Argao's patron saint.

In relation to the study of native chickens as local resources, Contreras, Catamin, Paragadas and De la Cruz (2014) push for the commercialization of the native chicken and introduce four dishes such as chicken lechon, chicken adobo, chicken nuggets, and fried chicken, which they aspire to be a part of OTOP for their own town. Further, they also suggest producers of these recipes to use local natural additives like spices and herbs. This is one way to assert our identity when it comes to food heritage list in the region.

Another known festival in the province of Cebu is the *Bakasi* Festival of Cordova, which is now replaced with the Dinagat Festival. This is known because of the abundance of *bakasi* as local sea resources. *Bakasi* Fishing is one of the sources of living among the people of the town, which contributes their subsistence by earning income. Locals say that *bakasi* is a known aphrodisiac more especially to men who have low virility. Some couples who dream to have a child adapts eating *bakasi* that is why *bakasi* is known as a fertility food. Though, scientific investigations validate the food chemistry of the *bakasi* by Rupasinghe and Attygalle (2006), Bouchereau, Marques, Pereira, Guelorget, and Vergne (2009), this eel is rich in protein because of its carnivorous nature of eating fish all year round except for milder weather conditions. But, this does not prevent the local community to appreciate the consumption of *bakasi* as part of socio-economic practice of the people in the community. In the Chinese trade, they sell it in order to be dried and pulverized, a potential ingredient for food supplements, food enhancers, and if not for medicines.

Once processed, shrimps can also be used as potential powder for delicious tempuras and crackers that one can enjoy during leisure time. To Khan and Nowsad (2012), countries in Southeast Asia are known producers of crackers basically made of shrimps shell wastes, with high protein component. To Salvacion (2014), "the animal food sources provide the highest quality of complete protein" vis-à-vis, this can also be sourced in the *bakasi*. Khan and Nowsad's study reveals that the production of shrimp wastes to crunch crackers yields a high quality protein. Though considered as junk foods among many, shrimp crackers are ideal for snacks more especially among students in schools and at home while watching one's favorite television shows.

Everywhere at the corner on the busy street of the metropolis near the university junctions and offices are the stalls and carts that sell the popular fish balls, which are also derived from the grinded fish powder. Another product that is created on the same fish source is a nutritional cracker. Okereke and Onunkwo (2014) innovate to produce fish crackers which are basically combined from the ingredients of tilapia (*Oreochromis Niloticus*) and catfish (*siluriformes*). This study diversifies the fish industry in Nigeria that helps create national income.

Objectives of the Study

The study determined the quality and acceptability of 'Bakasi' (*Anguilla japonica*) Cookies. This sought to answer these objectives: find out *bakasi* powder formulation to enhance cookies and analyze the acceptability of *bakasi* cookies in terms of color, aroma, taste and texture.

Methods and Materials

Research Design

This study utilized an experimental design of the quality and acceptability of *Bakasi* (*Anguilla japonica*) Cookies. The prepared *bakasi* powder were measured and used to enhance cooking following the three (3) treatment formulations. The first formulation was (T1) cookie mixture added with 120 grams *bakasi* powder, (T2) cookie mixture added 90 grams *bakasi* powder, and (T3) cookie mixture added 60 grams *bakasi* powder. The different levels on quantity of *bakasi* powder were added to the other three (3) formulated treatments.

Research Tools

The two kilograms of *bakasi* fish were cleaned/ washed, boiled and skinned to remove body covering, which is believed to be toxic. The fillet of *bakasi* fish was flaked, baked and pulverized. All other ingredients were held constant in all the three treatment formulations. There were sixty (60)

panelists consisting of three groups; teachers, students and consumers. The samples were subjected to sensory evaluation and testing using the 9-point Hedonic Scale Rating and Quality Scoring by trained and untrained panelists. Score sheets were used to evaluate the sensory attributes. The result of the evaluation were collated, tabulated, analyzed and interpreted statistically. To ensure its scientific objectivity of the treatments, the Analysis of Variance (ANOVA) is used.

Results and Discussion

Bakasi Powder Formulations in Three Treatments

Table 1: Bakasi (*Anguilla japonica*) Cookies Treatment Formulation Matrix

TREATMENT 1	TREATMENT 2	TREATMENT 3
3 cups all purpose flour	3 cups all purpose flour	3 cups all purpose flour
1 cup butter	1 cup butter	1 cup butter
1 cup refine sugar	1 cup refine sugar	1 cup refine sugar
2 egg yolks	2 egg yolks	2 egg yolks
1 tsp baking powder	1 tsp baking powder	1 tsp baking powder
1 tsp baking soda	1 tsp baking soda	1 tsp baking soda
120 grams *bakasi* eel powder	90 grams *bakasi* eel powder	60 grams *bakasi* eel powder

The Table 1 shows the different treatments of *Bakasi* Cookies. Treatment 1 used 120 grams *bakasi* eel powder plus the other ingredients, Treatment 2 used 90 grams *bakasi* eel powder plus the other ingredients, Treatment 3 used 60 grams *bakasi* powder plus other ingredients. The table also reveals that the three treatment formulations of *Bakasi* Cookies differ only in the amount of *Bakasi* powder being used.

Sensory Quality Attributes

Table 2: Acceptability of Color

Treatment	R1	R2	R3	Total	Mean
T1	6.4	8.53	6.01	20.94	6.98
T2	7.31	8.55	6.11	21.97	7.32
T3	6.23	8.06	5.85	20.14	6.71
Total	19.94	25.14	17.97	63.05	

Color is one of the most appealing attractions in terms of food selection. Inocian (2013 and 2015) rejoins this that color provides a strong attraction in the cooked *puso* or hanging rice pouches in Cebu. Table 2 shows the variations in ratings of the cookies. Based on the figures, it can be observed that the color of the cookies formulation utilizing *bakasi* powder is more appealing to the eyes of consumers. This means that in terms of color acceptability treatment two (2) having a mixture of 90 grams *bakasi* powder,

with the average mean of 7.32 is the most acceptable product in terms of color based on the assessment of the panelists.

Table 3: Acceptability of Aroma

Treatment	R1	R2	R3	Total	Mean
T1	6.56	8.5	5.95	21.01	7.00
T2	6.98	8.57	6.4	21.95	7.31
T3	6.11	8.48	6.23	20.82	6.94
Total	19.65	25.55	18.58	63.78	

One aspect to determine how palatable the food offered on the table is the aroma. From Table 3 variation in ratings of the acceptability of aroma in *bakasi* cookies can be observed. The table shows the mean of each treatment with respect to Aroma attributes. For T1, the mean is 7.00, while for T2 the mean is 7.31. For T3, the mean is 6.94. The aroma of the cookies utilizing 90 grams of *bakasi* powder has the most pleasant aroma to the consumer panelists, which is in T2.

Table 4: Acceptability of Taste

Treatment	R2	R2	R3	Total	Mean
T1	6.3	8.35	6.21	19.86	6.95
T2	6.68	8.6	6.8	22.08	7.36
T3	6.6	8.18	5.75	20.53	6.8
Total	19.58	25.13	18.76	62.47	

Based on taste, it can be noted that the formulated cookies utilizing 90 grams of *bakasi* powder is the most suitable to the respondents. Table 4 shows the variety of assessments in terms of taste. Taste is highly palatable in T2 that obtains the highest mean of 7.36 followed by T1 with the mean of 6.95, and T3 with the mean of 6.84. The Table reflects 7.36 the mean scores acceptability of taste of *bakasi* cookies. The panelists' ratings in different treatments reveal an acceptability mean scores that range from 6.8 to 7.36. The results implies **Treatment 2 (T2)** has the most suitable taste to the respondents, which is similar with the findings of Okereke and Onunkwo (2014) that fish crackers made from tilapia and catfish are accepted by the consumers in terms of taste and contributes to the food and nutritional security that alleviates poverty in Nigeria.

Table 5: Acceptability of Texture

Treatment	R1	R2	R3	Total	Mean
T1	6.11	8.2	5.85	20.16	6.72
T2	7.05	8.3	6.06	21.41	7.13
T3	6.43	8.53	6.41	21.37	7.12
Total	19.59	25.03	18.32	62.67	

Table 5 illustrates the mean acceptability scores for the texture of *bakasi* cookies. Treatment 1 (T1), the mean is 6.72, while **Treatment 2 (T2) the mean is 7.13**. For Treatment 3 (T3) the mean is 7.12. The panelists

prefer treatment 2, which implies that the cookie mixture has resulted in a very crispy texture, mostly acceptable to the panelists. To Inocian (2013 and 2015) supports the value of texture in a certain food recipe, he rejoins that texture provides freshness of the *puso* or hanging rice.

Table 6: General Acceptability

Treatment	Color	Aroma	Taste	Texture	Total	Average	Verbal Description
T1	6.98	7.00	6.95	7.13	28.07	**7.02**	**LM**
T2	7.32	7.31	7.36	6.72	28.71	**7.18**	**LM**
T3	6.71	6.94	6.8	7.12	27.57	**6.89**	**LM**
Total	7.00	7.08	7.04	6.99	28.11	**7.03**	**LM**

The mean in general acceptability of the three formulations are presented in table 6. All treatments obtain the verbal description with **Like Moderately (LM)** from the sensory evaluation of the identified panelists. As presented in Table 6, it is found out that the three treatment formulations reveal a Like Moderately response by the panelists. Although there is a slight difference in the evaluation of the professors, students and consumers of *Bakasi* Cookies; but the result of the three formulations the most accepted is the Treatment 2 (T2), which comprises of 90 grams of *bakasi* powder.

Table 7: Summary on the Level of Acceptability Mean Scores as Evaluated by 60 Panelists

Attributes	T1			Mean	DR	T2			Mean	DR	T3			Mean	DR
	R1	R2	R3			R1	R2	R3			R1	R2	R3		
Color	6.4	8.53	6.01	6.98	LM	7.31	8.55	6.11	7.32	LM	8.06	6.23	5.85	6.71	LM
Aroma	6.56	8.5	5.95	7.00	LM	6..98	8.57	6.4	7.32	LM	8.48	6.11	6.23	6.94	LM
Taste	6.3	8.35	6.21	6.95	LM	6.68	8.6	6.8	7.36	LM	8.18	6.6	5.75	6.84	LM
Texture	6.11	8.2	5.85	6.72	LM	7.5	8.53	6.06	7.29	LM	8.53	6.43	6.41	7.12	LM

The most acceptable treatment was determined based on the mean value of the attributes being evaluated. In terms of color, in order to get the mean, the ratings given by the panelists are summed up and divided by 60. The treatment obtaining the highest mean is the most acceptable. The same procedure is applied to the rest of the product attributes.

Table 8: One – Way Analysis of Variance on Level of Acceptability as Evaluated by 60 Panelists

Source of Variation	***SS***	***Df***	***MS***	***F***	***P-value***	***F crit***
Between Groups	0.010492	3	0.003497	0.0472757	0.985379	4.066181
Within Groups	0.5918	8	0.073975			
Total	0.602292	11				

The Sum of Squares between groups is 0.010492 with the four attributes (Color, Aroma, Taste, and Texture) and three is the degree of freedom producing the Mean Square 0.003497. The Sum of Square within group is 0.5918 with eight degree of freedom and a Mean Square 0.073975 is produced. The findings show that the null hypothesis is accepted which stated that there is no significant mean difference between the original roll-out cookies and the acceptability of *Bakasi* (*Anguilla japonica*) Cookies, a distinction that Baskasi cookies have unique attributes of quality and acceptability than other cookies. This is supported by the conclusion of Khan and Nowsad (2012) that flavor, texture, and overall acceptability of shrimp crackers reveal to have a good prospect for trade that brings economic benefit of the producer. Likewise, this has been related to the findings of Mahawan, Tenorio, Gomez, and Bronce (2015) that their experiment on the use of avocado seed flour, the result shows a highly significant difference of the biscuits using 0%, 25%, and 50% in terms of color, taste, texture, aroma and overall acceptability.

Conclusion

The quality and acceptability of '*Bakasi*' (*Anguilla japonica*) ingredients contributed to the cookies production business. Processing *Bakasi* cookies added to the realization of the new thrust in the country's educational system to help the people in enhancing their knowledge and skills in the effective use of *bakasi* as one of the local raw materials and other resources in the community.

Recommendation

Based on the results of the study, the following may be recommended: the production of the techno guide to be prepared by housewives as a form of alternative livelihood programs in the community, other scholars will look into the quality and profitability of *Bakasi* Powder in Cookie Production, study on the use of *Bakasi* in making Fish Pretzel, and Study on the shelf life and Packaging Design of *Bakasi* Cookies.

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