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BREADFRUIT (Artocarpus, Altilis, Park, Fosb) CATSUP: LIVELIHOOD TECHNOGUIDE

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ABSTRACT

The experimental research was conducted to determine optimum levels of salt, sugar and vinegar that will produce the best treatments and the desired sensory attributes and physico-chemical composition of breadfruit (Artocarpus, Altilis, Park, Fosb) catsup to be able to formulate a technoguide. The study employed the Response Surface Methodology (RSM). Box Benken Design (BBD) in 3^3 fractional factorial design was used to determine the fifteen treatments of the study. Findings revealed that optimum formulation of breadfruit catsup greatly influence its sensory terms of color, flavor, consistency, aftertaste, and general acceptability. In effect this makes the newly developed product more acceptable, and comparable to its commercial counterparts. High acceptability of breadfruit catsup can be due to its sweet and sour taste and the color associated with it. The findings further disclosed that breadfruit catsup product has wider acceptance among consumers.

KEYWORDS: Breadfruit catsup, livelihood, technoguide.

INTRODUCTION

Breadfruit (artocarpus, altilis, park fosb), a nutritious starchy melon weighing between two to five pounds was looked upon as an excellent food source for the African slaves in the plantation of Caribbean. Although it is a fruit, its light yellow flesh has the starchy consistency of unripe potato which makes it softens to about consistency of a mango but without the sweetness (Hughes, 1995).

A starchy staple of the Caribbean and Pacific Island, breadfruit, fluid, baked, boiled, and sometimes mixed with coconut milk to a pudding. On the other hand, in Guam, a kind of biscuit is made by slicing the boiled fruit into a moderately then selection and drying slices under the sun or over. This dried preparation which may last until the next fruiting season may be eaten as is toasted or grounded and in other several ways (Hughes, 1995 2000).

Furthermore, different preservations methods like refrigeration, freezing, salting, fermentation, drying and dehydration, sugar preservation of fruits are now available in both domestic and international market (De Leon and Guzman, 1982). However, for breadfruit plain boiling and frying are some of the ways of utilizing the fruit. If the fruit can be processed into an acceptable, stable and nutritious product such as catsup then utilization of breadfruit can be maximized.

Catsup/ketchup sauce is increasingly becoming a popular condiment used as a flavoring in gradient in fast food or even in our homes as part of our daily meals. To date banana and tomato are the main ingredients in making catsup/ketchup here in the Philippines. Banana and tomato are greatly in demand in every Filipino menu and dishes that's why their prices were quite expensive (Constan, et.al,). On the other hand, the demand for catsup is considering high. Hence, there is a cogent need for existing and prospective processors to search for readily available substitute raw materials to assure continue processing of the product and to lower the cost of producing it if possible without changing its sensory qualities (Amestoso, 1995).

To overcome these problems some researchers have been focused on utilization of breadfruit. The researcher aims at converting the perishable product into more stable, nutritious and highly marketable food products. At present, breadfruit production in Biliran Province is mainly for farmers' subsistence. The high perishability, low market value and bulkiness of breadfruits are the major constraints in motivating farmers to venture into large scale production of breadfruit. It is therefore, obvious that processing and utilization play an important role in the promotion and stabilization of this fruitcrop.

Likewise, breadfruit (*artocarpus, altilis, park fosb*) is considered to have high processing potentials for both local consumption and export. It is also one of the potential raw materials for catsup production based on the preliminary study of Duallo (2006). Breadfruit processes a great potential for processing because of its unique and desirable physico-chemical properties

and starchy in nature. Its high protein and low fat content are added characteristics that make breadfruit catsup a healthy food (Lauzon, 2000).

MATERIALS AND METHODS

The study employed the experimental method of research utilizing laboratory techniques and procedures in the developing breadfruit catsup. The formulation of the product was based on researcher's previous study. A constant 400 grams freshly harvested mature breadfruit was used in this study.

Salt, sugar and vinegar at different levels in each formulation with other ingredients were held constant. Utensils, apparatus and equipment, mixing processes and the time of cooking were also the same all throughout the process.

Samples were labelled prior to sensory analysis using a sensory score cards. The Response Surface Methodology (RSM) was employed in this experiment. The optimization in this study combined special experimental designs with Taylor First and Second Order Equation in a sequential testing procedures as cited by Henika (1972). A Box Benken Design (BBD) was followed for response surface regression in 3^3 fractional factorial designs to determine the influence of chosen variable of difficult levels of salt, sugar and vinegar are independent variable.

A total of fifteen treatments were formulated. Chosen levels were 15, 20, 25 grams for salt: 120, 160 and 200 grams of sugar and 150, 200 and 250 ml of vinegar. These fifteen treatments were subjected to optimization study, which indeed activities leading to the choice of a best product formulation. Different formulations were compared and the most favorable option was retained while the other was discarded (Gordon and Dorkback, 1985).

The optimization pattern in this study followed the fractional factorial experiment design for the three variables namely: salt, sugar, and vinegar are unique at three levels.

RESULTS AND DISCUSSION

The subsequent tables illustrated below manifest the results of the study. Outlined of the tables are the optimum formulation of breadfruit (*artocarpus, altilis, park, fosb*) catsup, the physico-chemical qualities of breadfruit catsup, consumer's acceptance and the cost of production.

Table 1: Optimum Formulation of Breadfruit catsup.

Salt	Sugar	Vinegar
16 to 24 gms	151gms	214 ml

It could be gleaned in the above table that among the parameters studied, the interaction of salt, vinegar and sugar played a significant effect on the visual sensory acceptability. With all ingredients held constant the optimum levels of salt, vinegar and sugar in breadfruit catsup contained 16 to 24 grams of salt, 151 grams of sugar and 214 ml of vinegar in a 1000 ml recipe.

Table 2: Physico-Chemical Qualities of Breadfruit Catsup Proximate Complex.

pH AWM	TSS AWM	% Moisture	% Dry Matter	% Crude Proteins	% Crude fat	% Crude Fiber	% Ash
3.71	18.0	74.5	25.46	0.84	1.28	0.09	2.93

As shown in the table, the physico-chemical qualities of breadfruit catsup were influence by the levels of the variables in the formulation. The pH of the product was affected by practically all the parameters studied. However, Total Soluble Solid (TSS) was more affected by salt which includes both its linear and quadratic terms indicating that TSS values increased with salt after a contain point but decreases after that. While the proximate analysis disclosed that breadfruit catsup contained 74.5 percent moisture content, 25.46 percent dry matter, 0.84 crude protein crude fat, 1.28 percent crude fat, 0.09 percent crude fiber and 2.93 percent ash.

Table 3: Acceptability Level of Breadfruit Catsup by consumers.

Level of Acceptability	AWW	Verbal Description
Color	3.46	Pale Orange
Flavor	6.31	Like slightly
Consistency	6.66	Like moderately
Aftertaste acceptability	6.34	Like slightly
General acceptability	6.55	Like moderately

It could be noted in the foregoing table, the sensory evaluation disclosed varied significant differences among the sensory attributes studied. For sensory acceptability evaluation only consistency and after taste resulted no significant differences among the regression parameters studied.

Table 4: Consumers testing of breadfruit Catsup.

Code	Like	Dislike	Total
(A) Catsup without chicken	92	8	100
(B)Catsup with chicken	99	1	100
	Yes	No	Total
Use this catsup	98	2	100
Are you willing to buy this if available in the market	99	1	100

As regards to consumer's testing, divulged that breadfruit catsup was highly acceptable and they were very much willing to utilized breadfruit catsup for food preparation or cooking and were willing to patronize the product if available in the market.

Table 5: Cost an Return in Producing 400 grams Breadfruit Catsup.

Items	Quantity (m/ or 9)	Provability Price (P)
A. Cost		
Breadfruit	400	1.00
Vinegar	200	2.25
Sugar	160	8.00
Onion fresh	18.1	5.00
Salt	20	0.25
Onion powder	15.2	5.00
Cinnamon	22	5.00
Garlic powder	3.7	5.00
Paper labuyo	2.0	0.25
Food color	16 yellow with .44 red	1.00
Gas		2.00
Bottle	5 pcs	0.25
Total Cost		**35.00**
B. Return	5 bottles of ₱17.00/bottles	₱85.00
C. Net Income		50.00

The result revealed that the cost and return analysis was also determined by subtracting the total production cost for the gross income. It was observed that breadfruit catsup production is profitable and could be a good source of livelihood that could help augment family income.

CONCLUSION

Based on the findings of this study, the optimum formulation of breadfruit catsup greatly influenced its sensory quality acceptability. This makes the product more acceptable and comparable to its commercial counterparts. High acceptability of breadfruit catsup can be due to sweet and sour taste, color, as well as the flavor associated with it. Its high acceptance and diverse uses may greatly contribute to high demand of this product. Therefore, optimum formulation of breadfruit is found to be economically profitable. Thus, may create a gainful

employment for those who may wish to venture in the production of breadfruit catsup. It is technically possible and economically feasible.

RECOMMENDATIONS

The following are recommended for implementation to enhance the output of the study:

1. Follow the optimum formulation of breadfruit catsup to include 16 to 24 grams of salt, 151 grams of sugar, and not more than 214 ml of vinegar for a 1000 ml recipe.
2. Storage studies and microbial examination as well as analysis of nutritional value of breadfruit catsup are highly recommended for health and safety reasons prior to mass production.
3. Adopt the proposed activities of breadfruit catsup production for target community as livelihood/income generating project.
4. Explore more possibilities of utilizing breadfruit in product development.
5. Farmers as well as household members should be encouraged to plant and raise breadfruit as primary source of catsup and other product development activities.

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