GREEN JACKFRUIT(Artocarpus heterophyllus) FLOUR AS SUBSTITUTE TO COMMERCIAL FLOUR

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ABSTRACT Jackfruit (Artocarpus heterophyllus Lam.) is an ancient fruit that is widely consumed as a fresh fruit. The use of jackfruit bulbs and its parts has also been reported since ancient times for their therapeutic qualities. The beneficial physiological effects may also have preventive application in a variety of pathologies. The health benefits of jackfruit have been attributed to its wide range of physicochemical applications. This review presents an overview of the functional, medicinal, and physiological properties of this fruit. Some physicochemical and rheological properties of jackfruit seed flour and starch, isolated from the flour were investigated. The flour had good capacities for water absorption (205%) and oil absorption (93%). Substitution of wheat flour with the seed flour, at the level of 5, 10 and 20% markedly reduced the gluten strength of the mixed dough. The Brabender amylogram (6% concentration, db) of seed starch showed that its pasting temperature was 81 °C and its viscosity was moderate, remained constant during a heating cycle and retrograded slightly on cooling. The starch showed an A-typed X-ray powder diffraction pattern.

Keywords: Jackfruit Flour, Jackfruit Starch, physicochemical and rheological properties

INTRODUCTION

Background of the Study

Flour has been made since prehistoric times. The earliest methods used for producing flour all involved grinding grain between stones. Home-based flour makers who produce flour for their own daily consumption and to give to friends and family. Most flour makers, no matter what level, normally aim for one or all of these objectives in their practice. Flour is the perfect complement to bake some cakes or different cakes and also it can make some desserts like "lutong pinoy (kakanin)".

Jackfruit (Artocarpus heterophyllus) is popular fruit crop that is widely grown in Thailand and other tropical areas including the Philippines. The ripe fruit contains well flavored yellow sweet bulbs and seeds (embedded in the bulb). The edible bulbs of ripe jackfruit are consumed fresh or processed into canned products.

Seeds make-up around 10 to 15% of the total fruit weight and have high carbohydrate and protein contents. There have been few studies on jackfruit seeds. Seeds are normally discarded or steamed and eaten as a snack or used in some local dishes. There had been researches conducted for utilizing the jackfruit seeds such as conducted by Bobbio et al (1978) which reported some physicochemical properties; Kumar et al (1988) studied the proximate compositions of two varieties of jackfruit seeds and reported considerable biochemical difference between the two varieties; Rahman et al (1999) in which the starch content of the seed increases with maturity. All above studies and researches conducted are focused in the utilization of jackfruit seeds which may have neglected the process on how to utilize or to process the unripe jackfruit flesh flour. It was observed that in the locality, aside from being sold in the market as part of the local recipes and menus, still a large volume of these unripe fruit are rotting caused by underutilization or somehow the lack of ideas on how to utilize them fully.

Based on thorough internet searches and journal sources, there are no studies that have been conducted for processing unripe jackfruit flesh flour as flour and using it for bake products. The researchers aimed to process flour made from unripe jackfruit flesh. Unripe jackfruit flesh is not fully utilized for human consumption or food production, hence this study was proposed.

Objectives of the Study

This study is aimed to make process and formulation in producing flour from unripe jackfruit flesh and conduct acceptability testing for the three (3) treatments of bread using the said product. Specifically this study aims to:

1. to determine the feasibility of processing green jackfruit as flour.
2. to develop a process schedule for green jackfruit flour.
3. to conduct the acceptability testing of green jackfruit flour.

METHODOLOGY

Criteria of the study

The study was based on the information gathered and related studies conducted by other researchers which would be the basis in processing the flour from unripe jackfruit flesh.

Description of the Product. The study utilized the unripe jackfruit flesh flour in baked product for the conduct of sensory evaluation or acceptability testing of the product. The researchers determined the appropriate treatments, in which two (2) samples were done for each treatment.

Replication Treatments for Unripe Jackfruit Flesh Flour Bread. The researchers prepared two (2) treatments for the purpose of evaluating the appropriate formulation or ratio of flour mixture (unripe jackfruit flesh flour and bread flour) for the finished product. The researchers also prepared one (1) kilo of flour mixtures for each trial as reference volume for the study while all other ingredients are the same as reflected in the recipe. The table below showed the computed proportion of flours to be used for all replications.

Treatment	Jackfruit Flesh Flour		Bread Flour	
	%	Weight in Grams	%	Weight in Grams
1	25	250	75	750
2	75	750	25	250

Evaluation of the Study

Part One of the study determined the appropriate researchers-made procedure in producing flour from unripe jackfruit flesh. Part Two of the study, evaluation was conducted using the flour made from unripe jackfruit flesh by having a sample baked food product. Thirty (30) randomly selected students and faculty acted as respondents of the study. Five (5) hedonic scale was used as measure of acceptability as to sensory evaluation of the said product. Description of rating were: 5 (like extremely, 4(like moderately), 3 (Dislike slightly), 2 (Dislike moderately), and 1 (Dislike very much).

The following are the raw materials, supplies, tools and materials needed in making green jackfruit flour.

Product	Raw Materials	Supplies	Tools/Equipment
Green Jackfruit Flour	Green jackfruit	Apron	Cabinet Dryer
	Rock salt	Hairnet	Strainer
	De-browning agent	Disposable Hand Gloves	Weighing scale
		Face mask	Stainless Steel Bowls
		Cheese cloth	Water tubs
			Basin
			Knife
			Chopping board
			Flour mill

Procedures for Processing Green Jackfruit Flour

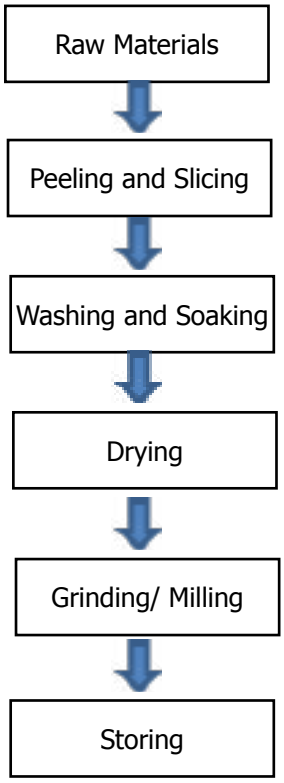
1. Peel the jackfruit.
2. Slice the unripe jackfruit flesh thinly.
3. Wash the sliced jackfruit thoroughly.
4. Soak in water with the treatment to remove the latex.
5. Drain and arrange in trays to dry
6. Grind the dried unripe jackfruit flesh until desired fineness is attained.
7. Sift and pack the jackfruit flour in air tight container and store in cool dry place.

Procedures for Utilizing Jackfruit Flour for Baked Product

1. Prepare (weigh/measure) all needed ingredients.
2. Add all ingredients and mix until the desired consistency of the dough is achieved.
3. Knead the dough thoroughly and form into desired shape and sizes.
4. Proof the sliced dough for 1 hour.
5. Pre-heat the oven at 110 degrees Celsius to 120 degrees Celsius for 15 minutes.
6. When it is finished, insert a toothpick into the center. If it becomes out clean, it's done. If not, bake it for a few more minutes.
7. After the bread is baked, let it rest in the oven for 2 minutes
8. Take out and serve.

Preparation of Materials and Equipment

All the products to be produced will undergo the following process:



Output variable:
Recovery
Yield

Table 2. Budgetary Requirements

Quantity	Unit	Description	Unit cost	Total cost
20	Kilograms	Unripe jackfruit	20.00	400.00
1	cup	Rock salt	5.00	5.00
20	grams	De-browning agent	25.00	25.00
2	kilograms	White sugar	60.00	120.00
1/2	dozen	Egg	8.00	96.00
25	grams	Yeast	10.00	10.00
350	ml	Corn oil	60.00	60.00
30	ml	Vanilla	30.00	30.00
1	kilo	Bread Flour	40.00	40.00
2	cans	Evaporated milk	30.00	60.00
Sub Total>>>>>>>>>>>>>>>>>>>>>				846.00
Grand Total (x 3 replications) >>>>>>>				2,538.00

Recipe for Utilizing Jackfruit Flour Bread
Ingredients

- ✓ 2 ¼ teaspoons active dry yeast
- ✓ ¼ cup warm water
- ✓ 1 cup lukewarm milk
- ✓ 2 tablespoon margarine
- ✓ ½ cup sugar
- ✓ 1 teaspoon salt
- ✓ 2 eggs, beaten
- ✓ 4 ½ cups bread flour or more as necessary
- ✓ jackfruit flour

Procedures for Utilizing Jackfruit Flour for Baked Product

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6. When it is finished, insert a toothpick into the center. If it becomes out clean, it's done. If not, bake it for a few more minutes.
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RESULTS AND DISCUSSION

As a result of the study, attributes such as appearance, flavor or taste and aroma or smell of the finished product, the jackfruit flour bread, presented high results collectively ranging from "like moderately" to "like extremely"; while attributes such as texture and mouth feel, presented results ranging from "neither like or dislike" to "like extremely".

Evaluation as to appearance, yielded high assessment described as "like extremely". Treatment 1, frequency mean = 17 or 57% and treatment 2, frequency mean = 18 or 60% of the respondents respectively generally accepted the appearance of the finished product.

Evaluation results as to flavor or taste, yielded high marks described as "like moderately". For treatment 1, frequency mean = 16 or 53% and for treatment 2, frequency mean = 21 or 70% as presented in table 16, implied that this quality of the finished product was generally accepted to produce a pleasing impressions to the palate.

In terms of aroma/ smell the evaluation for treatment 1, frequency mean = 18 or 60% described as "like extremely" and treatment 2, frequency mean = 20 or 67% described as "like moderately" as reflected in table 16, shown that treatment 1 was more preferred than treatment 2 but that does not mean that the finished product is low-grade. This might imply that the preference of the treatment for the final product should follow the treatment 1 in order to be generally accepted by consumers.

As to texture, in treatment 1 the respondents evaluated "like moderately" with a frequency mean = 17 or 57% while treatment 2 was evaluated "like extremely" with a frequency mean = 25 or 83% which showed that the attribute (texture) of the finished product sought after by the consumer was presented by treatment 2. Although some of the respondents are undecided for treatment 1, this does mean that they do not like the product.

In terms of mouth feel, the ratings for treatment 1, frequency mean = 12 or 40% described as "like moderately" and treatment 2, frequency mean = 20 or 67% described as "like extremely" as reflected in table 16, the respondents assessed and agreed the finished product presented the softness was appealing to the touch and palate of the evaluators. The result showed that the attribute (mouth feel) of the finished product sought after by the consumer was presented by treatment 2. Although the same with "texture", some of the respondents are undecided for treatment 1, this does mean that they do not like the product, it might mean that they are expecting a more fineness and fullness in jackfruit flour bread the equally with commercial flour.

Attributes	Hedonic	Treatment 1		Treatment 2	
		Descriptions		Mean	
		f	%	f	%
Appearance	Like extremely	17	57	18	60
	Like moderately	13	43	12	40
Flavor/Taste	Like extremely	15	50	9	30
	Like moderately	16	53	21	70
	Like extremely	18	60	11	37
Aroma/Smell	Like moderately	12	40	20	67
	Like extremely	11	37	25	83
Texture	Like moderately	17	57	5	17
	Neither like or dislike	3	10		
Mouth feel	Like extremely	11	37	20	67
	Like moderately	12	40	11	37
	Neither like or dislike	8	27		

CONCLUSION

The appearance, flavor or taste and aroma or smell was the attributes having high results was generally accepted by the respondents. Moreover, the texture and mouth feel of the finished product was highly satisfactory to the respondents and agreed that the finished product presented the softness and consistency was appealing to the touch and palate of the evaluators. Based on the high results of the sensory evaluation for acceptability of the product, the researchers conclude that the jackfruit flour bread offered a potential for production and has slated itself to the table as Pinoy almusal.

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