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Going Local? Assessment of Arrowroot (*Maranta arundinacea l.*) Flour in Pandesal Making in the Philippines

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Abstract

This study aimed to assess the acceptability of arrowroot flour (Maranta arundinacea L.) in the country's production of salt bread (pandesal). Two experiments were conducted: a pre-experiment and an actual experiment. The pre-experiment had two trials in making pandesal wherein the first trial focused on producing traditional pandesal (T1, 0%) while the second trial used different percentages of arrowroot flour (T2, 20%; T3, 30% and T4,40%) to determine the optimum ratio with selected flours. The acceptability used a 9-point Hedonic scale wherein nine is the highest (Like extremely) and 1 (Dislike extremely). Results showed that T1 had the highest general acceptability (7.8) followed by T3 (7.5) and both were labeled as 'Like very much' while T2 (6.8) and T4 (6.7) were both labeled as 'Like moderately'. In terms of cost, T1 was the cheapest, and T4 was the most expensive. While arrowroot-based flour pandesal is more expensive right now, it was found to be an acceptable flour substitute for making pandesal. Using this flour as an alternative to producing bread can help address the problem of the country's heavy dependence on imported flour. The result of this study and further studies on the use of arrowroot flour will support local farmers in growing arrowroot for other potential uses.

Keywords— acceptability, arrowroot flour, assessment, sensory evaluation

1 Introduction

Arrowroot (*Maranta arundinacea L.*), is a low perennial herbaceous plant more popularly known as "uraro" in the Philippines. Its roots and tubers are usually cultivated due to their carbohydrate content [1, 2]. This plant is known for its various uses and is found mostly in tropical countries like Indonesia and Philippines and grown for its medicinal properties and other health uses [3]. It is also common in tropical regions around South America and the West Indies [4, 5, 6]. The plant is widely cultivated and used for its starchy rhizome which is transformed into the energy-providing ingredient called starch [7] and the popularly known 'arrowroot flour'. Arrowroot requires friable, well-drained soil, but studies have shown that it can thrive in an open field with sufficient moisture during its growing period [8].

In the early times, natives from the West Indies used the arrowroot plant as a cure for poisoning, such as snake venom found in combat arrows [9]; hence, the term 'arrowroot' is believed to have originated from this plant. The rhizome is commonly used to transform into flour or starch as a baking ingredient in cookies, biscuits, cakes, and desserts [10, 11].

After harvesting the arrowroot rhizome it is then transformed into a dry white powder called arrowroot flour which is then sold to the market as a baking ingredient. It is a good source of carbohydrates, which form into starch and are suitable ingredients for making foods for infants and medicinal tablets [3, 12]. Based on a study by Deswina and Priadi [13], arrowroot flour is also a good source of potassium, minerals, iron, manganese, phosphorus, magnesium, zinc, protein and is low calorie. Baked products such as bread and biscuits made of arrowroot flour are easily digestible which is good for children [14]. Another reason why arrowroot flour is easier to digest is because it contains a low glycemic index, helps decrease risk factors for diseases such as diabetes mellitus, and improves health in general [13, 15, 16, 17]. Arrowroot flour is known to be gluten-free, which is excellent for people with celiac disease. 100g of freshly harvested arrowroot only contains 65 calories [18].

Gluten is a protein that helps maintain the dough's stability and consistency, keeping the shape of the bread. A lack of gluten can result in the dough from collapsing or rupturing during baking [11]. Compared to arrowroot flour, which is gluten-free, other gluten-containing flours are required to maintain the shape of the bread when baked.

However, even though gluten has its benefits, it still has disadvantages. One of these disadvantages is Celiac disease. Celiac disease is known to be an autoimmune condition that is caused by ingesting food that has high gluten [19]. There are different clinical features to observe in determining whether an individual has celiac disease including stature that is short, difficulty or failure to thrive during childhood, puberty, lethargy, and loss of weight [6]. With the prevalence of celiac disease, the production of gluten-free foods has increased. With that, there has been an increase in the consumption of wheat-free products, especially by people who have celiac disease or any other gluten intolerance [20].

The Philippines is known to produce a significant amount of rice and corn. However, in the case of wheat or barley, less significant amounts are produced because the climate in our country is unfitting for these grains. This is one reason Filipinos depend on imported wheat or barley to make baked goods like pandesal. Studies have shown that there has been an increase in Filipinos' appetite for imported goods, and wheat is the main food ingredient exported to the Philippines [21]. According to Alviola and Monterde [20], consuming refined wheat products can be associated with diabetes, poor digestive health, unwanted weight gain and cardiovascular diseases due to the high glycemic index. To help with the rising import of flour for bread and its association with high-risk diseases, this study focuses on finding a locally sourced alternative to help prevent high-risk diseases.

Thus, this study aimed to assess the acceptability of arrowroot flour as a flour substitute for pandesal making. Specifically, it aimed to: (1) determine the optimum ratio of arrowroot flour in

proportion to all-purpose flour and bread flour used in pandesal making; (2) assess the general acceptability of arrowroot flour in making pandesal using sensory evaluation; (3) compare the cost of arrowroot pandesal with other pandesal; and (4) formulate recommendations/adjustments on how arrowroot flour will be more acceptable in making pandesal.

The Philippine salt bread, locally known as "Pandesal," is a traditional breakfast bread staple for Filipinos. Its' level of acceptability to most Filipinos is highly accepted [22]. It is commonly composed of wheat flour, sugar, salt, shortening, and yeast with the added salt and use of breadcrumbs making the pandesal unique [23].

With that, the production of pandesal in different bakeries and shops has increased over time. However, as the demand for pandesal increases, so does the demand for imported flour, resulting in continuous price increases for bread in the country. Thus, the results of the study may serve as a basis for policy makers to craft policies to support the planting of arrowroot and other locally-grown plants that may be used as alternative ingredients in bread production. A study conducted by Widanti et al. [24], explains that using arrowroot flour as a substitute but with the addition of modified cassava flour in cake making has high acceptability among people, which can help bakers and other food producers in deciding if arrowroot flour can be an excellent substitute to other flours. In doing so, it is hoped that pandesal with arrowroot flour as an alternative ingredient to imported flours will benefit Filipino consumers and the agriculture sector.

2 Methodology

The study was conducted at the College of Human Ecology and College of Forestry and Natural Resources, University of the Philippines Los Baños, Los Banos, Laguna.

The participants/evaluators were selected through purposive sampling. They were carefully selected based on the assumption that they can evaluate the pandesal independently and objectively. Their evaluations were based on the following criteria: (1) appearance, (2) odor, (3) taste, (4) texture and (5) general acceptability.

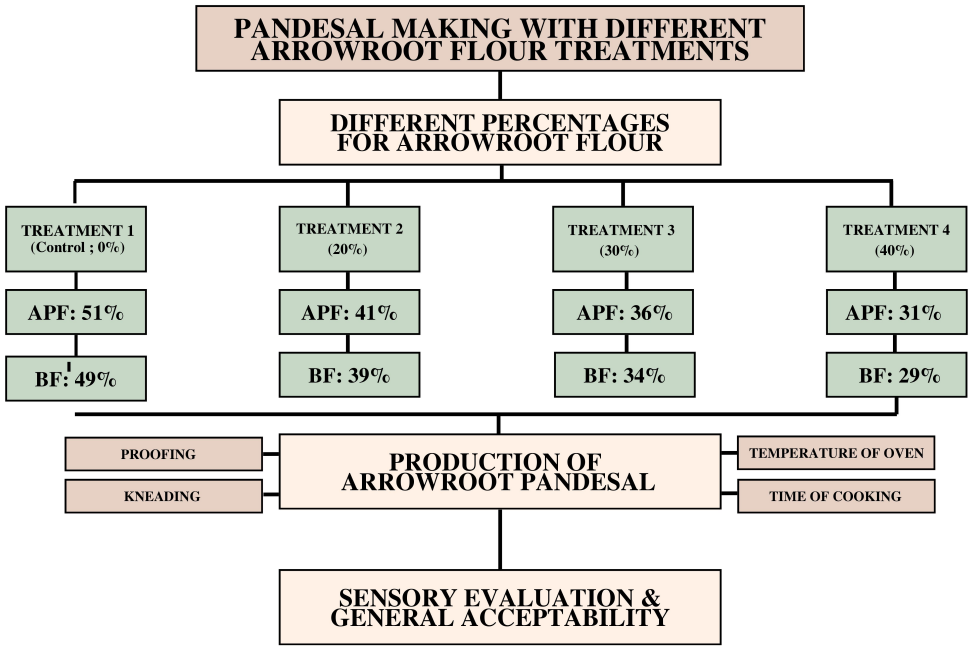

Figure 1.
Experimental framework of the study

The experiment was conducted by determining the optimum ratio for each treatment, specifically Treatment 1 (Control) or T1, Treatment 2 or T2 (20%), Treatment 3 or T3 (30%) and Treatment 4 or T4 (40%) of arrowroot flour with the adjusted amount of all-purpose flour and bread flour. The specific recipe that was used to bake the pandesal was based on HNF 101: Food Selection and Preparation Handbook by Abacan et al. [25]. After this, a sensory evaluation was conducted by the selected 20 participants to evaluate the products from each treatment. Figure 1 shows the experimental framework of the study.

Data were collected through a sensory evaluation questionnaire for 20 of the selected participants. Evaluation was done in the College of Human Ecology and College of Forestry and Natural Resources, UPLB where the selected evaluators were employed faculty, research, extension and professional staff, and administrative staff.

But before the evaluation, a baking trial was done on April 28, 2022. The trial was based on the recipe of HNF 101: Food Selection and Preparation Handbook [25] for pandesal making. The measurements of each ingredient were then doubled during the experiment. The ingredients for this recipe are shown in Table 1.

Table 1. Baker's percentage for pandesal ingredients

INGREDIENTS	WEIGHT	BAKER'S PERCENTAGE	WEIGHT	BAKER'S PERCENTAGE	
	Original Recipe (grams)		Doubled Recipe (grams)		Actual Amount Used (grams)
All Purpose Flour	508	51.42	1,016	51.42	1,016
Bread Flour	480	48.58	960.3	48.58	960.3
Total	988	100	1976	100	1976
Other Ingredients					
Yeast	15	1.52	30	1.52	31.1
Sugar	196	19.84	392	19.84	392.9
Salt	15	1.52	30	1.52	31.0
Water	488	49.39	976	49.39	976.4
Butter	60	6.07	120	6.07	120.6
Total dough	1,762		3,424		3424

The total flour is always 100% in recipes, and all other ingredients are written and listed in percentages to produce the baker's formula. This can also be used to prepare different baked goods. The step-by-step procedure for the experiment are the following:

1. Weigh the ingredients that will be used for the experiment.
2. Mix all the ingredients in a stand mixer for 20 minutes.
3. Let the dough rest for an hour.

4. After an hour, cut the portions of the pandesal roughly the same size and place it in a tray.

5. After portioning, proof the dough for 1 hour.

6. Once proofing is done, bake the pandesal for 20 minutes in an oven that is preheated to 190°C.

7. Once baked, let the pandesal cool for at least 1-2 hours, and then serve.

This baking trial produced 112 pandesals, each of which weighed 30g. The exact process was done when the researcher conducted the experiment with the substitution of arrowroot flour (ARF) following specific ratios to bread (BF) and all-purpose flour (APF). A detailed information on the formulation of all the treatments were summarized in Table 2.

Table 2. Ingredients with corresponding weights and baker's percentage for the different treatments

FLOURS USED	TREATMENTS							
	T1 (Control)		T2		T3		T4	
	B%	Qty (g)	B%	Qty (g)	B%	Qty (g)	B%	Qty (g)
APF	51%	508	41%	403	36%	353	31%	302
BF	49%	480	39%	387	34%	339	29%	291
ARF	0	0	20%	198	30%	296	40%	395
Total	100	988	100	988	100	988	100	988

Each treatment had specific measurements for the arrowroot flour, all-purpose flour and bread flour based on the recipe of HNF 101: Food Selection and Preparation Handbook [25].

2.1 Data Analysis

Frequency, counts and averages were used to analyze the data. It was then interpreted based on the Hedonic scale method of measuring the level of food products with the following interpretations: 9, Like extremely; 8, Like very much; 7, Like moderately; 6, Like slightly; 5, Neither like or dislike; 4, Dislike slightly; 3, Dislike moderately; 2, Dislike very much; and 1, Dislike extremely.

3 Results

3.1 Pre-Experiment Activities

Two experiments were conducted before the actual experiment. These were conducted to determine the feasibility of the proposed formulations. Once found to be feasible, formulation of the optimum ratio of arrowroot flour and assessment of the results were done.

The step-by-step procedure and ingredients to be used for pre- and actual experiments were also identified. Treatments 2, 3, and 4 were the three treatments with the corresponding ratios

of arrowroot flour in proportion to all-purpose flour and bread flour. The first pre-experiment includes baking the original recipe with the ingredients used in making pandesal. The experiment showed that the pandesal is soft and fluffy which is the usual texture of a pandesal. For the second pre-experiment, it consisted of the baking of T2, T3, and T4. Treatment 3 showed a more dense and crumbly texture for the pandesal. For Treatments 2 and 4, results showed that parts were stiff specifically at the bottom of the pandesal.

Before the actual conduct of the experiment, arrangements were made with the Institute of Human Nutrition and Food, College of Human Ecology, UPLB, for the use of the IHNF Laboratory Kitchen. Last July 29, 2022, the actual baking took place at the IHNF Laboratory Kitchen. After all the baking, packing, and labeling of the container per evaluator and all other preparations for evaluation were done, the packs of pandesal were then distributed to where the evaluators were working.

3.2 Actual Conduct of the Experiment

The actual baking began at around 10:00 am starting with the control. Following the recipe based on the HNF 101: Food Selection and Preparation Handbook [25], the dough for the control was mixed using a stand mixer for 20 minutes while being observed. 40g of water was added to the control since the dough was dry. After mixing, the dough was kneaded and formed, placed in a bowl, and left to rest for an hour. While the dough for T1 was resting, the ingredients for T2 were mixed. With the same methods used for T1, 20g of water was also added due to the same observation of the dough being dry. The dough was also placed in a bowl to rest for 1 hour. The same steps were repeated for T3 and T4.

During the actual experiment, there were different proofing times for each treatment. For T2, the proofing time was 20 to 30 minutes, while for T3 and T4, the proofing time was not set. This was done due to the observation from the pre-experimentation that the dough tends to flatten when the proofing time is longer.

While the dough was resting, the T1 was prepared for proofing. The dough was shaped into their pandesal form and proofed for 1 hour. Next was Treatment 2, which involved 20-30 minutes of proofing. And finally, there was no proofing done for both Treatments 3 and 4, to avoid the flattening of the dough. Proofing is letting the dough rise after being shaped into its necessary form and before it is baked [26]. The dough rises due to the yeast as a part of the 'rising' ingredient. Proofing is important in the production of baked products since it also helps keep the bread's physical form before baking.

The oven was pre-heated to 190°C, and then the first treatments to be baked were T1 and T2. This was followed by T3 and T4, respectively. To keep the freshness of the pandesal, each treatment was labeled and placed in their respective containers for evaluation. The 20 containers were then immediately distributed to the 20 evaluators. The evaluation forms were retrieved immediately after their assessments.

3.3 Sensory Evaluation and General Acceptability

The evaluation was based on the Hedonic scale wherein 9 is Like extremely; 8 is Like very much; 7 is Like moderately; 6 is Like slightly; 5 is Neither like or dislike; 4 is Dislike slightly; 3 is Dislike moderately; 2 is Dislike very much; and 1 is Dislike extremely. For the appearance criteria, T1 had the highest average score of 8.1 (Like very much) was the T1 and was followed by T3 with an average score of 7.8 (Like very much). T1 had ratings ranging from 5 to 9 points which was between neither like nor dislike (5) and like extremely (9).

For the odor criteria, Treatment 3 had the highest average score of 7.4 (Like moderately) and was followed by Treatment 1 with an average score of 7.2 (Like moderately). Treatment 3 had ratings

ranging from 4-9 points between dislike slightly and like extremely, respectively.

For the taste criteria, the treatment with the highest average score of 7.8 (Like very much) was T1, followed by T3 with an average score of 7.6 (Like very much). T1 had ratings ranging from 6-9 points, which were between slightly and extremely, respectively.

Similarly, the treatment with the highest average score of 7.8 (Like very much) was again T1, followed by T3 with an average score of 7.3 (Like Moderately). T1 had ratings ranging from 6-9 points which was between neither like slightly and like extremely, respectively.

Finally, for the general acceptability, the treatment with the highest average score of 7.8 (Like very much), was still T1, followed by T3 with an average score of 7.5 (Like very much). The control had votes ranging from 5-9 points which was between neither like or dislike and like extremely, respectively based on the 9point Hedonic scale.

Results showed that the T1 got the highest acceptability (7.8, Like very much) among the 20 evaluators was the control treatment (T1). This is because T1 generally follows the original recipe of pandesal based on the HNF 101: Food Selection and Preparation Handbook [25]. This treatment contains 508g of all purpose flour, 480g of bread flour and none for the arrowroot flour. Filipinos are used to the appearance, taste, and texture of the pandesal from T1 since this is the type of pandesal bought from bakery shops and grocery stores, and they are naturally accustomed to that particular taste. While T1 got the highest acceptability, T3 is not far behind with an acceptability of 7 and is also categorized as Like very much.

Similarly, it was also found that T2 got 6.8 acceptability and T4 got 6.4, categorized as Like Moderately. On average, T1 ranked first (7.76), followed by T3 (7.54), T2 (6.79), and T4 (6.76), respectively. This means that evaluators rated all the pandesal from the four treatments as acceptable regarding their appearance, odor, taste, and texture. This means that pandesal with arrowroot flour may have a potential market for Filipino tastes. The positive response from the evaluators to these formulations may also open other uses of arrowroot aside from what is available in the market. Table 3 summarizes the sensory evaluation criteria and general acceptability results.

Table 3. Summary of the sensory evaluation criteria and general acceptability results

SENSORY EVALUATION CRITERIA	TREATMENT			
	Treatment 1	Treatment 2	Treatment 3	Treatment 4
Appearance	1st (8.1)	4th (6.8)	2nd (7.8)	3rd (7.2)
Odor	2nd (7.2)	3rd (6.9)	1st (7.4)	2nd (7.2)
Taste	1st (7.85)	3rd (6.6)	2nd (7.65)	4th (6.45)
Texture	1st (7.85)	3rd (6.85)	2nd (7.35)	4th (6.25)
General Acceptability	1st (7.8)	3rd (6.8)	2nd (7.5)	4th (6.7)
Average	**7.76 (Like very much)**	**6.79 (Like Moderately)**	**7.54 (Like very much)**	**6.76 (Like Moderately)**
Final Rank	**1st**	**3rd**	**2nd**	**4th**

3.4 Cost of Pandesal Per Treatment

Table 4 shows the cost of pandesal per treatment. Results showed that the treatments with arrowroot flour are more expensive than T1, which is the original pandesal. This is because arrowroot flour is in limited supply in the market. The law of supply and demand states that when the demand is higher for a product, the supply must also increase and vice versa [27]. In the case of arrowroot flour, since it has a low supply, markets tend to increase its price resulting in a more expensive product. Thus, it is important to ensure a continued supply of arrowroot to possibly reduce the price.

Furthermore, even if T1 has the highest acceptability and cheaper production cost, arrowroot flour has numerous advantages like having a low glycemic index which is excellent for people with diabetes. As to calorie content, arrowroot flour has lower calories compared to all-purpose flour and bread flour. All-purpose flour has 364 kcal, bread flour has 361 kcal and arrowroot has 357 kcal per 100 grams [28]. Arrowroot was also found to be gluten-free which is helpful for people with Celiac disease.

It is also important to support the cultivation of arrowroot for flour production to increase its supply in the market. This way, the cost of the arrowroot pandesal can be reduced and made more affordable to most Filipinos.

Table 4. Cost of pandesal (PHP) per treatment

INGREDIENTS	TREATMENTS											
	T1 (Control)			Treatment 2			Treatment 3			Treatment 4		
	Price	Qty	Cost	Price	Qty	Cost	Price	Qty	Cost	Price	Qty	Cost
	(P/g)			(P/g)			(P/g)			(P/g)		
APF	0.22	508.00	109.22	0.22	403.00	86.65	0.22	353.00	75.90	0.22	302.00	64.93
BF	0.08	480.00	37.92	0.08	387.00	30.57	0.08	339.00	26.78	0.08	291.00	22.99
ARF	0.42	0.00	0.00	0.42	198.00	83.16	0.42	296.00	124.32	0.42	395.00	165.90
Yeast	0.33	15.00	4.92	0.33	15.00	4.92	0.33	15.00	4.92	0.33	15.00	4.92
Sugar	0.10	196.00	19.11	0.10	196.00	19.11	0.10	196.00	19.11	0.10	196.00	19.11
Salt	0.08	15.00	1.17	0.08	15.00	1.17	0.08	15.00	1.17	0.08	15.00	1.17
Butter	0.73	60.00	43.50	0.73	60.00	43.50	0.73	60.00	43.50	0.73	60.00	43.50
Total Cost			215.84			269.08			295.70			322.52
Yield			28 portions			24 portions			24 portions			24 portions
Cost/portion			7.71			11.21			12.32			13.44

4 Discussion

Gluten is a protein that helps maintain the stability and consistency of the dough and keeps the bread shape. A lack of gluten can result in the collapsing or rupturing of the dough during baking [11]. Since, arrowroot flour is gluten-free and requires other gluten-containing flours to help maintain its bread shape during baking. Results on the appearance show that T2, bread with the most arrowroot flour, had the lowest score from the participants compared to T1, which has the highest percentage of bread flour, and also scored the highest among the four (4). This conforms with the study conducted by Sudaryati et al. [11], which found that to achieve soft, fluffy bread consistency, the dough must contain enough gluten to support the shape and maintain a bread-like appearance.

The cost of an arrowroot pandesal was observed to be higher than that of the original pandesal. Arrowroot flour was used because it was identified as a locally sourced flour that can lessen dependence on imported flour. The arrowroot pandesal was more expensive than the original pandesal, which does not conform to having a cheaper alternative flour source. However, these results can be explained by the law of supply and demand, which states that if the demand for a product is

higher, the supply must also increase, and vice versa [27]. The low supply of arrowroot flour makes it more expensive than other flour.

To achieve the general acceptability of the public, cost must always be considered when producing products. With the resources given, the researcher has identified that promoting arrowroot flour to the market can help decrease its price and, at the same time, help the agricultural sector plant more arrowroot and increase the production of arrowroot flour in the country.

Since pandesal is a staple food for Filipinos, Nutritionist-dietitians are responsible for helping the community prioritize their health by providing them with proper nutrition and promoting healthy alternative food in their everyday diet. With the health benefits of arrowroot flour, such as being a good source of potassium, minerals, iron, manganese, phosphorus, magnesium, zinc, and protein and considered to be in the low glycemic index, it can help in decreasing diseases such as diabetes mellitus and improve health in general [13, 15, 16, 17].

With the adequate findings of this research, limitations were observed that can be improved over time. One example is the limited resources used during the experiments since they were done during the pandemic. Scouting for ingredients was challenging due to the limited number of supermarkets/markets in the area with affordable ingredients since funding was solely from the researcher. Lastly, due to the limited data gathered, hence the pandemic, only twenty (20) were selected to participate in the study to protect their health.

Most of the limitations were caused due to the pandemic. With that, it is recommended to perform a more comprehensive study that allows more resources/equipment to be used during experiments, a more thorough budgeting on the cost of all the ingredients to be used in the whole experiment, and invite more individuals to participate.

5 Conclusion and Recommendations

This study assessed whether arrowroot flour can be a flour substitute in pandesal making. Specifically, it aimed to: 1. determine the optimum ratio of arrowroot flour in proportion to all-purpose flour and bread flour used in pandesal making; 2. assess the general acceptability of arrowroot flour in making pandesal using sensory evaluation; 3. compare the cost of arrowroot pandesal with other pandesals; and 4. formulate recommendations/adjustments on how arrowroot flour will be more acceptable in making pandesal.

The study was conducted at the University of the Philippines, Los Baños, Laguna. The participants/evaluators were selected through purposive sampling. The participants were carefully selected based on the assumption that they can evaluate the pandesal independently and objectively. The evaluation was based on the following criteria: (1) appearance, (2) odor, (3) taste, (4) texture, and (5) general acceptability.

Data were collected through a sensory evaluation questionnaire from the participants. The evaluation was done in the College of Human Ecology and the College of Forestry and Natural Resources, UPLB, where the evaluators are employed as faculty, research, extension, professional staff, and administrative staff.

Results showed that the treatment that was generally acceptable for the 20 evaluators was the control treatment (T1), which followed the original recipe of pandesal based on the HNF 101: Food Selection and Preparation Handbook [25]. This treatment contains 508g of all purpose flour, 480g of bread flour, and none for the arrowroot flour. Filipinos are used to the appearance, taste, and texture of the pandesal from T1 since this is the type of pandesal bought from bakery shops and grocery stores. However, it was observed that T1 (7.8, Like very much) is only slightly higher than Treatment 3 (7 Like very much) while T2 (6.8, Like Moderately) and T4 (6.7, Like Moderately). On average, T1 ranked first (7.76), followed by T3 (7.54), T2 (6.79), and T4 (6.76), respectively. This means that evaluators rated all the pandesal from the four treatments acceptable.

With the results “Like very much” (T1 and T3), “Like moderately” (T2 and T4), we can conclude

that arrowroot flour can be a flour substitute in pandesal making. The positive response from the evaluators is a good sign that there is a potential for arrowroot flour in the future, aside from the commonly known uses in the country. Given a more comprehensive study on the feasibility of arrowroot flour, this may serve as an alternative ingredient in the production of bread in the country. In doing so, it is hoped to help address the problem of heavy dependence on imported flour and, at the same time, help families/local farmers who are dependent on agricultural livelihood, support the growth of arrowroot and production of arrowroot flour for bread. With its health benefits, promoting proper nutrition in these communities can help improve their health and well-being through this study.

In the light of these conclusions, the following recommendations were formulated:

Since the optimum ratio of arrowroot flour with all-purpose flour and bread flour that is most acceptable is Treatment 3 (Like very much), it is recommended that this formulation will be the one to be produced in the market once arrowroot flour is readily available and less expensive. But since Treatments 2 and 4 (Like moderately) are also acceptable to the evaluators, these formulations can also be recommended. This will depend, however on the cost of arrowroot flour and its supply will be ensured in the market.

To address the high cost and low supply of arrowroot flour in the market, policymakers should propose policies to support the growth and production of arrowroot flour for domestic use. More studies to determine the acceptability of a larger number of evaluators are also recommended.

Finally, to make pandesal with arrowroot flour more acceptable to Filipinos, a more in-depth study should be conducted on the nutrient composition of the pandesal with arrowroot flour. This way, a scientific basis for the health benefits of arrowroot will be determined.

Statements and Declarations

Funding Information

The authors did not receive any form of financial support or conduct for this study.

Compliance with Ethical Standards

Ethical considerations included using a consent form from the participants. Information of the participants was kept confidential and anonymous throughout the entire research.

Authors Contribution

M.E.S.V. wrote the study, analyzed the data, and drafted and finalized the manuscript. **V.R.M.E.** proofread, revised, and refined the manuscript. All authors have read and agreed to the published version of the manuscript.

Data Availability

The data in the study are available upon request from the authors.

Competing Interest

The authors declare no conflicts of interest.

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