

DEVELOPMENT OF MILLET-BASED RECIPES UTILISING POTATO STARCH, RICE FLOUR AND ARROWROOT POWDER AS THICKENING AGENTS

T. GAYATRI* and VADAREVU SONY

Department of Home Science St Joseph's College for
Women (Autonomous), Visakhapatnam, Andhra Pradesh

Date of Receipt : 15-04-2025

Date of Acceptance : 19-06-2025

ABSTRACT

The present study aimed to develop value-added products from selected millets by incorporating plant-based, gluten-free starches. Conducted in 2023 at St. Joseph's College for Women, Visakhapatnam, the research focused on four millet varieties: Barnyard, Kodo, Little and Foxtail. Three plant-derived starches—potato starch, arrowroot powder and rice flour were used to enhance the functional and sensory properties of millet-based recipes. The developed products included Barnyard Cutlet, Kodo Steam Cake, Little Millet Soup and Foxtail Papad. Each product was prepared in three variations, using the different starches. Sensory evaluation was conducted using a 9-point hedonic scale. Among the Barnyard Cutlet variations, the rice flour version scored highest for aroma, while the arrowroot-based cutlet was rated best in appearance. Little Millet Soup received consistent ratings across all three starch variations for aroma, aftertaste, and overall acceptability. The Kodo Steam Cake prepared with potato starch received the lowest scores in most parameters, except for appearance, which was rated favourably. In addition to sensory analysis, a line spread test was conducted to assess the viscosity of the starches. The results showed that rice flour had the highest spread ability, indicating lower viscosity, while arrowroot powder showed the least spread, suggesting it is a stronger thickening agent. Moisture content was also analysed, as it plays a critical role in determining the structural and functional properties of food products. Based on loss-on-drying results, arrowroot powder exhibited the highest moisture content among the starches tested.

Keywords- Gluten free, Millets, Starches.

INTRODUCTION

Millets, traditionally known as “Siri Anna,” have been staple grains in India for centuries, consumed regularly by previous generations. However, in recent decades, globalization introduced more refined, gluten-containing cereals such as wheat, oats and rye, which became preferred due to their palatability and

texture. This shift contributed to rising lifestyle and digestive disorders, renewing interest in millets as nutrient-dense, gluten-free alternatives (Makadi *et al.*, 2024).

The year 2023 was declared the International Year of Millets at the G20 summit, led by India, underscoring the importance of these ancient grains in promoting nutrition

*Corresponding author email id: medagayatri87@gmail.com

security and sustainable agriculture (Makadi *et al.*, 2024). Millets are gluten-free, which differentiates them from commonly consumed cereals and makes them suitable for gluten-intolerant individuals and those with celiac disease (Aggarwal *et al.*, 2018). However, gluten's absence poses challenges in achieving desirable textures and mouthfeel in cereal-based recipes, such as soft pooris or stretchable naans, which rely on gluten's viscoelastic properties. This limitation was demonstrated by Onyango *et al.*, (2020), where porridges with higher millet content scored lower in sensory evaluations compared to mixed flours containing cassava and cowpea leaf.

Currently, common thickening agents like refined wheat flour (maida) and corn flour are widely used but provide mainly empty calories and, in the case of maida, contain gluten, which is unsuitable for gluten-free diets. To address this, the present study explores the incorporation of lesser-used, nutritionally valuable plant starches-potato, arrowroot and rice starch-to develop millet-based, gluten-free recipes with improved texture and sensory appeal.

Sensory evaluation by semi-trained panellists, alongside instrumental assessments such as the Line Spread Test (LST) and moisture content analysis, were employed to compare the functional and sensory properties of these starches in millet recipes. Previous research has shown that millet-based products can achieve sensory qualities comparable to refined cereals when appropriate formulation strategies are used (Lim, 2024). For instance, millet muffins developed with various millet flours demonstrated good acceptability and nutritional benefits, including higher fiber and mineral content. Similarly, meal preparations using different millet types scored closely to polished white rice in sensory tests, with

barnyard millet and little millet often performing well in taste and texture attributes (Lim, 2024).

Nutritionally, millets are rich in protein with balanced amino acids, dietary fiber, polyphenols, vitamins, and essential minerals such as iron, calcium, zinc, and magnesium, contributing to their functional health benefits including glycaemic control, antioxidant activity, and gut health promotion. Finger millet, in particular, is noted for its exceptionally high calcium content, beneficial for bone health (Bhaduri, 2013).

This study aims to harness the nutritional and functional advantages of millets while overcoming textural limitations by integrating selected plant starches, thereby promoting millet-based foods as viable, gluten-free alternatives with enhanced sensory qualities.

MATERIAL AND METHODS

The present study was carried out in a systematic sequence to develop millet-based value-added recipes utilizing plant-based gluten-free starches. The study started with identification and procurement of raw materials. Four types of millets viz., Barnyard, Kodo, Little, and Foxtail were selected along with three plant-derived starches: potato starch, rice flour and arrowroot powder. The millets were cleaned and ground into flour, and the starches were procured from certified sources to ensure quality and consistency.

The next phase involved the development of recipes, where each millet was incorporated with all three starches to create three different variations per product. The products developed included Barnyard Cutlet, Kodo Steam Cake, Little Millet Soup, and Foxtail Papdas. Physical analysis of the starches was conducted using the line spread test to evaluate viscosity and moisture content analysis to understand their functional properties.



Fig. 1. Research design

Sensory evaluation was carried out using a 9-point hedonic scale to assess organoleptic attributes such as taste, texture, aroma, appearance, and overall acceptability. A panel of semi-trained individuals was employed for the sensory testing under controlled conditions. The data obtained from sensory and physical analyses were subjected to appropriate statistical analysis such as Mean and Standard deviation to interpret the results and identify the most acceptable combinations based on overall performance. Detailed research design is depicted in the form of schematic diagram (Fig.1).

Selection of Ingredients

The study aimed to formulate millet-based recipes using different plant-derived, gluten-free starches. Four varieties of millets—Barnyard, Kodo, Little, and Foxtail were

selected along with three starches: potato starch, arrowroot powder, and rice flour. Each millet was used to develop one recipe, and each recipe was prepared in three variations, incorporating a different starch in each version. The details of millet and starch combinations along with recipes are listed in Table 1.

A total of four value-added recipes were developed, one using each millet. Each recipe was prepared in three versions using the different starches to observe the effect on sensory and physical properties.

The amounts of millet and starch used in these four recipes vary depending on the type of dish and the texture needed. In Little millet soup, 10g of millet and 5g of starch make for a light, easy-to-digest dish—probably warm and soothing. The Barnyard millet recipe uses 50g of millet with 10g of starch, showing millet

Table 1. List of Millets and Starches Used

Sl.No.	Millet	Recipe Name	Starch Variations
1	Barnyard Millet	Barnyard Millet Cutlet	1. Potato Starch 2. Arrowroot Powder 3. Rice Flour
2	Kodo Millet	Kodo Millet Steamed Cake	1. Potato Starch 2. Arrowroot Powder 3. Rice Flour
3	Little Millet	Little Millet Soup	1. Potato Starch 2. Arrowroot Powder 3. Rice Flour
4	Foxtail Millet	Foxtail Millet Papads	1. Potato Starch 2. Arrowroot Powder 3. Rice Flour

Table 2. Millet and Starch composition for value added recipes

Sl. No.	Recipe	Millet (g)	Starch (g)
1	Little millet soup	10	5
2	Barnyard millet	50	10
3	Foxtail papad	80	10
4	Kodo millet cake	25	25

as the main ingredient, while starch adds a bit of thickness. Foxtail millet papad has the highest millet content (80g) along with 10g of starch, which works well for a crispy snack-millet gives the bulk, and starch helps bind and crisp it up. For Kodo millet cake, 25g of millet and 25g of starch are used equally, giving a soft and balanced texture. The starch helps the cake hold its shape and stay moist, while millet adds nutrition.

Line Spread Test

The rheological behaviour of the starches viz., potato starch, arrowroot powder, and rice flour-was assessed using the line spread test. For each sample, readings were recorded at intervals of 5, 15, and 30 minutes.

The results were plotted to compare the viscosity and flow characteristics of each starch.

Moisture Content Analysis

Moisture content of the starches was determined using the hot air oven method. A 5 g sample of each starch was placed in a hot air oven at 210°C for 2 hours. After drying, samples were transferred to a desiccator to cool and then reweighed. Moisture content was calculated using the formula:

$$\text{Moisture Content (\%)} = \frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \times 100$$

Sensory evaluation of the developed recipes was conducted using a 9-point hedonic scale to assess attributes including taste, aroma, texture, appearance and overall acceptability. A semi-trained panel evaluated all three variations of each recipe. The data obtained was used to identify the most acceptable starch variation for each millet-based product.

RESULTS AND DISCUSSION

Sensory Evaluation

Sensory evaluation was done by a 10 membered semi trained panel for each recipe. They judged the recipes of different attributes like appearance, flavour, aroma, taste, texture, overall acceptability, mouth feel, after taste on a 9- point hedonic scale. Results of sensory evaluations are presented in Table 3.

Kodo Millet Steam Cake

Among the different variations of the Kodo millet steam cake, the rice flour version emerged as the most appreciated. It received the highest scores across nearly all sensory attributes, resulting in an impressive overall

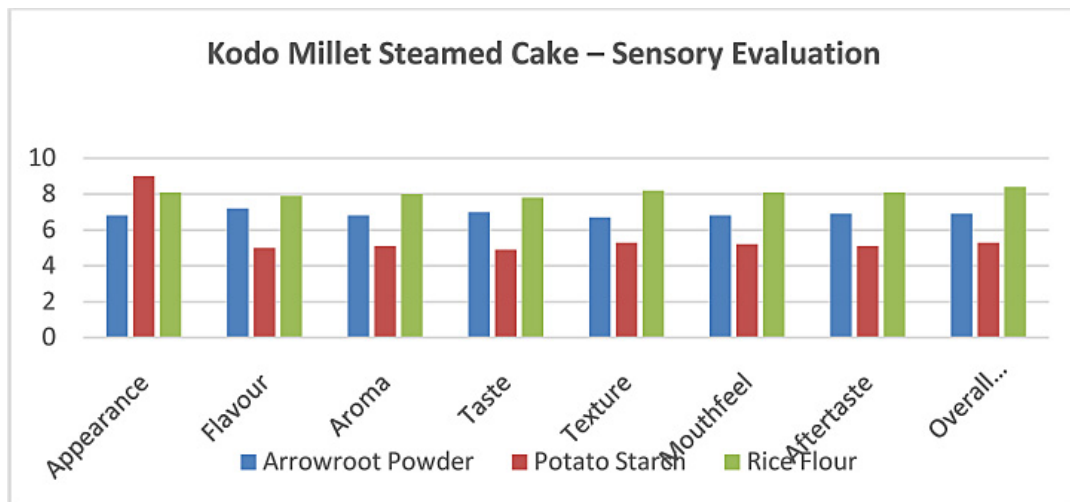


. Plate 1- Kodo millet steam cake

acceptability score of 8.4. This indicates that rice flour contributed positively to the product's texture, taste, and overall sensory appeal, likely due to its neutral flavour profile and familiar mouthfeel.

Table 3. Sensory attributes of Kodo millet steam cake

Attribute	Arrowroot Powder	Potato Starch	Rice Flour
Appearance	6.8±0.82	9±0.08	8.1±0.45
Flavour	7.2±0.71	5±0.58	7.9±0.87
Aroma	6.8±0.47	5.1±34	8±0.78
Taste	7±0.65	4.9±0.16	7.8±0.44
Texture	6.7±0.23	5.3±0.28	8.2±0.77
Mouthfeel	6.8±0.82	5.2±0.55	8.1±0.53
Aftertaste	6.9±0.57	5.1±0.19	8.1±0.56
Overall Acceptability	6.9±0.81	5.3±0.39	8.4±0.18



Graph 1. Sensory attributes of Kodo millet steam cake

Table 4. Sensory attributes of Barnyard millet cutlet.

Attribute	Arrowroot Powder	Potato Starch	Rice Flour
Appearance	8.2±0.17	7.5±0.71	6.2±0.56
Flavour	6.9±0.34	7±0.44	6.8±0.06
Aroma	5.5±0.58	6.8±0.50	7.2±0.33
Taste	6.8±0.29	7.3±0.6	7.2±0.8
Texture	7±0.80	6.9±0.23	6.5±0.9
Mouthfeel	6.9±0.24	6.8±0.13	6.7±0.39
Aftertaste	7±0.33	6.5±0.04	6.8±0.71
Overall Acceptability	7±0.54	6.8±0.9	7.2±0.67

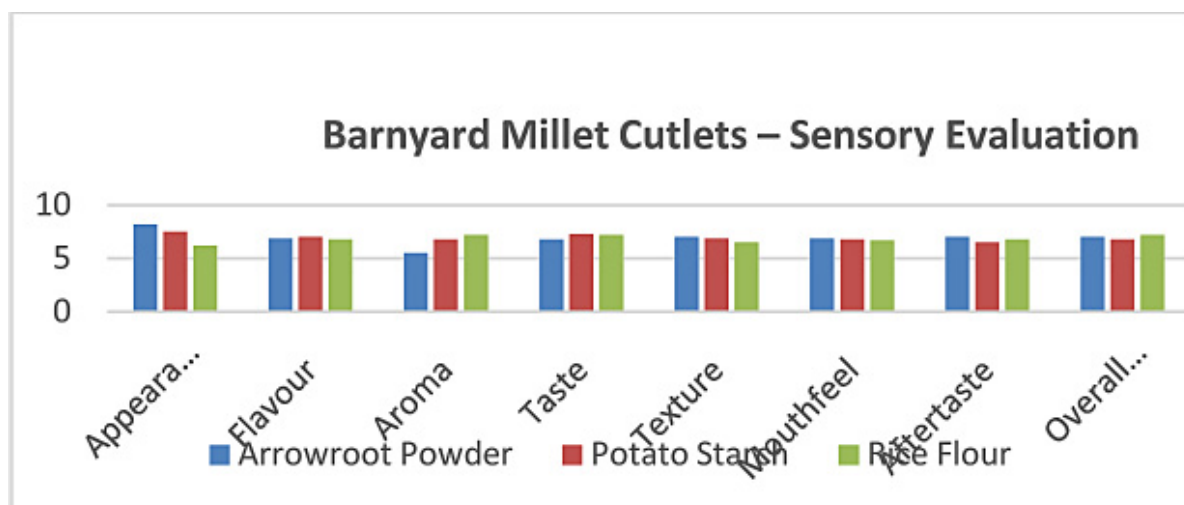
The potato starch variation, although rated the highest for appearance (9.0) was due to its glossy and smooth finish, scored poorly in other attributes such as taste, flavour, and mouthfeel (around 5), bringing down its overall acceptability to just 5.3 this decline in score was possibly due to gummy or dense texture, which did not provide pleasant mouthfeel.

The arrowroot starch version was slightly better than the potato starch one. It achieved decent scores in taste (7.0) and flavour (7.2), suggesting it contributed positively to the sensory profile. However, its overall acceptability score was moderate (6.9),

possibly due to bland flavour of arrowroot powder.

Overall, the findings suggest that while appearance is important, attributes like flavour, texture, and taste play a more crucial role in determining the acceptability of millet-based steam cakes.

A comparative sensory study of millet and rice-based products showed that rice flour-based products scored highest in overall acceptability, taste, and texture, likely due to rice flour's neutral flavour and smooth mouthfeel. This aligns with the present finding that the rice flour version of the steam cake had the highest overall acceptability score (8.4)

**Graph 2. Sensory attributes of Barnyard millet cutlet**

due to its positive sensory profile (Verma *et al.*, 2015).

Rice flour variation cake was better in overall acceptability and moistness. Rice flour had better water binding capacity. This study highlights textural property of rice flour being at par (Kim and Shin, 2009).

In a study conducted where Sensory evaluation of freshly baked gluten-free cookies was carried out using a 9-point hedonic scale. Potato starch showed some improvement, but certain varieties still scored lower in texture and overall acceptability, consistent with the present study's observation that the potato starch steam cake had the highest appearance score (9.0) but low scores (~5) in taste, flavour, and mouthfeel, resulting in a lower overall acceptability (5.3) (Ali *et al.*, 2023).

Barnyard millet cutlet

Barnyard millet cutlet was prepared in 3 variations by incorporating different starches. None of the variation fared extremely well in overall acceptability being 7, 6.8, 7.2 for arrowroot, potato and rice respectively. The arrowroot powder variation showed a more balanced performance, receiving the highest scores for appearance (6.2), texture (7.0), mouthfeel (6.9), and aftertaste (7.0). These results suggest that arrowroot provided a desirable structure and consistency, likely



Plate No. 2 Barnyard Cutlet

contributing to a more cohesive and pleasant eating experience. but its relatively mild taste might have limited its appeal in terms of flavour intensity, keeping the overall acceptability at 7.0.

The potato starch variation, despite being rated highest for taste (7.3) and flavour (7.0)—possibly due to its ability to enhance taste and moisture retention. It was rated the lowest in overall acceptability (6.8).

On the other hand, the rice flour variation scored highest in aroma, suggesting a pleasant smell profile, but it was rated the lowest in appearance, flavour (6.8), texture (6.5), and mouthfeel (6.7). The result shows that while the aroma was inviting, but may be due to a dry or gritty texture it was scored low.

A sensory study conducted by Singh and Iraj, (2023) on products developed using arrowroot powder revealed that formulations with arrowroot scored well in flavour, texture, color, and overall acceptability, with scores around 7.1 to 7.6 on a 9-point hedonic scale, indicating consumer liking. This demonstrates that arrowroot can contribute positively to sensory attributes such as body, texture, and appearance, supporting the above findings of balanced sensory performance in arrowroot cutlets.

A study on gluten-free cookies made from rice flour and green banana flour done by Mouminah and Althaiban, (2025) discusses how rice flour contributes to aroma (mild, pleasant smell) but can result in dry or gritty texture, reducing mouthfeel and overall acceptability. These results are at par with present study's results where rice flour cutlet variations score well only in aroma but other attributes were not appreciated well.

Little millet soup.

Among the three starch variations used in the preparation, arrowroot powder was rated

Table 5. Sensory attributes of Little millet soup.

Attribute	Arrowroot Powder	Potato Starch	Rice Flour
Appearance	7.8±0.09	7.3±0.43	7.5±0.75
Flavour	7.1±0.89	7.4±0.0.7	7.6±0.48
Aroma	6.5±0.85	6.8±0.92	7.1±0.28
Taste	7.4±0.70	7±0.25	7.5±0.03
Texture	7±0.58	7.9±0.72	7.4±0.63
Mouthfeel	7.1±0.40	7.8±0.13	7.6±0.24
Aftertaste	6.5±0.68	6.7±0.55	6.6±0.71
Overall Acceptability	7.1±0.35	7.2±0.60	7.3±0.62s

**Plate 2- Three variations of little millet soup**

the highest in appearance (7.8), possibly due to its ability to produce a clean, smooth surface and appealing structure. However, it received the lowest scores in aroma (6.5), mouthfeel (7.1), and aftertaste (6.5), indicating that while

visually appealing, it may have lacked the sensory depth and lingering flavour profile desired in the product. Consequently, its overall acceptability remained moderate at (7.1).

The potato starch variation performed best in terms of aftertaste (6.7), mouthfeel (7.9), and texture (7.8). These findings suggest that potato starch contributed to a creamy consistency and pleasant tactile quality, enhancing the eating experience. However, it was rated lowest in appearance (7.3) and taste (7.0), possibly due to a slightly dull look and a neutral or bland flavour.

On the other hand, the rice flour variation stood out by scoring the highest in

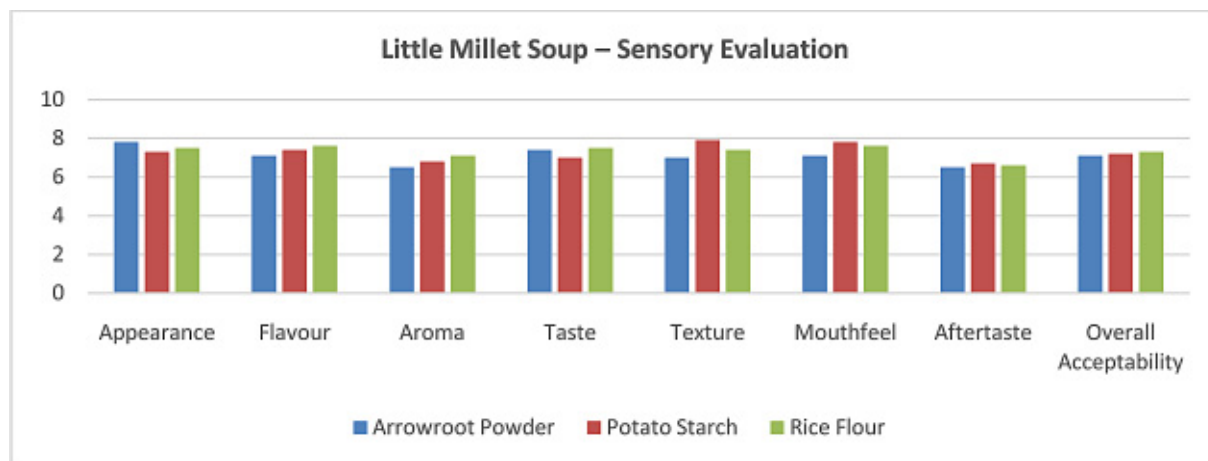
**Graph 3. Sensory attributes of Little millet soup.**

Table 6. Sensory attributes of Foxtail millet papad

Attribute	Arrowroot Powder	Potato Starch	Rice Flour
Appearance	8±0.54	8.2±0.73	8.3±0.26
Flavour	7.2±0.64	7.4±0.80	7.3±0.06
Aroma	7.1±0.05	7.3±0.32	7.5±0.67
Taste	7.3±0.68	7.5±0.56	7.2±0.31
Texture	7.4±0.40	7.6±0.27	7.1±0.41
Mouthfeel	7.3±0.26	7.5±0.46	7.2±0.50
Aftertaste	7.3±0.76	7.4±0.5	7.1±0.11
Overall Acceptability	7.4±0.22	7.5±0.54	7.3±0.52

flavour (7.6), aroma (7.1), taste (7.5), and overall acceptability (7.3). This indicates that rice flour enhanced the sensory appeal of the product through a more balanced and familiar flavour profile, as well as a pleasing aroma.

Texture of arrowroot powder was also well-appreciated; taste of the soups was almost rated alike in all variations. In a review study conducted by Amante *et al.*, (2021) mentioned that arrowroot starch is rich in minerals. It showed great rheological properties on gelatinization and many food products like ice cream stabilizers, breads and infant formulas were developed. Rheological properties of the plant present negative synergesis, stability during cooking, higher solubility, and absorption index.

A study characterized native and partially gelatinized potato starch, showing that partially gelatinized potato starch forms stable pastes with shear-thinning (pseudoplastic) behaviour ideal for thickening applications. The apparent viscosity increases with gelatinization degree, contributing to creamy, smooth textures in soups and sauces. These results are at par with the sensory results of Little millet soup which was showed good sensory scores for mouthfeel and texture(Xu *et al.*, 2021).

Foxtail millet papads

Millet papad, a novel and nutritious recipe, was developed in three different variations using arrowroot powder, potato starch, and rice flour as binding agents. Among

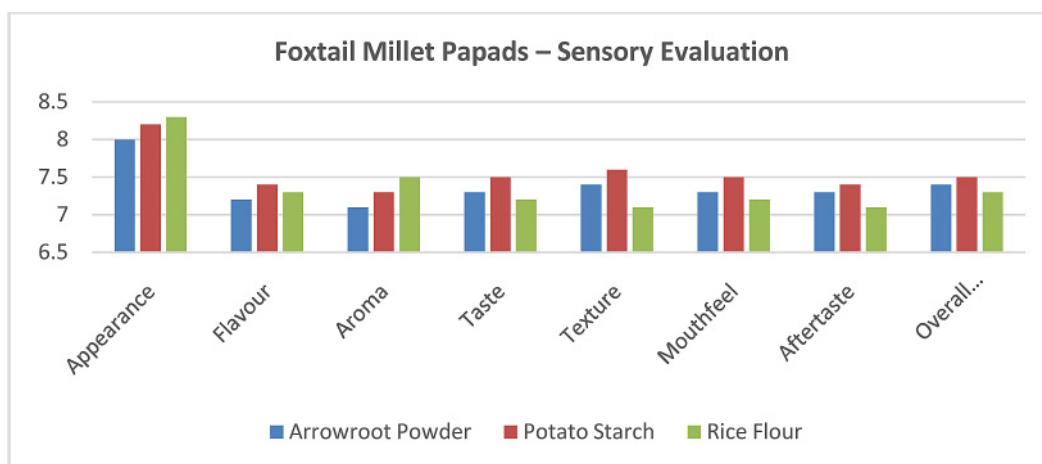
**Graph 4. Sensory attributes of Foxtail millet papad**

Table 7. Line spread test

Time	Rice Flour	Potato Starch	Arrowroot
5 mins	23	20	10
15 mins	25	23	12
30 mins	28	24	16

these, the arrowroot-based variation did not perform well across most sensory attributes, likely due to its neutral flavour profile and less appealing mouthfeel and less desirable texture required for papad preparation resulting in a moderate overall acceptability score of 7.4.

In contrast, the potato starch variation emerged as the most palatable, receiving the highest scores in flavour (7.4), taste (7.3), and overall acceptability (7.5). This can be due to potato starch's ability to enhance the crispness and flavour absorption of the papad.

The rice flour variation stood out in terms of aroma (7.5) and appearance (8.3). However, it scored the lowest in taste (7.2), texture (7.1), mouthfeel (7.2), and aftertaste (7.1). This could be due to rice flour's tendency to harden on frying and imparting bland flavour, which may have resulted the overall acceptability, scoring slightly lower at 7.3.

The same results were seen in studies conducted by Thapa and Thapa (2019), where potato starch stood out among other starch

sources due to its exceptional qualities. With its notable attributes including high swelling power and viscosity, it surpasses other starch varieties. Distinguished by its larger granule size and a low glass transition temperature, potato starch offers clear pastes and a neutral taste profile. A study revealed that Potato flour serves as a versatile ingredient, functioning as both a thickener and flavour enhancer. Its unique and pleasant taste enhances a variety of dishes when combined with cereal and pulse flours. This combination creates a delightful array of products, including biscuits, cakes, parathas, and bread (Thapa and Thapa, 2019).

In a study conducted by Aggarwal (2018), where sensory evaluation of masala khakhra made with arrowroot, were assessed for the following parameters, appearance, colour, flavour, texture, taste, and overall acceptability using trained panellists. The results showed variation with arrowroot starch had improved sensory characters and was

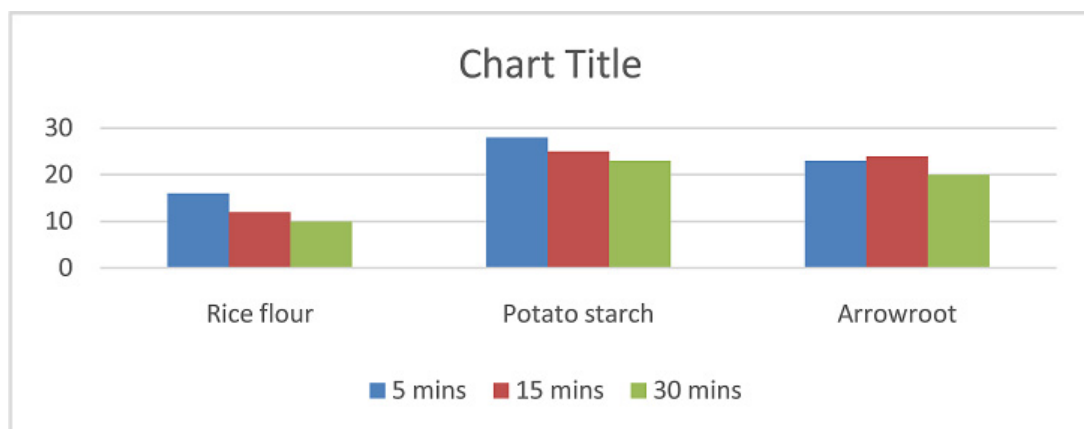
**Graph 5. Line spread test**

Table 8. Mean moisture content in thickening agents

Thickening agents	Weight of the sample (g)	Mean (D)	Moisture content (%)
Rice flour	5	0.1046	10.46%
Arrow root powder	5	0.1196	11.96%
Potato starch	5	0.1038	10.38%

scored best for texture and taste in contrast to the present study.

II. Physical Analysis

The physical analysis was tested by line spread test and moisture content analysis among three thickening agents arrow root powder, potato starch and rice flour and here is the view of the results in Table 8.

Line spread test

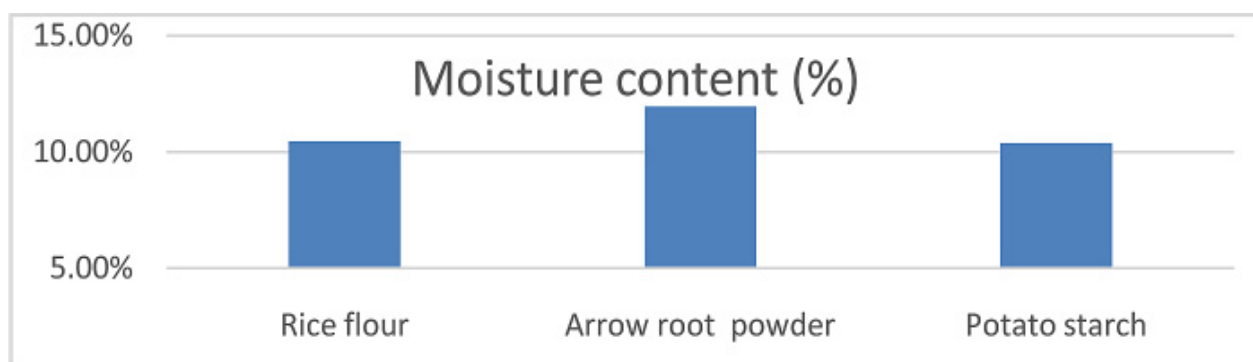
The Line Spread Test results indicate the flow behaviour of rice flour, potato starch, and arrowroot at different time intervals. At 5 minutes, arrowroot shows the lowest spread (10), meaning it forms the thickest gel, while rice flour spreads the most (23), indicating a thinner consistency. Potato starch lies in between with a spread of 20. As time progresses, the spread increases slightly for all samples. By 30 minutes, rice flour has the highest spread 28, suggesting it remains the most fluid, while arrowroot, with a spread of 16, continues to form the most stable and thickest gel. Potato starch remains

intermediate at 24. Overall, arrowroot produces the most viscous and stable gel, while rice flour shows the least resistance to flow, making it the thinnest among the three.

A study conducted by Katayama *et al.*, (2023) showed same results as the present study i.e potato starch being more viscous than rice flour. LST measurements were taken at 30 seconds and 5 minutes on starch-thickened foods including potato starch and rice flour-based samples. The results showed that potato starch samples exhibited minimal increase in spread distance over time, indicating stable viscosity and thickening properties. In contrast, rice flour samples showed a greater increase in spread distance, reflecting lower viscosity stability and faster texture deterioration likely due to moisture absorption.

Moisture Analysis

The moisture content analysis of millet papad prepared with different thickening agents revealed slight variations in their ability to retain water. Among the three, arrowroot

**Graph 6. Mean moisture content in thickening agents**

powder showed the highest moisture content at 11.96%, indicating a greater tendency to retain moisture, which could contribute to a softer texture or reduced crispness after frying. Rice flour recorded a moisture content of 10.46%, while potato starch had the lowest at 10.38%, suggesting better moisture control and potentially crisper texture in the final product. All samples were of equal weight (5g).

The moisture content of arrowroot starch in the present study was found to be 11.96%, which aligns well with scientifically reported values. According to Malki *et al.*, (2023) arrowroot starch typically exhibits a moisture content of $10.87\% \pm 1.30\%$, which falls within the acceptable range of less than 15% for starch powders. This consistency indicates that the arrowroot starch used in the current study possesses good stability and quality for food applications, as higher moisture content beyond 15% can lead to microbial growth and reduced shelf life. Therefore, the result of 11.96% not only validates the quality of the sample used but also supports its suitability for safe storage and use in various food formulations.

In the present study, the moisture content of potato starch was found to be 10.38%, which is in close agreement with values reported in earlier scientific research. According to Bao *et al.*, (2021) potato starch samples dried using standard laboratory hot oven methods show moisture content ranging from 8.7% to 10.5%, depending on the drying conditions. Since sample falls well within this range, it confirms the accuracy of the drying process and indicates that the potato starch used is of acceptable quality and suitable for food applications. Maintaining moisture content below 12–14% is crucial for the safe storage and stability of starch powders, and result of present study 10.38% suggests good shelf life and reduced risk of microbial spoilage.

CONCLUSION

In this study, four different millet grains viz., barnyard, little, foxtail, and kodo were taken to create new products by adding non-glutinous starches such as potato starch, arrowroot powder, and rice flour. Three recipes for each type of millet by using these three starches were developed. A panel of 10 semi-trained individuals evaluated the taste and quality of these recipes. Arrowroot powder received the highest scores in most recipes, while potato starch was not well-received. The viscosity of the starches was tested using the line spread test at specific time intervals and found that the rheological properties of the starches increased over time. We also analyzed the moisture content of the starches using the Loss on Drying method. The results suggest that these starches can be a suitable substitute for wheat flour and cornflour for individuals with digestive issues such as celiac disease and gluten allergies.

REFERENCES

- Aggarwal, M., Verma, P. and Sharma, D. 2018. Preparation and sensory evaluation of arrowroot masala khakhra. *International Journal of Fermented Foods*, 7(2): 137–142.
- Ali, S.M., Siddique, Y., Mehnaz, S. and Sadiq, M.B. 2023. Extraction and characterization of starch from low-grade potatoes and formulation of gluten-free cookies containing modified potato starch. *Heliyon*. 9(9): e19581. <https://doi.org/10.1016/j.heliyon.2023.e19581>.
- Amante, P.R., Santos, E.C.Z., Correia, V.T.D.V. and Fante, C.A. 2021. Benefits and possible food applications of arrowroot (*Maranta arundinacea* L.). *Journal of Culinary Science & Technology*, 19(6): 513–521.

- Bao H., Zhou J., Yu J. and Wang S. 2021. Effect of Drying Methods on Properties of Potato Flour and Noodles Made with Potato Flour. *Foods*. 2021 May 18;10(5):1115. doi: 10.3390/foods10051115. PMID: 34070076; PMCID: PMC8158102.
- Bhaduri, S. 2013. A comprehensive study on physical properties of two gluten-free flour fortified muffins. *Journal of Food Processing & Technology*, 4(7): 1–4.
- Katayama, K., Tokunaga, Y., Kobayashi, H., and Harada, H. 2023. Line Spread Test Results for Commercially Available Universal Design Foods. *Acta Scientific Medical Sciences*. 7(9): 18–25. Available at: <https://actascientific.com/ASMS/pdf/ASMS-07-1649.pdf>
- Kim, J.N. and Shin, W.S. 2009. Physical and sensory properties of chiffon cake made with rice flour. *Korean Journal of Food Science and Technology*, 41(1): 69–76.
- Lim, S. 2024. Sensory and nutritional evaluation of nine types of millet substituted Indian meal preparations. *Frontiers in Sustainable Food Systems*, 8, Article 1331260.
- Makadi, A., Barapatre, P. and Desa, P. 2024. Role of proso millet (*Panicum miliaceum*) as preventive diet in lifestyle disorders. *World Journal of Biology Pharmacy and Health Sciences*, 17(1): 043–048.
- Malki, M.K.S., Wijesinghe, J.A.A.C., Ratnayake, R.H.M.K. and Thilakarathna, G.C. 2023. Characterization of arrowroot (*Maranta arundinacea*) starch as a potential starch source for the food industry. *Heliyon*. 9(9): e20033. <https://doi.org/10.1016/j.heliyon.2023.e20033>.
- Mouminah, H.H. and Althaiban, M.A. 2025. Production and evaluation of gluten-free cookies for celiac patients made from rice flour and green banana flour. *Nutrition & Food Science*, 13(2).
- Onyango, S.O., Abong, G.O., Okoth, M.W., Kilalo, D. and Mwang'ombe, A.W. 2020. Physico-chemical properties and sensory quality of cassava-cowpea-millet composite flours. *African Crop Science Journal*, 28(1): 27–39.
- Singh, A. and Iraj, S. 2023. To standardize and develop the product using arrowroot. *International Journal of Home Science*, 9(2): 23-26.
- Thapa, S. and Thapa, S. 2019. Scope of value-addition in potato. *International Journal of Horticulture Agriculture and Food Science*, 3(3): 132-146.
- Verma, S., Srivastava, S. and Tiwari, N. 2015. Comparative study on nutritional and sensory quality of barnyard and foxtail millet food products with traditional rice products. *Journal of Food Science and Technology*, 52(8): 5147–5155. <https://doi.org/10.1007/s13197-014-1617-y>.
- Xu, F., Zhang, L., Liu, W., Liu, Q., Wang, F., Zhang, H., Hu, H. and Blecker, C. 2021. Physicochemical and structural characterization of potato starch with different degrees of gelatinization. *Foods*, 10(5): 1104. <https://doi.org/10.3390/foods10051104>.

Gayatri, T. and Sony, V. 2025. Development of Millet-Based Recipes Employing Potato Starch, Rice Flour and Arrowroot Powder as Thickening Agents. *The Journal of Research ANGRAU*, 53(2), 63–75. <https://doi.org/10.58537/jorangrau.2025.53.2.08>