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Assessment of the acceptability, proximate properties, and product cost of amylase-enhanced mixed cassava and sweet potato syrup

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Abstract: The variety of goods obtained from root crops, particularly cassava and sweet potatoes, is getting low, thereby affecting their sustainability. The researcher has produced a syrup by combining cassava and sweet potato starch. This study evaluated the sensory acceptability, proximate characteristics, and production cost of a blend of cassava and sweet potato syrup with amylase. The procedure involves boiling cassava starch with purified water for 30 minutes; thereafter, amylase enzyme is incorporated into the slurry. The enzyme is stirred and combined with the slurry, converting it into a liquid, and then simmered for 30 minutes until it attains a syrupy consistency. The nutritional analysis and physicochemical evaluation of food products were performed at DOST CAR utilizing various methodologies. The technique included ash determination by the Gravimetric Method, which entails weighing samples prior to and subsequent to the ash determination procedure. Total carbs were determined based on the Philippine Food Composition Tables (FNRI), which provide extensive information on the chemical and nutritional composition of foods. Crude lipids were extracted via the Soxhlet extraction method, which entails heating a solvent to facilitate lipid extraction. The Kjeldahl method, which involves digesting the sample in concentrated sulfuric acid followed by pH adjustment, was employed to determine crude protein. The moisture content was assessed using the oven method, wherein a representative sample of the food material is placed into a pre-weighed dish and heated in a preheated oven at a designated temperature. The ALne-Eynon Constant Volumetric Method was employed to quantify sugar content, ascertained using Fehling's solution. The pH was evaluated utilizing the Potentiometric Method/AOAC 945.27, which quantifies the electrical potential of a solution with an electrode to ascertain the pH level. These approaches yielded significant insights into the chemical and nutritional composition of the food products. This study employed hedonic scaling, a 9-point hedonic scale that has been utilized in food science for over six decades, to assess cassava syrup. The brain's production of numerical values and categories of numbers is essential for choosing measurement methods. The research assessed parametric statistical analysis of scaling data and investigates alternatives, including simple ranking using the hedonic R-Index signal detection method. Judges ingested the cassava, cleansed their lips, and observed intermissions. They assessed the position on the scale that most precisely reflects the flavor of the food, taking into account their distinct preference for cassava syrup. The study seeks to ascertain the classification of cassava syrup as advantageous, harmful, or neutral. The study employed a weighted mean to analyze the data, determined by multiplying the values in the dataset and aggregating the results. The formula for the weighted mean is expressed as $\Sigma wx / \Sigma w$, where Σ denotes summation and w signifies weights. One-way ANOVA is a statistical technique employed to compare means across groups. The study revealed that the syrup containing 1/4 teaspoon of amylase exhibited a marginally favored appearance, but the syrup with 1/2 teaspoon demonstrated a moderate preference. The third sample with 1 teaspoon of amylase exhibited a significant preference, demonstrating a slight inclination towards clarity and uniformity. The participants preferred the syrup containing 1/2 teaspoon of amylase compared to the other options. The study indicated that syrups containing 1/4 teaspoon of amylase had a marginally preferred aroma, but those with 1/2 teaspoon demonstrated a moderately preferred aroma. The participants favored the syrup containing 1/2 teaspoon of amylase compared to the alternatives, with a mean intensity of 6.09 and a pleasantness rating of 5.93. The study revealed that syrups with varying amylase concentrations elicited distinct preferences. The initial syrup, comprising 1/4 teaspoon of amylase, had a moderate inclination towards sweetness, but the subsequent syrup displayed a slight preference. The third syrup, which contained 1 teaspoon of amylase, exhibited a moderate preference, with participants liking the initial flavor. The research indicated that syrup containing 1/4 teaspoon of amylase was marginally favored by tasters. The second syrup was moderately preferred, whilst the third possessed a relatively esteemed texture. The participants preferred the syrup consistency with 1 teaspoon of amylase compared to the alternatives. The study indicated that participants favored the syrup formulation with 1/2 teaspoon of amylase compared to the others. The syrup containing 1/2 teaspoon of amylase had a somewhat more favorable appearance, aroma, flavor, and texture. The syrup mixture with 1/2 teaspoon of amylase had the highest preference, with a

weighted mean of 6.07. The syrup mixture containing 1/2 teaspoon of amylase was deemed satisfactorily acceptable by most respondents.

Keywords: amylase, total fat, total protein

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INTRODUCTION

The study focuses on enhancing the value and sustainability of root crops—particularly cassava and sweet potato—through the development of an amylase-enhanced syrup. Cassava and sweet potatoes are staple foods in many tropical regions and have long been integral to the diet and cultural heritage of Indigenous Peoples. However, their declining consumption and market opportunities pose a threat to food security. The research aims to address this gap by producing a syrup from a blend of cassava and sweet potato starch and evaluating its sensory acceptability, nutritional properties, and cost-effectiveness. By incorporating enzyme technology, specifically the use of amylase, the study attempts to improve syrup production and provide an innovative, economically viable food product that maximizes the nutritional and culinary potential of root crops.

Statement of the problem

Despite the known nutritional value and cultural significance of root crops such as cassava and sweet potato, the diversity of goods derived from these crops remains limited, resulting in decreased consumption and sustainability. This study seeks to address the problem of underutilization by formulating a syrup enhanced with amylase enzyme and evaluating its acceptability, proximate composition, and cost. Specifically, the study investigates whether varying amounts of amylase in the cassava-sweet potato syrup affect sensory attributes, nutritional properties, and production costs.

METHODOLOGY

Research design

The study employed an experimental research design focusing on the formulation and evaluation of cassava and sweet potato syrup enhanced with different concentrations of amylase enzyme. The independent variable was the amount of amylase added (1/4 tsp, 1/2 tsp, and 1 tsp), while the dependent variables included sensory characteristics (appearance, aroma, taste, texture), proximate nutritional values, and cost. The syrup was prepared through a standardized cooking process, followed by laboratory analysis and sensory evaluation using hedonic scaling. This design allowed for controlled manipulation and assessment of the effects of amylase concentration on the syrup's quality and consumer acceptability.

Respondents and locale of the study

The study was conducted with student-respondents who participated in the sensory evaluation of the syrup samples. The research locale and laboratory analyses were primarily situated in the DOST-CAR facility, where the physicochemical and nutritional analyses were carried out. The students were selected as evaluators for the sensory test to assess the acceptability of the syrup

based on a 9-point hedonic scale, ensuring consistent feedback across different amylase concentrations.

Research instrument

The primary instruments used in the study were the laboratory tools and equipment for nutritional analysis (such as Soxhlet extractors, Kjeldahl apparatus, potentiometric devices, and gravimetric scales), as well as a survey questionnaire designed for the sensory evaluation. The survey utilized a 9-point hedonic scale to measure the respondents' perceptions of the syrup's sensory attributes. Each syrup sample was labeled and presented in a controlled environment, with respondents instructed to cleanse their palates between tastings to ensure unbiased assessments.

Data analyses procedure

Data gathered from the sensory evaluations were analyzed using weighted mean to quantify the level of acceptability for each syrup attribute. Additionally, one-way ANOVA was employed to identify statistically significant differences among the three syrup formulations in terms of sensory attributes and overall preference. Proximate nutritional data were interpreted using standard calculations based on established AOAC methodologies. The combination of statistical tools and laboratory analyses ensured the reliability and validity of the study’s findings.

FINDINGS AND DISCUSSION

Sensory acceptability

Sensory evaluation comprises a collection of testing methodologies and established approaches for product presentation, including statistical tools and tactics for result interpretation. The precise implementation of sensory techniques necessitates the appropriate alignment of methods with the test objectives, accompanied by effective communication between sensory specialists and the end-users of the data. In food businesses, the sensory evaluation department interacts not only with product development but also provides information to quality control, packaging, marketing, and various other divisions within the organization. The primary benefits of sensory information encompass the economical development of food items by mitigating risks associated with decision-making in product development and techniques for addressing consumer demands (Sharif et al, 2017).

The role of sensory evaluation has undergone significant transformation over the years. In collaboration with the research and development and marketing divisions, it aids in the formation of a lucrative strategy. During the first phases of product development, sensory testing can identify the essential sensory attributes influencing acceptability. It is beneficial to identify target consumers, evaluate product competitors, and appraise novel concepts. Currently, the chemical and physical features of products that influence sensory attributes are determined by integrating data from sensory and instrumental analyses. Sensory evaluation helps ascertain the effects of transitioning pilot samples to large-scale production (Sharif et al., 2017).

Understanding that the sensory attributes of food affect selection and consumption behavior is crucial, yet this insight will be ineffective unless we utilize sensory signals to promote the adoption of better diets. Several proof-of-principle experiments have unequivocally indicated that it is feasible to modify sensory cues in the eating environment to reduce caloric

intake while preserving dietary palatability. These methodologies necessitate additional investigation to comprehend the long-term effects of sensory attributes on energy consumption inside the food environment and across a broader demographic of customers. To learn more about how well these long-term strategies work at making foods that are better for our senses and keeping our energy levels in check, controlled studies on "sensory-nutrition" interventions are needed (Forde, C. & Graaf, 2022).

The sensory acceptance test is a highly economical tool that is crucial for the successful creation of products. When employed effectively, it can significantly influence the development and enduring strategies of sensory evaluation (Store, H. et al., 2021).

The measurement of sensory features indicative of high-quality products is essential for developing and producing items that align with customer expectations, as product flavor quality significantly influences consumer acceptability and demand. The students' sensory tests were done under controlled conditions to minimize bias in the panelists' evaluations of the products. The sensory area was devoid of distractions (sound, odors) to prevent influencing participants' decisions. The product samples were presented in a random sequence and allocated three-digit codes to maintain anonymity and further minimize bias in the panelists' choices. The students planned and executed sensory tests to ascertain whether any observed differences were genuinely significant. Following statistical analysis, the students derived a significant interpretation from the sensory data results (Ackbarali, D. & Maharaj, R. 2024).

Sensory evaluation ensures that substandard items are not introduced into the market. In many instances, sensory evaluation is employed to assess the shelf life of food goods, as the sensory attributes deteriorate prior to the decline in microbiological quality. Customer evaluation is widely utilized in the research domain. It investigates innovative technology for product development and analyzes consumer behavior (Sharif et al., 2017).

The first attribute is appearance. Appearance is the initial attribute seen by human senses and plays a crucial role in the identification and ultimate selection of food. This is the visual perception of food comprised of color, shape, size, gloss, dullness, and transparency. The presentation of a meal has demonstrated an influence on appetite enhancement or suppression, leading to either joy or complete despondency. The appearance of food or beverage influences desirability and acceptance prior to consumption. We visually assess food prior to engaging our sense of smell or taste (Sharif et al., 2017).

This investigation indicates that the appearance of the syrup, using 1/4 teaspoon of amylase, exhibited a weighted mean of 6.11 for color, 6.1 for clarity, and 6.21 for consistency. It was somewhat appreciated. The second syrup, incorporating 1/2 teaspoon of amylase, received a weighted mean of 6.56 for color and 6.46 for consistency, indicating moderate preference, while its clarity, with a weighted mean of 6.34, was somewhat preferred. The third syrup, enhanced with 1 teaspoon of amylase, received a weighted mean color rating of 6.38, indicating considerable preference, while the weighted averages for clarity (6.27) and consistency (6.11) reflected modest preference. The data indicates that the criteria from dislike to extreme like modest or moderate preference occurred frequently with the second syrup with 1/2 teaspoon of amylase. The conclusion indicates that the respondents favored the syrup appearance, which has 1/2 teaspoon of amylase over the alternatives.

The second attribute is aroma. Aroma is closely related to taste. These are volatile substances detected by the odor receptors in the olfactory tissues of the nasal cavity. Aromatic chemicals are emitted during the mastication process. Olfaction evaluates the scent of food, which is crucial to the appreciation of flavor. An agreeable aroma enhances the appeal of food.

To elicit an olfactory experience, the substance must be in a gaseous condition. Moreover, fragrance is essential for detecting fresh, spoiled, or even toxic food (Sharif et al., 2017).

This study indicates that the aroma of the syrup, enhanced with 1/4 teaspoon of amylase, had a weighted mean intensity of 6.09 and a pleasantness rating of 5.93, suggesting it was marginally favored. The second syrup, incorporating 1/2 teaspoon of amylase, had a weighted mean intensity of 6.39 and pleasantness of 6.47, both of which were moderately favored. The third syrup, enhanced with 1 teaspoon of amylase, had a 6.17 intensity and a 6.18 pleasantness as weighted means, both of which were moderately appreciated. The criteria, ranging from extremely dislike to extremely like moderate preference, were regularly observed in the second syrup containing 1/2 teaspoon of amylase. The respondents favored the syrup aroma, which has 1/2 teaspoon of amylase, over the alternatives.

This study indicates that the taste of the syrup, enhanced with 1/4 teaspoon of amylase, received a weighted mean of 5.68 for sweetness, 5.59 for savoriness, and 5.58 for tanginess, suggesting a modest preference among tasters. The second syrup, enhanced with 1/2 teaspoon of amylase, received a weighted mean of 6.3 for sweetness, 6.23 for savoriness, and 6.24 for tanginess, indicating a mild preference. The third syrup, incorporating 1 teaspoon of amylase, had a sweetness of 6.35 and a tanginess of 65.94, both of which were fairly appreciated, while the savory aspect, with a weighted mean of 6.22, was marginally favored. The criteria, ranging from extremely dislike to extremely like and moderate preference, were regularly observed in the second syrup containing 1 teaspoon of amylase. The respondents favored the syrup taste containing 1 teaspoon of amylase over the others.

Flavoring chemicals are aromatic compounds that result from the amalgamation of taste and odor, detected through the mouth and nose. The scent enhances the pleasure of eating, such as the aroma of freshly cooked rice and various baked goods. Flavor facilitates the recognition, acceptance, and appreciation of cuisine. The taste buds on the tongue perceive it. There exist four categories of taste perception: sweet, salty, sour, and bitter. Sour and bitter are frequently conflated. Lemon juice possesses a sour flavor, while coffee exhibits a bitter flavor. The sensory experience of mouthfeel is stimulated by the nerves within the oral cavity, which react to chemical or thermal stimuli, such as the chill of ice cream or the pungency of pepper (Sharif et al., 2017).

This study indicates that the texture of the syrup, enhanced with 1/4 teaspoon of amylase, received a weighted mean of 6.3 for thickness, 6.18 for viscosity, and 6.33 for smoothness, suggesting a slight preference among tasters. The second syrup, enhanced with 1/2 teaspoon of amylase, received a weighted mean of 6.47 for thickness, 6.53 for viscosity, and 6.47 for smoothness, indicating a moderate preference. The third syrup, incorporating 1 teaspoon of amylase, had a thickness of 6.17 and a viscosity of 6.25, both of which were fairly appreciated, while the smoothness aspect, with a weighted mean of 6.52, was marginally favored. The criteria, ranging from extremely dislike to extremely like and moderate preference, were regularly observed in the second syrup containing 1 teaspoon of amylase. The respondents favored the syrup texture containing 1 teaspoon of amylase over the others.

Texture. This is sensed through a mix of senses, including touch, mouthfeel, sight, and hearing. It is one of the most essential features of cuisine. If a customer consumes a soggy biscuit or ice cream with a gritty texture, it is unlikely they will return. Texture is essential for the acceptance of various food items, such as the tenderness of meat and the softness of bread. It also encompasses the consistency, viscosity, fragility, and chewiness, as well as the dimensions and

morphology of food particles. A texture analyzer is essential for ensuring the desired texture is maintained from the laboratory to the consumer's kitchen (Sharif et al., 2017).

The overall preference for mixed cassava and sweet potato syrup with 1/4 teaspoon amylase was slightly liked. It has 6.07 weighted mean. The second mixture, which has 1/2 teaspoon amylase, was moderately liked. It has a 6.56 weighted mean. The third mixture which, has 1 teaspoon amylase, was also slightly liked. Therefore, the one with moderately like, which is the syrup mixture with 1/2 teaspoon amylase, was favored.

Based on the findings, it can be concluded that the respondents preferred the syrup appearance, which contains 1/2 teaspoon of amylase, over the other different options. The aroma of the syrup, which contains 1/2 teaspoon of amylase, was the one that the respondents preferred over the other options. The taste of the syrup that contained 1 teaspoon of amylase was the one that the respondent preferred more than the others. The taste of the syrup that contained 1 teaspoon of amylase was the one that the respondents preferred more than the others. The syrup texture that contained 1 teaspoon of amylase was the one that the respondents liked more than the other options. The syrup mixture that contained 1/2 teaspoon of amylase was the one that was liked by the majority of people. This is the one that was reasonably acceptable.

Mixed cassava and sweet potato sensory acceptability result

P-value
The p-value is 0.0343, indicating it is below the standard significance threshold of 0.05. This demonstrates a statistically significant difference among the group means.

F-statistic
The F-statistic is 3.5092. This value determines the significance of differences between group means.

Degrees of freedom
It refers to the number of independent values or quantities that can vary in a statistical analysis without violating any constraints. This concept is crucial in various statistical tests and models, as it influences the distribution of test statistics and the interpretation of results. The between-groups degrees of freedom is calculated as 2 (number of groups minus 1), while the within-groups degrees of freedom is 86 (total number of observations minus the number of groups).

Mean square
The mean square for between groups is 4.97, while for within groups it is 1.4152. The calculation involves dividing the sum of squares by the degrees of freedom.

Sum of Squares
The summation of squares: the sum of squares between groups is 9.93, while the sum of squares within groups is 121.7080. The measurement assesses the variability present in the data. Consequently, a statistically significant difference in syrup color (appearance) exists among at least two of the three groups. Post-hoc tests are necessary to identify which specific groups exhibit significant differences from one another.

One-way ANOVA result of the syrup in terms of color (appearance)

The data indicates that the p-value of 0.2401 exceeds the conventional significance level of 0.05; thus, the null hypothesis, which posits no significant difference between the means of the groups, cannot be rejected. This suggests that there is no statistically significant difference in the clarity of the syrup across the three groups.

One-way ANOVA result of the syrup in terms of clarity (appearance)

The p-value (0.1801) is greater than the typical alpha level of 0. 05, indicating that there is no statistically significant difference in the consistency of the syrup among the three groups.

One-way ANOVA result of the syrup in terms of consistency (appearance)

F-Statistic
The F-statistic is 2.0339. This value indicates the ratio of between-group variance to within-group variance.

P-value
The p-value is 0.1370. This value represents the likelihood of obtaining the observed results under the assumption that there is no true difference between the group means.
Therefore, the p-value (0.1370) exceeds the conventional significance threshold of 0.05, indicating that there is no statistically significant difference in syrup intensity (aroma) among the three groups.

One-way ANOVA result of the syrup in terms of intensity (aroma)

The results of the ANOVA test demonstrate a statistically significant difference in the pleasantness (aroma) of the syrup among the groups ($p = 0.0288$). The p-value, being less than the conventional significance level of 0.05, indicates sufficient evidence to reject the null hypothesis, which posits no difference in means between the groups. This indicates that at least one group's mean differs significantly from the others.

One-way ANOVA result of the syrup in terms of pleasantness (aroma)

The p-value (0.0291) is below the conventional significance threshold of 0.05, indicating a statistically significant difference in sweetness among at least two syrup groups. This indicates that there is sufficient evidence to reject the null hypothesis asserting that all group means are equal.

One-way ANOVA result of the syrup in terms of sweetness (taste)

The p-value of 0.0258 is less than the conventional significance level of 0.05, indicating a statistically significant difference in the savory taste of syrup among at least two of the groups. The F-statistic of 3.8145, with 2 and 87 degrees of freedom, substantiates this conclusion. This indicates that the observed group differences are improbable to have arisen from random chance.

One-way ANOVA result of the syrup in terms of savory (taste)

Data displays the outcomes of the ANOVA test. It disaggregates the variability in the data into components that are between groups and within groups. The F-statistic (3.0557) and p-value (0.0522) are employed to ascertain whether significant differences exist among the group means. The p-value of 0.0522 marginally exceeds the standard significance threshold of 0.05. This indicates insufficient statistical evidence to ascertain a significant difference in the mean tanginess of the syrup across the three groups. Although the sample means exhibit certain disparities, these variations may have occurred by random chance. Consequently, it cannot be asserted with certainty that the variety of syrup much influences the feeling of tanginess according to this investigation.

One-way ANOVA result of the syrup in terms of tanginess (taste)

P-value
The P-value (0.2256) exceeds the conventional alpha level of 0.05, signifying the absence of a statistically significant difference in the mean thickness of syrup among the three groups.

F-statistic
The F-statistic (1.5146) indicates the ratio of between-group variance to within-group.
In conclusion, Table 10 displays the one-way ANOVA results, indicating no significant difference in syrup viscosity (texture) among the three groups examined.

One-way ANOVA result of the syrup in terms of thickness (texture)

The F-statistic is 1.4738, accompanied by a p-value of 0.2347. Given that the p-value above the standard significance threshold of 0.05, the null hypothesis (which posits no difference in mean viscosity between the groups) remains unrefuted. The result indicates no statistically significant variation in syrup viscosity among the three groups.

One-way ANOVA result of the syrup in terms of viscosity (texture)

The high p- value (0.7259) indicates that there is no statistically significant difference in the mean smoothness of the syrup between the three groups.

One-way ANOVA result of the syrup in terms of smoothness (texture)

P-value
The likelihood of acquiring test results that are at least as extreme as those observed, given the assumption that the null hypothesis is valid. The p-value in this instance is 0.0803. Given that the p-value (0.0803) above the conventional significance threshold of 0.05, the null hypothesis (which posits no significant difference between the group means) remains unrefuted. Consequently, insufficient information exists to ascertain a statistically significant difference in total syrup preference among the three groups.

One-way ANOVA result of the syrup in terms of overall preference

Proximate analysis

The research performed a physicochemical analysis of the pH levels and nutritional composition of a mixture of cassava and sweet potato syrup. Physicochemical analysis involves assessing the chemical and physical properties of substances to ascertain their possible impacts on the skin, including penetration, irritation, or sensitization. This entails evaluating characteristics such as pH, absorbance spectra, partition coefficients, and further specialized chemical properties. Physicochemical analysis is a swift, economical, and standardized technique for evaluating potential cutaneous toxicity (Encyclopedia of Toxicology, 2005). The analysis indicates that it contains 0.18% w/w ash. Total ash denotes the inorganic residue that persists following the complete combustion of organic material. The ash content serves as a metric for product quality and the nutritional value of food items. When a significant ash content indicates the presence of an inorganic adulterant, it is prudent to assess the acid-insoluble ash (Encyclopedia of Toxicology, 2005). The acid-insoluble ash quantifies the sandy content, with maximum limits established for herbs and spices. Acid-insoluble ash is found by dissolving ash in a 10% w/v hydrochloric acid solution, filtering the liquid through ashless filter paper, setting it on fire in the dish it came in, letting it cool, and then weighing it (Encyclopedia of Toxicology, 2005). It has 10.92% w/w carbohydrates, 0.09% w/w crude fat, and 0.11% w/w crude protein. Moisture content: 88.70% w/w, energy: 45 kcal, and total sugar: 7.35% w/w. The pH is 4.53 at 24.8 degrees Celsius. "pH" is an abbreviation originating from the Latin phrase potentia hydrogenii, signifying the "power of hydrogen." It quantifies the concentration of hydrogen ions (H+) in a solution. The pH scale extends from 0 to 14, with 1 representing the highest acidity and 14 indicating the highest basicity. Acids dissociate in water, resulting in elevated quantities of H+ ions. pH is quantified on a reverse logarithmic scale; thus, an increased concentration of hydrogen ions corresponds to a decreased pH value. The pH level significantly influences the quality and safety of food products. Regarding quality, pH can influence color hue, flavor, consistency, and shelf life (Caesweb, 2024).

Mixed cassava and sweet potato proximate analysis result

Product cost

Cost estimation is a crucial activity at each phase of product development. The planning phase facilitates the assessment of the process’s cost-effectiveness and funding opportunities. The design phase permits the adjustment of future product parameters, while the manufacturing phase involves the selection of resources. Costs are a crucial factor in decision-making, and so their estimation is significant in management (Chwastyk, P., & Kolosowski, M., 2014).

The first table presents the processing cost of a mixture of cassava and sweet potato syrup utilizing 1/4 teaspoon of amylase. The initial section lists the ingredients: 2 cups (0.47 l) of cassava starch costing 40 pesos, 2 cups (0.47 l) of sweet potato starch costing 80 pesos, and 1/4 teaspoon of amylase costing 22 pesos. The cumulative cost of the three items amounts to 142 pesos. The second section outlines the supplementary costs, specifically the expenditure of 135 pesos for 90 minutes of liquefied petroleum gas (LPG) usage. The total cost of the ingredients and other charges amounts to 277 pesos. A recipe yields 3 cups (0.71 l). To get the cost per serving, the total expenses of 277 pesos are divided by the number of servings, resulting in 92.33 pesos per cup.

Product cost of mixed cassava and sweet potato syrup with 1/4 teaspoon of amylase

The initial section delineates the substances utilized: 2 cups (0.47 l) of cassava starch costing 40 pesos, 2 cups (0.47 l) of sweet potato starch costing 80 pesos, and 1/4 teaspoon of amylase costing 44 pesos. The aggregate of the three components amounts to 184 pesos. The second section outlines the supplementary charges, namely the 135 pesos charged for 90 minutes of liquefied petroleum gas (LPG) usage. The total cost of the ingredients and other charges amounts to 319 pesos. A recipe yields 3 cups (0.71 l). To get the cost per serving, the total expenses of 319 pesos are divided by the number of servings, resulting in 106.33 pesos per cup.

Product cost of mixed cassava and sweet potato syrup with 1/2 teaspoon of amylase

The initial section delineates the components utilized: 2 cups (0.47 l) of cassava starch costing 40 pesos, 2 cups (0.47 l) of sweet potato starch costing 80 pesos, and 1/4 teaspoon of amylase costing 66 pesos. The aggregate of the three components amounts to 186 pesos. The second section outlines the supplementary charges, specifically the expenditure of 135 pesos for 90 minutes of liquefied petroleum gas (LPG) usage. In total, the sum of the materials and other charges amounts to 321 pesos. A recipe yields 3 cups (0.71 l). To calculate the cost per serving, the total expenses of 321 pesos are divided by the number of servings, resulting in 107 pesos a cup.

The initial combination of cassava syrup and sweet potato syrup with 1/4 teaspoon of amylase yields 3 cups (0.71 l), priced at 92.33 pesos per cup. The second syrup, including 1/2 teaspoon of amylase and yielding 3 cups (0.71 l), would incur a cost of 106.33 pesos per cup. The third syrup, including 1 teaspoon of amylase and producing 3 cups (0.71 l), might be sold for 107 pesos a cup. The most economical choice is the blended cassava and sweet potato syrup with 1/4 teaspoon of amylase, costing 92.33 pesos per cup.

CONCLUSIONS

The syrup containing 1/2 tsp of amylase consistently achieved higher ratings across various attributes, characterized as "moderately liked," and was considered "reasonably acceptable" by the majority of respondents. The samples containing 1/4 tsp and 1 tsp of amylase received predominantly "like slightly" ratings across multiple attributes.

The analysis indicates that the mixture is predominantly composed of moisture, with substantial carbohydrates and comparatively low concentrations of ash, fat, and protein. The energy content is minimal, and the pH level is marginally acidic.

The most economical choice is the blended cassava and sweet potato syrup with 1/4 teaspoon of amylase, costing 92.33 pesos per cup.

RECOMMENDATIONS

The findings suggest a recommendation of 1/2 tsp of amylase, as it garnered the highest overall preference and was characterized as "like moderately" by the majority of respondents across most attributes. This concentration seems to enhance the sensory attributes of the mixed cassava and sweet potato.

Proper storage is essential to prevent spoilage, given the elevated moisture content. Drying or refrigeration may be required.

The mixture may serve as a viable source of carbohydrates; however, it should be paired with other foods to ensure a balanced diet, given its low protein and fat content.
The low pH may influence further processing or culinary applications, affecting flavor and shelf life.

Further research may investigate the specific carbohydrate types, the digestibility of the mixture, and its applicability across various food contexts.
In terms of the price, the most economical choice is the blended cassava and sweet potato syrup with 1/4 teaspoon of amylase, costing 92.33 pesos per cup.

REFERENCES

ACEDO, V. & LABANA, C. 2008. Rapid Propagation of Released Philippine Cassava Varieties through Tissue Culture. Tissue Culture Laboratory, Philippine Root Crops Research and Training Center, Visayas State University, Visca, Bayabas City, Leyte 6521-A, Philippines. Journal of Root Crops, 2008, Vol.34 No.2, pp.108-114.

AGRAWAL, A. K., JAIN, V., SAHOO, M. K., GEYI, N., & SHUKUL, J. A. Financial Management for Non-Financial Managers: Beyond the Balance Sheet.

AOAC International Official Methods of Analysis, 22nd edition, 2023. Gravimetric Method. Official Method No. 940.26)

AOAC International Official Methods of Analysis, 22nd edition, 2023. Soxhlet extraction. Official Method No. 920.39

BIGAMBO, P., MARANDO, S.I., & ELIAS, E. (2023). Costing and pricing of products in small and medium-sized firms in Tanzania Journal of Engineering and Technology, Volume 42, Issue 2, Pages 141-157.

CAESWEB, 2024. Understanding pH and its Importance in Food Safety. The Food Dawgs' Digest. UGA Extension Food Science and Technology. extension.uga.edu/food-science-and-technology/understanding-ph-and-its-importance-in-food-safety/

CASSAVA.2020, January 1. New World Encyclopedia. Retrieved 16:18, November 24, 2024, from https://www.newworldencyclopedia.org/p/indexphp?title=Cassava&oldd=1030031.

CHWASTYK, P., & KOLOSOWKI, M. (2014). Assessing the Expense of the Product Under Development. Procedia Engineering, 69, 351- 360. doi: 10.1016/ j. proeng. 2014. 02.

GAYAO, B. et al. 2016. Diversity of Roots and Tubers Grown and Known by Indigenous Peoples of Northern Philippines. Northern Philippine Root Crops Research and Training Center, Benguet State University. Benguet StateUniversity Research Journal (BRJ) April-August 2016, 76: 53-66.

GAYAO, B. et al., 2016. Traditional Storage and Utilization Practices on Root and Tuber Crops of Selected Indigenous People in the Northern Philippines. Northern Philippines Root Crops Research and Training Center, Benguet State University. Benguet State University Research Journal (BRJ) January- March 2016, 75: 37-49. Copyright 2016, Benguet State University.

LE, D. H.T. et al (2021). Bioactive and Physicochemical Characteristics of Natural Food: Palmyra Palm (Borassus flabellifer Linn.) Syrup. Biology, 10(10),1028. https://doi.org/10.3390/biology10101028

OFFICIAL METHODS OF ANALYSIS OF AOAC INTERNATIONAL, 22ND EDITION, 2023. Alne- Eynon Constant Volumetric Method. Method 923.09

OFFICIAL METHODS OF ANALYSIS OF AOAC INTERNATIONAL, 22ND EDITION, 2023. Kjeldahl technique. Official Method No. 2001.11, in compliance with the instruction manuals for the VELP Scientifica UDK 139 Semi-Automatic Distilling Unit and VELP Scientifica DKL 20 Digester

OFFICIAL METHODS OF ANALYSIS OF AOAC INTERNATIONAL, 22ND EDITION, 2023. Oven procedure. Official Method No. 934.01

OFFICIAL METHODS OF ANALYSIS OF AOAC INTERNATIONAL, 22ND EDITION, 2023. Potentiometric Method/AOAC 945.27

OKPALANMA, E.F., et al (2024). Assessment of the physicochemica characteristics of cassava, cocoyam, and sweet potato starches, as well as glucose syrups derived from the hydrolysis of these starches using sorghum malt enzyme extract. Food Science and Applied Biotechnology, Volume 7, Issue 1, Pages 24-35.

OWUSU, F. B., & ALHASSAN, A. L. (2020). Asset-Liability Management and bank profitability: Statistical cost accounting analysis from an emergin market. International Journal of Finance & Economics, 26(1), 1488–1502. https://doi.org/10.1002/ijfe.1860

PERKINS, T. D., & VAN DEN BERG, A.K. (2009). Chapter 4 Maple Syrup Production, composition, Chemistry, and Sensory Characteristics. Advances in Food and Nutrition Research, 101–143. https://doi.org/10.1016/s10434526(08)00604-9

PERSON, A.M., & ENNIS, D.H. (1979). SENSORY PROPERTIES OF HIGH FRUCTOSE CORN SYRUP ICE CREAM FORMULATIONS. Journal of Food Science, 44(3), 810–812. https://doi.org/10.1111/j.13652621.1979.tb08508.x

PHILIPPINE FOOD COMPOSITION TABLES, FNRI, DOST HANDBOOK, 1997. Calculation

REZVANIAN, K., JAFARINEJAD, S., & BOVELL- BENJAMIN, A. C. (2023). A review on Sweet potato syrup production process: effective parameters and syrup properties. Processes, 11(12), 3280. https://doi.org/10.3390/pr11123280

SEMENIUC, C.A., et al (2015). Characterization of pine bud syrup and its effect on physicochemical and sensory properties of kefir. CyTA - Journal of Food, 14(2), 213–218. https://doi.org/10.1080/19476337.2015.1085905

SHARIF, MIAN et al 2017). Assessment of Sensory Attributes and Consumer Preference.

STEPHANIE GLEN, 2009. Weighted Mean: Formula: How to Find Weighted Mean. StatisticsHowTo.com

SWEET POTATO.2022, October 24. New World Encyclopedia, Retrieved 16:13, November 24, 2024, from https://www.newworldencyclopedia.org/p/index.php?title=sweet_potato&oldd=1083580

SZCZSNA, T., et al (2021).Changes in the Physicochemical Properties of Starch Syrups after Processing by Honeybees. Agriculture, 11(4), 335.https://doi.org/10.3390/agriculture11040335

THABET, I.B., et al (2009). Compositional, Physical, Antioxidant and Sensory Characteristics of Novel Syrup from Date Palm (Phoenix dactylifera L.). Food Science and Technology International, 15(6), 583–590. https://doi.org/10.1177/1082013209353079

THABET ET AL. (2009). Use of Date Syrup as a Sweetener in non-Alcoholic Beer: Sensory and Rheological Assessment (2013). Journal of Microbiology, Biotechnology and Food Sciences, 182–184.

TORRES- RODRIGUEZ, E.,et al (2023). Production of malt syrup with Manihot esculenta starch and β-amylase extracted from Ipomea batatas. Cuban Journal of Chemistry, 35(2), 238–252. Accessed from https://cubanaquimica.uo.edu.cu/index.php/cq/article/view/5333

TOPOR, V. et al. 2008. Cyanide Content of the Roots and Leaves of Cassava (Manihot esculenta Crantz) from selected sources in Iloilo. Department of Chemistry, College of Arts and Science, U.P. Visayas, Miago, Iloilo Dinson Physical Sciences and Mathematics, College of Arts and Sciences, U.P.Visayas, 5023, Viagao, Iloilo, Philippines. UPVj. Nat Sci. 13: 25-34 (2008).

WICHCHUKIT, S., & O' MAHONY, M (2014). The 9-point hedonic scale and hedonic ranking in food science: a re-evaluation and alternatives. Journal of the Science of Food and Agriculture, volume 95, issue 11, pages 2167–2178. doi:10.1002/jsfa.6993