IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

Nutritional Analysis of Coco-Squash Peanut Nutri Bar

[1]Michelle M. Lomeda-Junio

[1]Assistant Professor I
[1]College of Technological and Developmental Education
[1]Camarines Sur Polytechnic Colleges, Philippines

Abstract: This study aimed to evaluate the nutritional composition of the Coco-Squash Peanut Nutri Bar, focusing on its energy, fat, carbohydrates, fiber, and protein content. The product was tested at two different food testing facilities: the Food and Nutrition Research Institute Service Laboratory (FNRI) and the Industrial Technology Development Institute. The analysis of the Coco-Squash Peanut Nutri Bar revealed key findings, such as an energy content of 414 kcal per 100 grams, with significant contributions of 13.1 grams of total fat, 67.4 grams of carbohydrates, 6.61% protein, and 6.11% dietary fiber. The results showed that a 25-gram serving provides 104 kcal for children and 207 kcal for adults, contributing to daily energy needs. Additionally, the bar serves as a good source of fat and dietary fiber, meeting 12-33% of daily fat and fiber requirements, respectively. Sensory evaluations demonstrated that the bar's quality attributes, such as appearance, aroma, taste, and texture, were positively affected by the formulation, with the most preferred mixture containing a higher proportion of squash. The findings suggest that the Coco-Squash Peanut Nutri Bar is a nutritious, sustainable, and marketable snack product, offering a healthy alternative for various age groups. This research highlights the potential of utilizing local agricultural resources to create innovative food solutions for commercial production.

Index terms **- Coconut Milk, Nutritional Analysis, Nutri Bar, Peanut, Squash.**

I. INTRODUCTION

Nutrition plays a vital role in health and development. Improved nutrition is linked to better outcomes in infant, child, and maternal health, enhanced immune function, safer pregnancies and childbirth, reduced risk of non-communicable diseases (such as diabetes and heart disease), and increased life expectancy. Well-nourished children perform better academically, while individuals with proper nutrition are more productive and better positioned to break the cycles of poverty and hunger. Malnutrition, in all its forms, poses significant threats to human health. The world now faces a dual challenge of malnutrition, characterized by both undernutrition and overweight, particularly in low- and middle-income nations. Malnutrition manifests in various ways, including undernutrition (wasting or stunting), vitamin and mineral deficiencies, obesity, and diet-related chronic diseases. The developmental, economic, social, and health-related consequences of the global malnutrition burden are profound and long-lasting, affecting individuals, families, communities, and entire nations. Childhood malnutrition, in all its forms including undernutrition (such as wasting, stunting, and underweight), micronutrient deficiencies, as well as overweight and obesity represent a triple burden of disease. This issue is particularly prevalent in low- and middle-income countries and is a leading cause of poor health. It also significantly hinders individual development and the ability to reach full human potential globally. (Amoroso, 2016) The researcher formulated a nutritious bar that may substitute for the existing snack bar in the market where preservatives and artificial ingredients are present.

The Coco-Squash Peanut Nutri Bar is a type of snack bar, it's the combination of the three locally found ingredients such as coconut milk, squash and peanut. Coconut (Cocosnucifera L.) is of the palm family (Arecaceae). The plant is highly cultivated in Malaysia and southern Asia. Spanish explorers named it cocos meaning grinning face, due to the three little eyes. It is classified as a fruit and very often mistaken as a nut. The coconut is a one seeded drupe. (Onsaard, 2006) Coconut milk can be a good health promoter as it stimulates weight loss and lowers cholesterol. It can add flavor to sweet and savory dishes and is an alternative to dairy milk. Coconut milk has another type of fat called MCTs, or medium-chain triglycerides. MCTs stimulate energy by a mechanism called thermogenesis, or the generation of heat. According to research, it has been suggested that MCTs might assist in the following: body weight and the accretion of body fat, causes a person to feel full longer after a meal, insulin sensitivity, potentially contributing to weight loss and boost exercise endurance. According to a research of Wang, Y. et. (2018) Medium Chain Triglycerides (MCT) is a nutritional supplement and typically prescribed with medications for the treatment of disorders in food absorption such as diarrhea, steatorrhea, and liver disease. It has been proven that MCT is involved in weight loss, and reduction of metabolic syndrome, abdominal obesity, and inflammation.

Squash or zucchini plant is one of the most important vegetable crops that are cultivated in Egypt for local market. The plants belong to the Cucurbitaceous family and are a very polymorphic vegetable plant and preferred for human nutrition in most parts of

the world. (Abd El-Mageeda et.al 2016). Squash is abundant in essential nutrients, including manganese, potassium, phosphorus, copper, and magnesium. (Tamer et. al 2010) Additionally, squash is a good source of protein and contains bioactive compounds, including antioxidants, flavonoids, vitamins, and medicinal properties. (Tamer et.al 2010) Squash plants are highly adaptable and can be cultivated in a variety of soil types. (Kumar et.al 2009) and they can also thrive in a range of temperature conditions, including Mediterranean, tropical, and subtropical climates. (Abd El-Mageeda et.al 2016) Squash production in low-fertility soils largely relies on enhancing soil organic matter, which plays a key role in regulating soil physicochemical properties and improving nutrient availability. Increasing the soil content of organic matter will lead to obtaining a safe product and savings in the consumption of mineral fertilizers in line with the principles of sustainable development (Fawzy et.al 2016)

Peanut (Arachis hypogeae L.) is one of the very important food sources with high nutritional and health values, it has nutrients (proteins, lipids, carbohydrates, vitamins, and minerals), chemical components (stilbenoids, flavonoids, phenolic acids, phytosterols, triterpenes, and alkaloids), biological activities of edible parts of peanut, and the research value of bioactive factor resveratrol. (Mingrou 2022). Peanuts are a composite food comprising a large range of nutrients like carbohydrates, proteins, lipids, vitamins, minerals, and a healthy amount of fiber. Bioactive compounds have been extracted from peanuts and these comprise flavonoids, phytosterols, amino acids, and stilbenes. Massive clinical trials revealed that peanut intake at regular levels can benefit people against cardiovascular diseases, type 2 diabetes, and Alzheimer's. These bioactive compounds are also anti-inflammatory, antioxidant, anticancer, and antitumor. Potential health concerns for peanuts include allergy and contamination with aflatoxins. Peanuts are highly used in the food industry to produce flour, protein concentrates and isolates, confectionaries, oils, and beverages. (Syed et. al 2020).

II. OBJECTIVES

The objective of the study is to:

1. Determine the nutritional content of Coco-Squash Peanut Nutri Bar, including energy, total fats, total carbohydrates, dietary fiber, and protein content.
2. Determine its contribution to the Recommended Energy and Nutrient Intake (REI/RNI) for children and adults.

III. RESEARCH METHODOLOGY

In testing the Nutritional Composition of the product, there are three methods used, these are the Kjeldahl method, Soxhlet Extraction Method and Air Oven Method to determine the nutritional composition of the product.

The Kjeldahl method is based on the principle that proteins can be converted to ammonia through a series of chemical reactions. The ammonia can then be quantified using a titration method. Even though the Kjeldahl method is very common and precise for measuring protein content, there are several limitations to the method. This method was particularly developed to find the nitrogen contents in organic and inorganic substances. Today, Kjeldahl nitrogen determinations are applied to many samples like wastewater, soil, fertilizers, meat, feed, grain, and many other substances in this modern world.

Soxhlet extraction is one of the most exhaustive extraction techniques that is widely applied to analytes that are sufficiently thermally stable. The extraction solvent continuously goes through the matrix, by boiling and condensation, and the sample is collected in hot solvent. Soxhlet extraction has been used very widely to extract valuable bioactive compounds from a wide range of natural sources. In this extraction, a small quantity of dry sample is put into a thimble and put in a distillation flask with the solvent of interest. After it has attained an overflow level, the solution of the thimble-holder is aspirated by a siphon that unloads the solution back into the distillation flask. The solution carries the extracted solutes into the bulk liquid. The solvent goes back to the solid bed of samples, and the solute stays behind in the distillation flask. This is repeated until complete extraction takes place (Saim et al., 1997).

Air Oven Method, these methods determine moisture content as loss in weight of a sample when heated under specified conditions. The results are in close agreement with those obtained by Method 44-40.01 (vacuum-oven). The methods are applicable to flour, semolina, bread, all kinds of grains and cereal products, and food products (except those that are sugar coated). These methods are not recommended for feeds and feedstuffs when fat determination is to be made on dried samples.

The grain moisture air-oven reference methods are procedures used to determine the percent moisture content in grain. Basically, a small sample of grain (ground or unground) that represents a larger sample set of that grain is placed in a small metal dish and the weight of the sample is recorded. A sample is put in the oven at the given temperature. Then, this sample is left there for some specific time duration. After it gets cooled off in each container, in such a manner that it may not lose its moisture or gain during the process, then reweighing the sample is carried out. In that case, loss in sample mass is used as a percentage of moisture content for grain.

IV. RESULTS AND DISCUSSION

4.1. Nutritional Composition of the Most Preferred Coco-Squash Peanut Nutri Bar

The objective evaluation of the Coco-Squash Peanut Nutri Bar focused on analyzing its nutritional composition, including energy, total fats, total carbohydrates, dietary fiber, and protein content. The testing was conducted at two different food testing facilities. The Food and Nutrition Research Institute Service Laboratory (FNRI) performed analyses for ash, energy, total fat, and total carbohydrates, as summarized in Table 5, based on a 100-gram sample. Meanwhile, the Industrial Technology Development Institute conducted tests for moisture, protein, and total dietary fiber, with results presented in Table 6 for a 40-gram sample.

Table 1. Nutritional Composition of Coco-Squash Peanut Nutri Bar Per Serving (100g)
(Food And Nutrition Research Service Laboratory)

Parameters	Result
Ash(Proximate Content)	1.0 g
Energy	414 g
Total Fat	13.1 g
Total Carbohydrate	67.4 g

4.1.1 Ash

Ash represents the inorganic residue that remains after water and organic matter are eliminated through heating in the presence of oxidizing agents, serving as an indicator of the total mineral content in a food product. The Coco-Squash Peanut Nutri Bar recorded an ash content of 1.0 g, suggesting a relatively low mineral presence. This low ash content may indicate that some minerals were lost during the product's processing stages. Minerals are lost in cooking because they are soluble in water or heat. Vitamins leach out during processing, but less than minerals. In addition, food processing and cooking processes may change the composition of food (vitamins, proteins, or fatty acids), thereby changing the composition and bioavailability of micronutrients. It is essential; therefore, all efforts should be made to restore the nutritional value of foods during preparation. (Yadav 2023)

4.1.2 Energy

Food energy, measured in kilocalories (kcal), reflects the calorie content of the product. A portion of these calories is derived from fat, which contributes to an individual's overall energy intake. The Coco-Squash Peanut Nutri Bar provides 414 kcal per 100 grams. For context, the Recommended Energy and Nutrient Intake (RENI) for children aged 6 to 9 years is 1600 kcal, while for adults aged 19 to 29 years, it is 2530 kcal. A 25-gram serving of the Coco-Squash Peanut Nutri Bar provides 104 kcal, meeting 6% of the daily energy needs for children. For adults, a 50-gram serving offers 207 kcal, fulfilling 9% of their energy requirements. This indicates that the Coco-Squash Peanut Nutri Bar can serve as a supplemental energy source, while additional energy intake would come from other carbohydrate-rich foods consumed throughout the day. A related study by Marty, L. et.al (2023), snacking is linked to an increase in overall daily energy intake, and dietary guidelines suggest that snacks should not exceed 200 kcal for adults and 100 kcal for children to help maintain a balanced diet.

4.1.3 Total Fat

Fat is an essential component of food, even in small amounts, as it plays a vital role in maintaining a healthy diet. It serves as a significant source of energy and heat, helping to keep the body active and warm. Fat is particularly important for adolescents, as it supports proper development of the brain and nervous system. Additionally, fats enhance the flavor, palatability, moistness, and tenderness of certain foods.

The recommended daily fat intake is 93 grams for males aged 16 to 18 years and 65 grams for females in the same age group. The Coco-Squash Peanut Nutri Bar contains 13.1 grams of fat per serving, which can provide 14% of the daily fat requirement for males and 20% for females, making it a valuable source of dietary fat.

4.1.4 Total Carbohydrate

Carbohydrates are the primary source of energy, providing an affordable and essential energy supply. They spare protein, regulate fat metabolism, serve as the exclusive energy source for the brain and nervous system, and act as a storage form of energy in the form of glycogen. Additionally, carbohydrates support intestinal peristalsis and contribute to dietary bulk.

The carbohydrate content of the Coco-Squash Peanut Nutri Bar was determined using the different method, where the sum of ash, moisture, protein, and fat contents was subtracted from 100%. The product was found to contain 67.4 grams of carbohydrates per 100 grams. According to reference values for nutrition labeling, the recommended daily intake of carbohydrates for adults and children aged 4 years and older is 300 grams. A 100-gram serving of the Coco-Squash Peanut Nutri Bar provides approximately 8% of the recommended daily carbohydrate intake for both adults and children.

Table 2. Nutrition Composition of Coco-Squash Peanut Bar Per Serving (about 40g)
(Industrial Technology Development Institute)

Parameters	Result
Moisture (Proximate Content)	11%
Protein	6.61%
Total Dietary Fiber	6.11%

Determining moisture content is a crucial aspect of food processing and testing. Moisture content refers to the total amount of water present in a food sample and plays a significant role in the product's shelf life by influencing the growth rate of microorganisms. It also impacts the texture, taste, appearance, and overall stability of food products. Foods with high moisture content are more prone to spoilage and typically require storage at low temperatures or prompt consumption to avoid early deterioration. The moisture content of the Coco-Squash Peanut Nutri Bar was found to be 11.9%.

4.1.6. Protein

Proteins are vital components of food, serving as a primary source of energy and providing essential amino acids. They play a key role in determining the texture of many foods and are critical for various bodily functions, including metabolism, digestion, nutrient and oxygen transport, and the production of antibodies that protect against infections and illnesses.

The Coco-Squash Peanut Nutri Bar contains 6.61% protein. The average daily protein requirement is 73 grams for males aged 16 to 18 years and 59 grams for females in the same age group. A 40-gram serving of the Coco-Squash Peanut Bar provides approximately 4% of the daily protein needs for males and 5% for females. While the protein content is modest, additional protein can be obtained from other dietary sources, such as meat, eggs, milk, and certain vegetables, consumed throughout the day.

4.1.7. Total Dietary Fiber

Dietary fiber is a type of carbohydrate that cannot be broken down by the body's digestive enzymes. It plays a crucial role in maintaining gut health and contributes to reducing the risk of various diseases, including diabetes, coronary heart disease, and bowel cancer. The Coco-Squash Peanut Nutri Bar was found to contain 6.11% dietary fiber.

4.2. Recommended Energy and Nutrient Intake (REI/RNI)

The nutritional content of the Coco-Squash Peanut Nutri Bar was analyzed in terms of its contribution to the Recommended Energy and Nutrient Intake (REI/RNI) for children aged 6-9 years and adults aged 19-29 years. The analysis highlights the bar's potential as a supplementary source of energy and essential nutrients.

Table 3. Recommended Energy and Nutrient Intake (REI/RNI) for children aged 6-9 years and adults aged 19-29 years

Nutrients	REI/RNI Amount per serving in grams		%REI/RNI Amount per serving in percentage	
	Children 6-9 years old	Adult 19-29 years old	Children 6-9 years old	Adult 19-29 years old
Energy, kcal	104 kcal	207 kcal	6%	9%
Total Fat	27 grams	42 grams	12%	40%
Total Carbohydrates	34 grams	17 grams	6%	8%
Dietary Fiber	4 grams	8 grams	29%	33%
Protein	4 grams	8 grams	14%	12%

4.2.1. Energy (kcal)

A serving of 25 grams for children provides 104 kcal, contributing 6% of their daily energy needs, while a 50-gram serving for adults provides 207 kcal, fulfilling 9% of their requirements. This demonstrates that the bar can serve as an energy-boosting snack, particularly beneficial for active individuals or those requiring additional caloric intake.

4.2.2. Total Fat

A serving contains 27 grams (children) or 42 grams (adults), meeting 12% and 40% of their respective daily fat needs. This significant contribution suggests the bar is a good source of dietary fat, which is essential for energy production and cellular function. However, moderation is important to balance fat intake from other dietary sources.

4.2.3. Total Carbohydrates

Children receive 34 grams per serving (6% of their REI/RNI), while adults receive 17 grams (8%). As carbohydrates are a primary energy source, the bar contributes meaningfully to daily energy needs while leaving room for additional carbohydrate intake from other food sources.

4.3.4. Dietary Fiber

The bar provides 4 grams for children and 8 grams for adults, meeting 29% and 33% of their daily fiber needs, respectively. This highlights the bar's strong role in promoting digestive health and supporting efforts to meet daily fiber intake goals, which are often challenging for many individuals.

4.3.4. Protein

A serving delivers 4 grams for children (14% of their daily protein needs) and 8 grams for adults (12%). While the bar provides a moderate amount of protein, it can complement other dietary protein sources like meat, dairy, and legumes to meet daily requirements.

V. ACKNOWLEDGEMENT

The researcher would like to thank all who contributed to the success of this research, the Food and Nutrition Research Institute Service Laboratory and the Industrial Technology Development Institute, for the professional and technical services in conducting the necessary nutritional analyses of the Coco-Squash Peanut Nutri Bar.

VI. REFERENCES:

[1] Abd El-All, H.M.; Ali, S.M.; Shahin, S.M. Improvement growth, yield and quality of squash (Cucurbita pepo L.) plant under salinity conditions by magnetized water, amino acids and selenium. J. Appl. Sci. Res. 2013, 9, 937–944.

[2] Abd El-Mageeda, T.A.; Semida, W.M.; Abd El-Wahed, M.H. Effect of mulching on plant water status, soil salinity and yield of squash under summer-fall deficit irrigation in salt affected soil. Agric. Water Manag. 2016, 173, 1–12.

[3] Affandi, A. R. and Ferdiansyah, M. K. 2017. Characterization of physicochemical and organoleptic properties of cookies substituted with suweg flour (Amorphophallus campanulatus BI). Jurnal Pangan Dan Gizi 7(1): 9-16.

[4] Agustina, W. 2019. Comprasion of hemoglobin levels in pregnant moms who consume iron tablets with and without vitamin C in the Puskesmas Working Area Langsa Lama 2019.

[5] Amoroso, L. The Second International Conference on Nutrition: Implications for Hidden Hunger. World Rev. Nutr. Diet. 2016, 115, 142–152

[6] Amertaningtyas, D. and Jaya, F. 2011. Physicochemical properties of mayonnaise with varying levels of concentration of vegetable oils and chicken egg of local chicken. Jurnal Ilmu-Ilmu Peternakan 21(1): 1-6.

[7] Amriani. 2017. Analysis of the nutritional content of purple sweet potato biscuits as an alternative for improving nutrition in society. Indonesia: Alauddin Islamic State University, thesis.

[8] Badan Pengawas Obat Dan Makanan Republik Indonesia (BPOM). 2018. Regulation of the food and drug supervisory agency number 13 of 2016 concerning supervision of claims on processed food labels and advertisements. Jakarta: BPOM.

[9] Claudia, R., Estiasih, T., Ningtyas, D. W. and Widyastuti, E. 2015. Development of biscuit from orange sweet potato flour (Ipomoea batatas L.) and fermented corn flour (Zea mays) - A review. Jurnal Pangan Dan Agroindustri 3(4): 1589-1595.

[10] Fairus, A., Hamidah, N. and Setyaningrum, Y. 2021. Substitution of flour with local food purple cassava flour (Ipomoea batatas L. Poir) and peanut flour (Arachis hypogaea) in cookies - Study of protein and organoleptic quality. Journal of Health Care Media 5(1): 16-22.

[11] Graf, D., Seifert, S., Jaudszus, A., Bub, A. and Watzl, B. 2013. Anthocyanin-rich juice lowers serum cholesterol, leptin, and resistin and improves plasma fatty acid composition in Fischer rats. PLOS One 8(6): e66690.

[12] Han, A. R., Kim, H., Piao, D., Jung, C. H. and Seo, E. K. 2021. Phytochemicals and bioactivities of Zingiber cassumunar Roxb. Molecules 26(8): 2377.

[13] Harikumar, K., Althaf, A. S. and Kumar, K. B. 2013. Review of hyperlipidemic. International Journal of Novel Trends in Pharmaceutical Sciences 3: 59-65.

[14] Hermansyah, B. 2015. Bioactivity of a compound of standardized bangle (Zingiber cassumunar Roxb.) extract fraction as a complimentary therapy to prevent malaria complications. Journal of Agromedicine and Medical Sciences 1(2): 19-25.

[15] Husna, N. E., Novita, M. and Rohaya, S. 2013. Anthocyanins content and antioxidant activity of fresh purple fleshed sweet potato and selected products. Agritech 33(3): 296-302.

[16] Im, Y. R., Kim, I. and Lee, J. 2021. Phenolic composition and antioxidant activity of purple sweet potato (Ipomoea batatas (L.) Lam.): Varietal comparisons and physical distribution. Antioxidants 10(3): 462.

[17] Indonesian National Standard (SNI). 2006. Microbiological test method - Part 4: Determination of Vibrio cholerae in fishery products. Indonesia: SNI. Indonesian National Standard (SNI). 2010. Fishery product sampling method. Indonesia: SNI.

[18] Izza, N. K., Hamidah, N. and Setyaningrum, Y. I. 2019. Fat and water content in cookies substituted with purple potato flour and peanuts. Jurnal Gizi 8(2): 106-114.

[19] Jauharah, M. Z. A., Wan Rosli, W. I. and Daniel Robert, S. 2014. Physicochemical and sensorial evaluation of biscuit and muffin incorporated with young corn powder. Sains Malaysiana 43(1): 45-52

[20] Jung, J. K., Lee, S. U., Kozukue, N., Levin, C. E. and Friedman, M. 2011. Distribution of phenolic compounds and antioxidative activities in parts of sweet potato (Ipomoea batatas L.) plants and in home processed roots. Journal of Food Composition and Analysis 24(1): 29-37.

[21] Kumar, G.; Purty, R.S.; Sharma, M.P.S.; Singla-Pareek, L.; Pareek, A. Physiological responses among brassica species under salinity stress show strong correlation with transcript abundance for SOS pathway-related genes. J. Plant Physiol. 2009, 166, 507–520.

[22] Kusharto, C. M. 2006. Dietary fiber and its role for health. Jurnal Gizi dan Pangan 1(2): 45-54

[23] Mahfudh, N., Sulistyani, N., Syakbani, M. and Dewi, A. C. (2021). The antihyperlipidaemic and hepatoprotective effect of Ipomoea batatas L . leaves extract in high-fat diet rats. International Journal of Public Health Science 10(3): 558564.

[24] Marty, L., Evans, R., Sheen, F., Humphreys, G., Jones, A., Boyland, E. and Robinson, E. (2021) The energy and nutritional content of snacks sold at supermarkets and coffee shops in the UK. DOI: 10.1111/jhn.12880

[25] Mingrou, L., Sen Guo L., Ho, C., and Bai, N. (2022) Review on chemical compositions and biological activities of peanut (Arachis hypogeae L.): DOI: https://doi.org/10.1111/jfbc.14119

[26] Mokodompit, A. R., Nurali, E. J. N. and Tuju, T. D. J. 2017. Physicochemical and sensory quality of specula biscuits four based on Goroho banana (Musa acuminata) and purple sweet yams (Ipomoea batatas L) composite flour. Cocos 9(4): 1-13.

[27] Montilla, E. C., Hillebrand, S. and Winterhalter, P. 2011. Anthocyanins in purple sweet potato (Ipomoea batatas L.) varieties. Fruit, Vegetable and Cereal Science and Biotechnology 5: 19-24.

[28] Mutia, S. 2018. The effect of ethanol extract of andong (Cordyline fruticosa (L.) A. Chev) leaves on total cholesterol and triglycerides level of the hypercholesterolemia white male rat (Rattus norvegicus) blood. Jurnal Bioleuser 2(2): 29-35.

[29] Nurcholis M. 2013. Practicum of food analysis - analysis of fats and oils. Indonesia: University of Brawijaya.

[30] Onsaard, E., Manee, V., Suncheon, S. and Julian,W. (2006) Food Research International, 39: 78–86

[31] Paramita, P., Wardhani, B. W., Wanandi, S. I. and Louisa, M. 2018. Curcumin for the prevention of epithelial-mesenchymal transition in endoxifen-treated MCF-7 breast cancer cells. Asian Pacific Journal of Cancer Prevention 19(5): 1243-1249.

[32] Park, J. S., Bae, J. O., Choi, G. H., Chung, B. W. and Choi, D. S. 2011. Antimutagenicity of Korean sweet potato (Ipomoea batatas L.) cultivars. Journal of the Korean Society of Food Science and Nutrition 40: 37-46.

[33] Permadi, M. R., Oktafa, H. and Agustianto, K. 2018. Design of food sensory test system with preference test (hedonic and hedonic quality), bread case study, using radial basis function network algorithm. Jurnal Mikrotik 8(1): 2642.

[34] Priska, M., Peni, N., Carvallo, L. and Ngapa, Y. D. 2018. Antioxidants and their uses. Indonesian E-Journal of Applied Chemistry 6(2): 79-97.

[35] Putri, N., Medhyna, V. and Shakila, A. 2021. Biscuit based on purple sweet potatoes as MP-ASI processing innovation. Jurnal Kebidanan Dan Kesehatan Tradisional 6(2): 74-83.

[36] Rahardjo, M., Rosita, S. M. D., Sudiarto and Kosasih. 2004. The role of plant population on the productivity of bangle (Zingiber purpureum Roxb.). Jurnal Bahan Alam Indonesia 3(1): 165-170.

[37] Ramadhani, M. R., Bachri, M. S. and Widyaningsih, W. 2017. Effects of ethanolic extract of arrowroot tubers (Maranta arundinacea L.) on the level of MDA, SGPT and SGOT in ethanol induced rats. Indonesian Journal of Medicine and Health 8(1): 10-18.

[38] Romadhoni, D. A., Murwani, S. and Oktavianie, D. A. 2014. Effect of Moringa oleifera Lam. water extract toward LDL and HDL serum levels of rats (Rattus norvegicus) Wistar strain given atherogenic diet. Indonesia: Universitas Brawijaya, thesis.

[39] Sari, N., Nurkhasanah, N. and Sulistyani, N. 2020. The antioxidant effect of bangle (Zingiber cassumunar) rhizome extract on superoxide dismutase (sod) activity in hyperlipidemic rats. Research Journal of Chemistry and Environment 24(1): 78-81.

[40] Setyaningsih, D., Apriyantono, A. and Sari, M. P. 2010. Sensory analysis for the food industry and agro. Indonesia: IPB Press.

[41] Shattat, G. F. A. 2014. Review article on hyperlipidemia: Types, treatments and new drug targets. Biomedical and Pharmacology Journal 7(2): 399-409.

[42] Sudarmadji, S. B., Haryono, B. and Suhardi. 1989. Food and agriculture analysis. Indonesia: Liberty Yogyakarta.

[43] Sunia Widyantari, A. A. A. S. 2020. Functional beverage formulation on antioxidant activity. Widya Kesehatan 2(1): 22-29.

[44] Sutirta-Yasa, I. W. P., Jawi, I. M., Ngurah, I. B. and Subawa, A. A. N. 2011. Balinese purple sweet potato (Ipomea batatas L.) on
SGOT, SGPT, MDA level and chronic alcohol. Indonesian Journal of Clinical Pathology and Medical Laboratory 17(3): 151-154.

[45] Syarfaini, Satrianegara, M. F., Alam, S. and Amriani. 2017. Analysis of nutritional content of purple sweet potato (Ipomoea batatas L. Poiret) biscuit as an alternative improvement of nutrition in the community. Al-Sihah - Public Science Journal 9(2): 138-152.

[46] Syed, F., Arif, S., Ahmed, I. & Khalid, N. (2020) Groundnut (Peanut) (Arachis hypogaea) https://link.springer.com/chapter/10.1007/978-981-15-4194-0_4

[47] Tako, M., Tamaki, Y., Teruya, T. and Takeda, Y. 2014. The principle of starch gelatinization and retrogradation. Food and Nutrition Sciences 5(3): 280-291.

[48] Tamer, C.E.; I˙ncedayi, B.; Parseker, A.S.; Yonak, S.; Copur, O.U. Evaluation of several quality criteria of low calorie pumpkin dessert. Not. Bot. Horti. Agrobot. Cluj-Napoca 2010, 38, 76–80.

[49] Tarwendah, I. P. 2017. Comparative study of sensory attributes and brand awareness in food product - A review. Jurnal Pangan dan Agroindustri 5(2): 66-73.

[50] Wang, Y., Liu, Z., , Han, Y., Xu, J., Huang, W. and Zhaoshen L. (2018) Medium Chain Triglycerides enhances exercise endurance through the increased mitochondrial biogenesis and metabolism. DOI: 10.1371/journal.pone.0191182

[51] Wihenti, A. I., Setiani, B. E. and Hintono, A. 2017. Analysis of moisture, thickness, weight, and texture of chocolate biscuit due to the difference of heat transfer. Jurnal Aplikasi Teknologi Pangan 6(2): 69-73.

[52] Yadav, S., Arora, S., and Vats, S. (2023) Vitamins and Minerals: A Review on Processing Losses and Strategies to Control It. DOI: 10.31031/MCDA.2023.12.000783

[53] Yunarto, N. 2019. Antioxidant activity along with inhibition of HMG CoA reductase and lipase from Anredera cordifolia leaf - Curcuma xanthorrhiza rhizome combination. Jurnal Kefarmasian Indonesia 9(2): 89-96.