

Formulation and quality evaluation of the *Moringa*-seed powder incorporated indian savoury snack (KARASEV)

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ABSTRACT: *Moringa oleifera* is a genus that is widely distributed in the moringeneric family. It contains micronutrients and other phytochemicals such as carotenoids. *Moringa* seeds are an excellent source of vitamin B6, C, Provit A such as beta-carotene, magnesium and protein among other nutrients. This study aimed to develop *Moringa* seed powder incorporated with an Indian savoury snack (Karasev), analyze its nutrients, and evaluate the shelf life of the products. In this study, *Moringa* seed powder was incorporated with the Indian savoury snack (Karasev), and four varieties (10,20,30, and 40%) and their sensory properties were tested. Protein and calcium nutrient analyses were performed. Additional shelf-life research was conducted for one month on nutrient and microbial analysis. *Moringa* seed powder incorporated in Indian savoury snack (Karasev) (10 %) is acceptable for organoleptic studies. Incorporated products contain more protein and calcium than standard products. The selected product was organoleptically acceptable for up to 30 days without microbial deterioration when stored in a zip-lock cover and an airtight container. Finally, since much evidence is available on the health benefits of *moringa* leaves, reports about moringa seeds are very limited; therefore, further research is needed to document the health benefits of moringa seeds and their potential implementation in various cookeries worldwide and make it a healthy diet.

Keywords: *Moringa* seed powder, Indian savoury snack (Karasev), Formulation, Organoleptic acceptance, Microorganism.

1. INTRODUCTION

Food is consumed for survival purposes. Food typically originates from animals and plants. They also provided energy and nutrition. They contain nutrients that people and animals require to maintain their health. Food is an energetic component of healthy lifestyle. When combined with physical activity and a healthy weight, it reduces the threat of enduring illnesses, namely, malignancy and heart ailments. Healthy nourishment plays a significant role in promoting healthy nourishment while preventing disease. (Elizabeth, 2018). New product development is the process of bringing new products into the market. New products thrive on sensitivity to market demands, create smarter product development, and provide emerging and more innovative food for customers (Business Queensland, 2016). A new product formulation involves the ideation, plan, creation, evaluation, and initiation of innovative foodstuffs for target consumers to distribute a resolution that reports a significant necessity.

Moringa oleifera might grow in all tropical and subtropical areas, with an average temperature between 25 °C and 35 °C. It belongs to the moringeneric family, which is efficient in resisting malnourishment, especially in children including lactating women. It is a personification of nutritive richness, owing to the numerous important phytonutrients prevailing in its leaves and seed pods. (Rockwood 2013). *Moringa oliefera* is an abundance of significant nutrients and antinutrients. It is enriched in micronutrients and phytochemicals including carotenoids. *Moringa* seeds are an excellent source of vitamins B6, C, and provitamin A, such as beta-carotene, magnesium, and protein, among others. (Mutiar Titi, 2013). Studies have shown that moringa seed oil contains 76 per cent PUFAs and has the potential for use in olive oil. (Mbikay, 2012). Pods are fibrous and help treat stomach disorders and prevent colorectal tumours. (Sánchez-Machado, 2010).

Karasev is a popular Indian savoury snack in southern India that serves well with hot tea, coffee, and even rice. Karasev is also served at weddings and on other important occasions. These are crunchy snack made of rice flour, besan flour, and pepper as the main components. They were deep-fried until they were crispy. They are very high in calories and fat (Venkatachalam, 2020). Nowadays, people like to eat snack because they are lighter and easier meals, feasibly eaten anytime, and all are related to the main dish. In addition to living a busy life, many people consume light meals to avoid hunger. (Sarangam.S, 2015). Traditional food

plays a prominent role in the individuality of the region, customer behaviour, transmission of the cultural legacy to forthcoming generations, and the interface of legacies around the world. (Albayrak et al., 2010). Karasev is a traditional Indian dish made from gram (besan) flour, salt, and spices. They are crispy, light, lovely in texture, and aromatic. Karasev tastes differ from those of traditional murukku and have the unique aroma of fried besan and carom seeds. (Swathi, 2019). Keeping this information in mind, current research has been conducted primarily to incorporate *Moringa* seed powder into Indian savoury snack (Karasev).

Objectives:

- Formulation and Quality Evaluation of *Moringa* Seed Powder Incorporated Indian savoury snack (Karasev)
- Selecting the Most Acceptable Product by Organoleptic analysis
- Analysis of the Nutrient Content of best variation and standard product.
- Analysis of the Shelf Life of the best formulation and standard by sensory and microbiological analysis.
- Popularize formulated products

2. MATERIALS AND METHODS

Moringa seeds were collected on a good-quality drumstick, the pods were removed by hand, and the air was dried at a temperature of 23-25⁰ C for five days before powdering. The dry pods were ground into powder and stored in an airtight container. In this study, *moringa* seed powder was added to the Indian savoury snack (Karasev), in four variants (10,20,30 and 40%) by incorporating drumstick seed powder in place of all-purpose flour, and standardization was further modified. Its sensory features were assessed by 30 semi-trained panel members using a 5-hedonic scale. The best products and standards selected were subjected to shelf-life research, nutrient analysis, and cost analysis, and eventually, the product became popular among school children.

2.1 PROCESSING OF MORINGA SEED FLOUR:

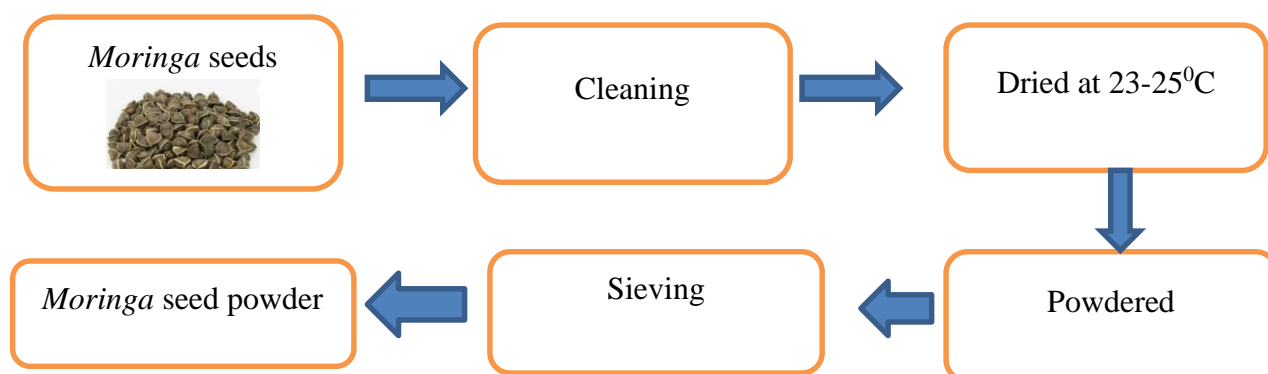




Figure 1

Moringa Seed Powder

2.2. PREPARATION OF INDIAN SAVOURY SNACK (KARASEV)

Mixing gram flour, rice flour, and baking soda. Red chilli powder, cumin, salt, and oil were also added. Mix everything well. Water was slowly poured into the dough. Therefore, they should be neither sticky nor stiff. A murukku plate with thick holes was chosen to create an Indian savoury snack (Karasev). Greases the murukku mould and transfers half of the dough to it. Drop a small piece of dough into the oil and determine whether the oil is sufficiently hot. If it rises and does not brown quickly, then the oil is sufficiently hot for frying. Hold the murukku maker with both hands, two to three times above the oil surface. Fry them in a medium flame until they turn the golden Cool Indian savoury snack (Karasev) completely before transferring them to airtight containers.



Figure 2

Indian Savoury Snack (Karasev)

2.3 SENSORY ANALYSIS:

Sensory assessment is a field of science used to stimulate, evaluate, and interpret reactions in food and building components, as seen by the senses of sight, smell, taste, touch, and hearing. These four variables affected the sensory, human, and spatial testing methods

used. (Kilcast,2017). The evaluation was conducted by 30 semi-skilled panel members, including staff from RVSCAS and Coimbatore. Postgraduate students were selected based on their willingness to participate in the study. The sensory characteristics of the standardized products were assessed using a 5- level hedonic scale scorecard. The criteria included in the scorecard were appearance, colour, aroma, texture, and taste. An evaluation card was provided to the panel members to evaluate the products. During the test, all the samples were kept at the same temperature, optimal levels, and constant. Furthermore, we considered the product with the highest score in sensory analysis.



PLATE-3

Standard and Moringa Seed Powder Incorporated (Karasev)

2.5 NUTRIENT ANALYSIS:

Nutritional analysis refers to the process of measuring the nutrient contents of food and food products. This process can be performed using a variety of proven methods such as laboratory and nutritional analyses. Its main constituents are calcium and iron. (Rasooly, 2016). Nutritional analysis was performed on the best sample of *Moringa* seed powder containing the Indian savoury snack (Karasev) and the standard. Nutrient analysis was performed at Alpha Lab, Coimbatore. *Moringa oleifera* seeds are rich in proteins and calcium. These two nutrients were analyzed using standard methods and selected as the best products.

2.6 MICROBIAL ANALYSIS:

Food microbiological analysis is part of food safety management and conformity testing, which defines microbiological criteria and evaluates the effectiveness of point-based management strategies. Fast and traditional methods can be used for the microbiological analysis of food. (Hungaro, 2014). Two selected products were packed in a zip-lock cover, and

air-tight containers were stowed at ambient temperature to determine longevity. The products were microbiologically analyzed on days 1, 4, and 9 using the spread plate technique. Sensory evaluation of the stored products was tested on days 1, 5, and 10 by the same panel members.

2.7 POPULARIZATION:

Being popular among the public helps to determine eating habits and preferences. This was an effort to raise awareness of the benefits and use of simple nutritious snack. The improved product became very popular with school-going children and found that the product was acceptable.

3. RESULTS AND DISCUSSION

3.1 MEAN SENSORY EVALUATION OF STANDARD AND MORINGA SEED INCORPORATED INDIAN SAVOURY SNACK (KARASEV)

Table I: Mean Sensory Evaluation

S.no	Particulars	Standard	SAMPLE-A	SAMPLE-B	SAMPLE-C	SAMPLE-D
1	Appearance	5 ± 0	4.74±0.42	4.38±0.44	4.08±0.18	3.8±0.42
2	Colour	5±0	4.7±0.46	4.28±0.48	4.06±0.26	3.3±0.6
3	Texture	5±0	4.81±0.39	4.3±0.37	4.1±0.5	3.2±0.34
4	Flavour	5 ± 0	4.8±0.3	4.3±0.3	4.14±0.36	3.1±0.39
5	Taste	5± 0	4.84± 0.34	4.24± 0.46	4.15± 0.35	3.04± 0.23

From Table 1, the average appearance score of the standard Indian savoury snack (Karasev) was highest at 5 ± 0. When moringa seed powder was incorporated, sample A had a maximum score of 4.74±0.42 for appearance, 4.7±0.46 for colour, 4.81±0.39 for texture, 4.8±0.3 for flavour and 4.84± 0.34 for taste. It is evident from the results of the standard and moringa seed-incorporated Indian savoury snack (Karasev) that sample A (10 per cent moringa seed powder) obtained the maximum score of the variants compared to other samples, such as samples B, C, and D, and was chosen for further research. A study conducted by Indu Rani (2015) showed that moringa pod incorporation was optimized to 10% based on overall acceptability and that adding moringa seed powder to cookies improved sensory properties.

3.2 NUTRIENT ANALYSIS

Table II: Nutrient Content

NUTRIENTS	STANDARD PER 100g	SAMPLE PER 100g
PROTEIN	7.20g	8.42g
CALCIUM	39mg	56mg

From Table II, it is clear that the selected product A (10%) contains a higher amount of protein (8.42 g) and calcium (56 mg) than the standard product of protein (7.20 g) and calcium (39 mg) per 100 g. Therefore, it was concluded that the selected product had higher protein and calcium contents than the standard. Protein is a macronutrient that is essential for building muscle mass. Calcium plays an important role in bone formation, muscle contraction, message transmission through nerves, and hormone release. Many researchers have also found an increase in protein, edible oil, protein, and essential minerals when moringa seed powder is incorporated into their products (Ogunsina 2011; Justina Y. Talabi, 2019; Sodipo M. A 2021).

3.3 MICROBIAL ANALYSIS:

Table III
Microbial Analysis

Days	Name of the product	Indicator Test Result (CFU/ gram) and Interpretation/ Standard Plate Count			
		G	M/S	US	PH
DAY 1	Standard		-	-	-
	Sample		-	-	-
DAY 4	Standard		-	-	-
	Sample		-	-	-
DAY 5	Standard		-	-	-
	Sample		-	-	-
Remark	On the 9 th day after sampling NO contamination was found				
Organism identified	No bacterial growth was observed				

(Good =G; Satisfactory =S; Marginal = M; Unsatisfactory = US; Potentially Harzardous = PH)

No growth of microorganisms was observed in the standardized and selection products at the end of the evaluation on the 9th day. Therefore, we concluded that this product is harmless and can be used for the storage of zip-lock covers and air-holding containers.

3.4 MEAN SENSORY SCORE FOR STANDARD AND SAMPLE PRODUCT

Table IV: Mean Sensory Score of Standard and Sample Product

S.No	Day	Standard		Sample	
		Zip lock cover	Air tight container	Zip lock cover	Air tight container
1	1 st day	5±0	5±0	4.9±0.3	4.9±0.3
2	5 th day	5±0	5±0	4.96±0.04	4.96±0.04
3	10 th day	4.9±0.03	4.9±0.03	4.96±0.04	4.96±0.04

Table III shows that the longevity of the selected product and durability are major indicators of the level of use of the manufactured product; storage conditions and packaging material were analyzed. Product quality was maintained on the zip-lock cover, and airtight containers were accepted for 10 days by panel members.

3.5 COST STUDY:

The results revealed that the cost of 100 g Indian savoury snack (Karasev) mixed with moringa seed powder was Rs.35, and the average price of Indian savoury snack (Karasev) was Rs.34. Although the rate of a standard is low, it contains more protein and calcium than conventional products.

3.6 POPULARIZATION:

Popularization was made using 30 randomly selected members of school children, RVS School, Sulur, and Coimbatore, and using a mini questionnaire (consisting of 10 questions), the nutritional benefits of the *moringa* pods were tested before and after popularization. The study concluded that 27 schoolchildren were aware of moringa seeds and that 20% of the participants were aware of their health benefits. Thirteen participants knew the nutrient content of *moringa* seeds and 28 members knew the importance of nutrients. All participants received *moringa* seeds mixed with Indian savoury snack (Karasev) and were willing to purchase them when they became available at the shop.

3.7 CONCLUSION:

Indian savoury snack (Karasev) incorporated with 10% *moringa* seeds were used in these studies. The sample product contained more protein and calcium than the standard product. Sample products were accepted for up to nine days without germs if stowed in a zip-lock cover and airtight container. The cost of the best sample was relatively high compared to that of the conventional product but was still good for all ages. This is beneficial for children, especially in averting anaemia, which helps in muscle growth and the formation of bones and teeth. In the popularization study, all the participants accepted the product.

Reference

- [1]. Elizabeth (2018). Shelf Life: Supermarkets and the Changing Cultures of Consumption, Cambridge University Press. ISBN 0-521-62630-7. Vol 7, Pp 10.
- [2]. Queensland (2016). <https://www.business.qld.gov.au/running-business/growing-business/becoming-innovative/developing-products/new-products>
- [3]. Rockwood JL, Anderson BG, Casamatta DA. (2013). Potential uses of *Moringa oleifera* and an examination of antibiotic efficacy conferred by *M. oleifera* seed and leaf extracts using crude extraction techniques available to underserved indigenous populations. *IntJ Phytotherapy Res.* Vol 3(2):61–71.
- [4]. T. MutiaraTiti, E.S.W. Estiasih. (2013). Effect lactagoguemoringa leaves (*Moringa oleifera* Lam) powder in rats, *J. Basic Appl. Sci. es.*, volume 3, pp. 430-434
- [5]. M. Mbikay. (2012). Therapeutic potential of *Moringa oleifera* leaves in chronic hyperglycemia and dyslipidemia: a review *Front. Pharmacol.*, vol 3 pp. 1-12
- [6]. D.I. Sánchez-Machado, J.A. Núñez-Gastélum, C. Reyes-Moreno, B. Ramírez-Wong, J. López-Cervantes. (2010). Nutritional quality of edible parts of *Moringa oleifera*, *Food Anal. Methods*, vol 3, pp. 175-180
- [7]. Soumya Venkatachalam. (2020). <https://www.subbuskitchen.com/karasev/>
- [8]. Jaimini, M., Rana, A. C., & Tanwar, Y. S. (2007). Formulation and evaluation of famotidine floating tablets. *Current drug delivery*, 4(1), 51-55.
- [9]. Indu Rani, C., Thirupathi, V., Arumuganathan, T., & Sasireka, R. (2015, August). Development of value-added foods from underutilized deseeded moringa pods. In *III International Symposium on Underutilized Plant Species 1241* (pp. 555-562).

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- [10]. Ogunsina, B. S., Radha, C., & Indrani, D. (2011). Quality characteristics of bread and cookies enriched with debittered Moringa oleifera seed flour. *International Journal of Food Sciences and Nutrition*, 62(2), 185-194.
- [11]. Talabi, J. Y., Origbemisoye, B. A., Ifesan, B. O., & Enujuigha, V. N. (2019). Quality characterization of biscuits from blends of Bambara groundnut (*Vigna subterranea*), ground bean seed (*Macrotyloma*) and moringa seed (*Moringa oleifera*) Flour. *Asian Food Science Journal*, 12(4), 1-12.
- [12]. Sodipo, M. A., Oluwamukomi, M. O., Oderinde, Z. A., & Awolu, O. O. (2021). Nutritional evaluation of unripe plantain, moringa seed and defatted sesame seed cookies. *International Journal of Food Studies*, 10.
- [13]. Van Alfen, N. K. (2014). *Encyclopedia of agriculture and food systems*. Elsevier.
- [14]. Sarangam, S., Chakraborty, P., & Chandrasheker, G. (2015). Development of Low Fat Multigrain Murukku-A Traditional Savoury Product. *International Journal of Research*, 15.
- [15]. Albayrak, M., & Gunes, E. (2010). Traditional foods: Interaction between local and global foods in Turkey. *African Journal of Business Management*, 4(4), 555-561., Vol.4 (4), Pp: 555-561