

Development and quality evaluation of millet and Moringa based instant soup premix

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Abstract

The present study centers on the development and quality evaluation of a Millet and Moringa-Based Instant Soup Premix—a nutritious ready-to-cook product that blends traditional ingredients with modern convenience. With increasing urbanization and a growing demand for healthy convenience foods, there is a rising need for shelf-stable, nutrient-dense instant products. Millets are rich sources of dietary fiber, minerals, and complex carbohydrates, while moringa leaves are valued for their high protein, vitamin, and antioxidant content. The premix was formulated by combining selected millets, moringa leaf powder, dehydrated vegetables, spices, and salt to enhance flavor, nutritional value, and consumer acceptance.

The formulation was standardized to achieve an optimal balance of taste, aroma, consistency, and reconstitution properties. Sensory evaluation, conducted using a 5-point hedonic scale, assessed color, flavor, taste, texture, appearance, and overall acceptability. The product received high sensory scores, reflecting strong consumer approval. Shelf-life studies demonstrated that the premix maintained its sensory qualities, with only slight declines in flavor and taste during storage. Microbial analyses, including Total Plate Count (TPC) and yeast and mold counts, showed no microbial growth, confirming the product's microbiological safety.

Chemical analysis indicated low moisture content, which supports extended shelf stability under ambient storage conditions. Nutritional evaluation revealed that the soup premix is a good source of energy, protein, and dietary fiber. In conclusion, the Millet and Moringa-Based Instant Soup Premix is a safe, convenient, and nutritionally enhanced product well-suited for modern consumers seeking quick and healthy meal options. This study underscores the potential of integrating millets and moringa into value-added functional foods to promote health, convenience, and dietary diversity.

Keywords: Millets, moringa, instant soup premix, ready-to-cook food, sensory evaluation, shelf stability, functional food

Introduction

Soup is one of the traditional foods which can be classified as an appetizer, warm food during cold and sickness. In the modern world commercially prepared instant soup has replaced homemade soup as preparing a soup is a time consuming process (Niththiya *et al.* 2014). Soup is generally made by combining ingredients such as vegetables and green leaves with juice, water, or other liquid. Hot soups are additionally characterized by boiling solid ingredients in liquids in a pot until the flavours are extracted, forming a broth. Ingredients commonly used to thicken soups and broths include rice, lentils, flour, and grains. Increase in population and accumulation of industries made more people to stay alone after education for employment. Less time is available for them to prepare food. Hence most of them consume foods that require less preparation time without considering the health benefits.

Soup is a primarily liquid food, generally served warm (but may be cool or cold), that is made by combining ingredients such as meat and vegetables with stock, juice, water, or another liquid. Hot soups are additionally characterized by boiling solid ingredients in liquids in a pot until the flavours are extracted, forming a broth.

Soups have to be one of the favourite meals. They are easy to make, easy to digest, low on calories, relatively inexpensive to make, are filled with fibre, nutrients, vitamins, high water content and can aid in illness. People ate healthier meals and obesity was almost unheard of. They provide an excellent source of fibre, vitamins, and nutrients, fantastic for weight loss success when incorporated into

your meal plans. Soups and broths contain high water content and are low in calories.

Eating a bowl of soup as an appetizer is a great way to cut down on the calories. Other benefits of soup that make a bowl at meal time more appealing. Since they are high in fibre and easy to digest they can help relieve constipation, poor digestion, and troubles with stomach acid. Soups are also a great way to maintain healthy body weight. Broth is beneficial for joint health, digestive problems, immune system, cold and flu, hair and nail strength and the list goes on. Bone broth in particular is an incredible tonic for bone health and the prevention of osteoporosis.

Instant soup is a type of soup designed for fast and simple preparation. Some are homemade, and some are mass-produced on an industrial scale and treated in various ways to preserve them. A wide variety of types, styles and flavours of instant soups exist. Instant soups play an important role in balancing the nutrients required for the people to stay healthy and can become an alternative food for breakfast (Mathangi, *et al.* 2017).

In recent years, changing lifestyles, urbanization, and increasing work commitments have significantly influenced food consumption patterns. Consumers now prefer convenient, nutritious, and quick-to-prepare foods that reduce cooking time without compromising quality. Among such products, instant soup premixes have gained remarkable popularity as Ready-to-Cook (RTC) foods. Instant soup is a dehydrated or powdered product designed for rapid preparation by simply adding hot water and cooking for a short duration. Unlike traditional soups that

require extensive preparation, industrially produced soup powders offer consistency, longer shelf life, convenience, and ease of storage. According to studies (BK Sarkar *et al.*, 2019), instant soups form an important segment of dried food products and play a significant role in meeting modern nutritional demands.

Traditionally, soups are categorized into clear soups and thick soups. Clear soups include broth, vegetable soup, and consommé, which are prepared from clarified stocks without thickening agents. Thick soups include cream soups, purées, chowders, bisques, and potage, which are thickened using ingredients such as flour, starch, milk, cream, lentils, or grains. In modern food systems, instant soup premixes are formulated to replicate these traditional varieties in powdered form, ensuring quick preparation while retaining desirable taste and texture. Compared to freshly prepared soups, premixes provide standardized quality, reduced preparation effort, and improved shelf stability, making them ideal for households, hostels, hospitals, and institutional feeding programs. (Srivastava, A., Attri, B., & Verma, S. 2019).

Millets and legumes have received renewed attention due to their superior nutritional profile and climate resilience. Finger millet (ragi), pearl millet (bajra), and horse gram are traditional crops widely cultivated in India. Ragi is recognized for its exceptionally high calcium content, dietary fibre, and essential amino acids. Bajra is valued for its iron, magnesium, and antioxidant components, contributing to cardiovascular and metabolic health. Horse gram, a protein-rich legume, is traditionally consumed in soups and is known for its high fibre, iron, and bioactive compounds. Incorporating these ingredients into an instant soup premix enhances protein quality, mineral density, and functional benefits compared to cereal-based commercial soups that often contain refined starches and higher sodium levels. (Rasool, L., Rouf, A., Amin, T., Parveen, S).

Conclusion

The present study was undertaken with the objective of developing nutritious and convenient millets and Moringa based instant soup premix and evaluating its sensory quality, physicochemical characteristics, microbial safety, and storage stability under ambient conditions. In recent years, rapid urbanization, changing lifestyles, and increased health awareness among consumers have significantly raised the demand for ready-to-cook and instant food products that are both convenient and nutritionally balanced. Therefore, this research focused on formulating an instant soup premix using nutrient-rich traditional ingredients and assessing its suitability as a healthy convenience food.

Several trial formulations were prepared and subjected to sensory evaluation using a hedonic scale by semi-trained panellists in order to select the most acceptable formulation. Based on sensory scores for colour, flavour, taste, texture, and overall acceptability, the best formulation was selected for further analysis and storage studies. The selected premix was packed in appropriate packaging material and stored at ambient temperature, and periodic evaluations were conducted to monitor changes in quality parameters throughout the storage period.

The developed soup premix exhibited desirable physical characteristics, including an attractive appearance, pleasant aroma, and smooth consistency after reconstitution. During storage, a gradual increase in moisture content was

observed, which is a common phenomenon in dehydrated food products due to environmental humidity. However, the increase remained within safe and acceptable limits, indicating good shelf stability and the effectiveness of the packaging material used. Sensory evaluation during storage revealed that the product retained good sensory quality, with only minor changes in taste, flavour, texture, colour, and overall acceptability over time. Although slight reductions in sensory scores were observed toward the end of the storage period, the product remained within acceptable limits, demonstrating its ability to maintain consumer acceptability during storage.

Microbial analysis confirmed the safety of the developed product, as no significant microbial growth was detected throughout the storage period. This indicates that the processing techniques, dehydration methods, and packaging conditions were effective in ensuring the microbiological safety and shelf stability of the premix. Nutritional evaluation demonstrated that the developed soup premix provides a good source of energy, protein, dietary fibre, and essential micronutrients, making it a wholesome and balanced food option suitable for people of all age groups.

In conclusion, the millets and moringa based instant soup premix developed in this study proved to be a nutritious, safe, and convenient ready-to-cook product with good sensory acceptability and satisfactory shelf stability under ambient conditions. The product maintained acceptable physicochemical, sensory, and microbial quality throughout the storage period, confirming its suitability for commercialization. This study highlights the importance of developing nutrient-rich convenience foods that combine traditional ingredients with modern processing techniques to meet the growing demand for healthy and time-saving meal options. The developed product has strong potential for large-scale production and can contribute to improving dietary diversity and promoting healthier eating habits among consumers.

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