



(RESEARCH ARTICLE)



Development of plant-based (Vegan) milk from white dried peas (*Pisum sativum*)

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Abstract

The growing prevalence of lactose intolerance, dairy allergies, and the increasing adoption of vegan diets have led to a rising demand for plant-based milk alternatives. The present study aimed to develop a plant-based vegan milk using white dried peas (*Pisum sativum*) and to evaluate its nutritional composition, shelf-life stability, microbial safety, and sensory acceptability. The product formulation required ten experimental trials to achieve optimal taste, texture, and consistency. Proximate analysis and pH determination were conducted using standard analytical procedures. Sensory evaluation was performed among thirty untrained panelists using a five-point hedonic scale to assess color, aroma, texture, taste, aftertaste, and overall acceptability. The developed beverage demonstrated acceptable sensory characteristics and was found to be microbiologically safe for consumption. The pH of the beverage was determined to be 6.6. Nutritional analysis showed that the beverage provided 87.5 kcal per 100 ml along with measurable amounts of protein, fat, and carbohydrates. Shelf-life evaluation revealed that the product remained stable for up to four days under refrigerated storage conditions. The findings indicate that pea-based vegan milk may serve as a nutritious and sustainable alternative to conventional dairy milk.

Keywords: Plant-Based Milk; *Pisum sativum*; Vegan Milk; Sensory Evaluation; Lactose Intolerance

1. Introduction

Plant-based milk alternatives, also referred to as non-dairy milk analogues, are beverages derived from plant materials such as legumes, cereals, nuts, and seeds. These beverages have gained significant popularity worldwide due to growing health awareness, environmental concerns, and dietary preferences such as veganism. Additionally, lactose intolerance and milk allergies have contributed to the increasing demand for dairy-free alternatives.

White dried peas (*Pisum sativum*) are a rich source of plant protein and essential nutrients. The utilization of peas for the development of plant-based milk may offer a sustainable and nutritionally valuable alternative to traditional dairy milk.

Objectives of the study

- To develop vegan milk using white dried peas (*Pisum sativum*).
- To conduct sensory evaluation using 30 untrained panelists.
- To determine the shelf life of the developed product.
- To estimate the nutritional composition of the developed beverage.

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2. Materials and Methods

2.1. Raw Materials

White dried peas were procured online from the brand Natureland Organics. Reverse osmosis (RO) water from a laboratory source was used during beverage preparation.

2.2. Preparation of Pea-Based Milk

The peas were soaked for 8–10 hours with a small quantity of salt. After soaking, the water was discarded and replaced with fresh filtered water. The peas were dehulled, washed thoroughly, and cooked at 100 °C for approximately 25–30 minutes until soft. The cooked peas were ground with approximately 30 ml of water to obtain a smooth paste with milk-like consistency.

The mixture was heated at 70 °C for approximately 25–30 minutes to improve texture and viscosity. About 1% fat was added to enhance mouthfeel. The mixture was filtered using muslin cloth to obtain a smooth beverage. The product was hot-filled into sterilized glass bottles and stored under refrigeration at 3 °C.

2.3. Proximate Analysis

Proximate composition was determined using AOAC (2005) standard methods including moisture determination using the hot air oven method, ash content using the dry ashing method, fat using Soxhlet extraction, protein using the Kjeldahl method, and carbohydrates using the Lane–Eynon method. Energy was calculated using ICMR-NIN guidelines.

2.4. Sensory Evaluation

Sensory evaluation was conducted among 30 untrained panelists. The beverage was evaluated for color, texture, aroma, taste, aftertaste, and overall acceptability using a five-point hedonic rating scale.

3. Results and Discussion

The formulation of plant-based milk required ten trials to obtain an acceptable product in terms of flavor, texture, and overall sensory quality.

Table 1 Nutritional Composition

Parameter	Value (per 100 ml)
Energy	87.5 kcal
Protein	1.54 g
Fat	8.1 g
Carbohydrates	1.3 g
Ash	2.4 %
Moisture	89 %

The proximate analysis demonstrated that the beverage contains moderate levels of protein and energy. The nutritional profile indicates that pea-based milk can serve as a suitable plant-based alternative to conventional dairy beverages.

3.1. Sensory Evaluation

The overall acceptability score obtained from the sensory evaluation was 3.9 on a five-point hedonic scale, indicating moderate consumer acceptance.

4. Conclusion

The study successfully developed a plant-based vegan milk from white dried peas. The beverage exhibited acceptable sensory properties and provided nutritional benefits including protein and energy. Pea-based milk may therefore serve as a sustainable dairy alternative for individuals with lactose intolerance or those following plant-based diets.

Limitations

- Sensory analysis was conducted using untrained panelists to know the trend amongst the non technical users.
- Only one formulation of pea-based milk was evaluated.
- The product was developed as an unsweetened beverage.

Recommendations

- Future studies may explore flavored variants of the beverage.
- Additional microbial and pathogen testing may be conducted.
- Extended shelf-life studies may be performed.

Compliance with ethical standards

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Disclosure of conflict of interest

The author declares that there are no conflicts of interest regarding the publication of this research work.

Statement of informed consent

Sensory evaluation was conducted voluntarily and no personal data were collected.

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