



# International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

*(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)*



**Impact Factor: 8.699**

**Volume 14, Issue 5, May 2025**

# **Development of Nutrient Rich Vegan Cottage Cheese from Cotton Seed Milk**

**Aysha Siddiqua.A, Najiya Nasreen, Jerisha C, Shabeena Mariyam, Selvamurugan C**

U.G. Students, Department of Food Technology, Dhaanish Ahmed Institute of Technology, Coimbatore, India

Associate Professor, Department of Food Technology, Dhaanish Ahmed Institute of Technology, Coimbatore, India

**ABSTRACT:** This study focuses on the formulation and evaluation of nutrient-rich vegan cottage cheese derived from cotton seed milk. Given the growing demand for sustainable and plant-based alternatives to dairy products, cotton seed milk offers a protein-dense and mineral-rich base. The production process involved standard cheese-making steps adapted for plant-based milk. Comprehensive analyses were carried out to assess nutritional composition, microbial safety, physicochemical characteristics, antioxidant activity, texture profile, sensory attributes, shelf-life, and functional properties. The product demonstrated satisfactory protein content (11 g/100g), calcium levels (83 mg/100g), and low microbial counts (<10 CFU/g). Sensory evaluation revealed high consumer acceptability. The study concludes that vegan cottage cheese from cotton seed milk is a promising plant-based alternative with good nutritional, sensory, and shelf-stability attributes.

**KEYWORDS:** Vegancottagecheese,cottonseedmilk,plant-basedcheese,sustainablefood,protein- rich, allergen-free, food innovation

## **I. INTRODUCTION**

The rising consumer interest in sustainable and plant-based food alternatives has led to innovative developments in the dairy substitute market. Vegan cottage cheese, a non-dairy counter part to traditional cheese, has gained attention for its potential health and environmental benefits. Among various plant-based milk sources, cottonseed milk stands out due to its high protein and mineral content. This study explores the formulation of vegan cottage cheese using cottonseed milk, aiming to develop a nutritious, allergen-free, and shelf-stable product that meets consumer expectations for taste, texture, and safety. The research emphasizes the significance of cottonseed milk as a viable and underutilized resource in plant-based food innovation.

## **II. LITERATURE SURVEY**

### **1. Nutritional Value of Cotton seed Milk**

Cottonseed milk is a nutrient-dense alternative to traditional dairy, containing approximately 22% protein, essential amino acids, unsaturated fats, and bio available minerals like magnesium and iron. Studies by Iqbalul et al. (2014) emphasize its potential for food fortification due to its high nutritional profile.

### **2. Vegan Cottage Cheese**

Plant-based cottage cheese is gaining popularity among vegan and lactose-intolerant consumers. Research by Bernat et al. (2021) highlights the challenges of replicating the texture, flavor, and nutritional quality of dairy-based cheese in plant-based alternatives. Common sources such as soy, almond, and cashew milk serve as precedents for exploring cottonseed milk.

### **3. Coagulation in Vegan Cheese Production**

The coagulation process is critical for achieving the curd structure in cheese. Studies by Karunanayaka et al. (2020) show that natural coagulants like lemon juice, vinegar, and citric acid can be effective in forming curds in vegan milk.

## **III. METHODOLOGY**

Cottonseed milk was prepared and used as the primary base. Lemon juice was added as a natural coagulant to induce curd formation. The curds were separated, collected, and gently pressed to form cottage cheese. The final product was then observed for texture, appearance, and yield. Sensory analysis was conducted to assess taste, texture, and overall

acceptability. Nutritional analysis was performed to determine the protein, fat and carbohydrate content of the cottage cheese.

Heat cotton seed milk to 75–80°C

Add coagulants (Lemon Juice) gradually while stirring to form curds

Separate the curds from the whey using a muslin cloth and press lightly to form cottage cheese

#### IV. EXPERIMENTAL RESULTS

Then nutritional analysis of the cotton seed cottage cheese showed an energy value of 98 kcal/100g, with 11g protein,

4.3g fat, and 3.4g carbohydrates. Calcium and potassium levels were 83mg and 104mg/100g, respectively, while sodium was moderately high at 364 mg/100g. Microbial analysis confirmed excellent hygiene, with *Bacillus cereus* and *Staphylococcus aureus* both below detectable limits (<10 CFU/g). Physicochemical properties included a pH of 5.1, 58% moisture, 1.4% ash, 42% total solids, and 0.19% lactic acid, aligning with desirable soft cheese characteristics. Antioxidant activity was moderate (38.2% DPPH) with 12.4 mg GAE/g phenolics. Texture analysis revealed a soft yet cohesive cheese (12 N hardness, 0.66 cohesiveness). Sensory evaluation indicated high acceptability, with an overall score of 8.0/9. Shelf-life was stable for up to 14 days under refrigeration. Functional properties such as 65% water holding capacity and stable emulsion behavior support its versatility in cooking.

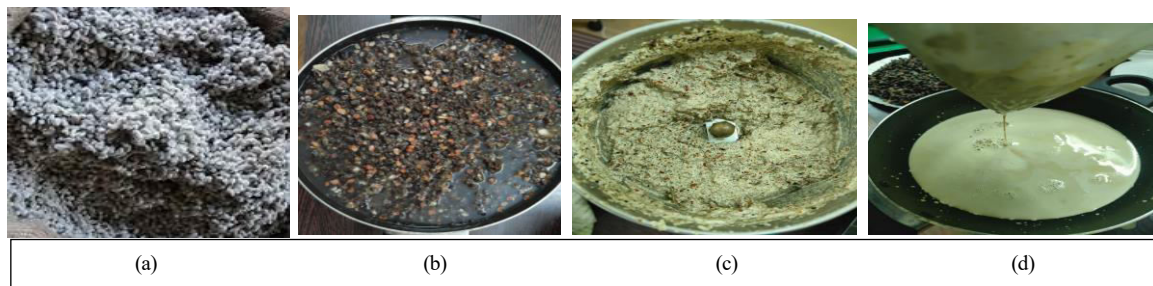


Fig.1:(a)raw cottonseeds(b)cotton seeds soaked in water(c)blended cottonseeds(d)cottonseed milk



(a)

(b)

(c)



Fig.2:(a)Heating(b)coagulant (lemonjuice) (c) Adding coagulant and stirring(d)Separation(e)Cottonseed cheese

## V. NUTRITIONAL ANALYSIS

S.No.	Parameters	Unit	Test Method	Results
1	Energy	Kcal/100g	EHS 360/F/SOP/002	98
2	Fat	g/100g	FSSI LAB MANUAL-01,048:2022	4.3
3	Carbohydrate	g/100g	EHS 360/F/SOP/003	3.4
4	Protein	g/100g	IS: 7219: 1973	11
5	Fiber	g/100g	IS 10226: 1982	Nil
6	Calcium	mg/100g	AOAC 21 <sup>st</sup> Edn.944.03	83
7	Iron	mg/100g	EHS360/FD/SOP/068	0.1
8	Potassium	mg/100g	AOAC 21 <sup>st</sup> Edn.984.27	104
9	Sodium	mg/100g	AOAC 21 <sup>st</sup> Edn.984.27	364
10	Vitamin A	mg/100g	In House Method	7.1

## VI. CONCLUSION

The vegan cottage cheese developed from cottonseed milk exhibits promising nutritional and sensory properties, along with a satisfactory shelf life and a safe microbial profile. Its high protein content, mineral richness, and antioxidant potential highlight its value as a healthy and functional dairy alternative. The favorable texture and taste contribute to consumer acceptability, positioning it as a viable option for the commercial plant-based food market.

## REFERENCES

1. Akhtar, Y., & Isman, M. B. (2018). Insects as an Alternative Protein Source. In *Proteins in Food Processing* (2nd ed., pp. 263–288). Elsevier Inc., Amsterdam, The Netherlands. ISBN 9780081007297.
2. Walia, A., Gupta, A., & Sharma, V. (n.d.). *Rolsoft Bioactive Compounds* 2. A. K. Publishers.
3. Sá, A. G. A., Moreno, Y. M. F., & Carciofi, B. A. M. (2020). Plant proteins as a high-quality nutritional source for the human diet. *Trends in Food Science & Technology*, 97, 170–184.
4. Aryee, A. N. A., Agyei, D., & Udenigwe, C. C. (2018). Impact of processing on the chemistry and functionality of food proteins. In *Proteins in Food Processing* (2nd ed., pp. 27–45). Elsevier, Amsterdam, The Netherlands. ISBN 9780081007297.
5. Craig, W. J., Mangels, A. R., & Brothers, C. J. (2022). Nutritional profiles of non-dairy plant-based cheese alternatives. *Nutrients*, 14(6), 1247.
6. Kovačević, J., Bechtold, T., & Pham, T. (2024). Plant-based proteins and their modification and processing for vegan cheese production. *Macromolecular Reports*, 4(1), 23–141.
7. Değirmenci, O. C. (2025). Consumption of Cheese by Vegetarians and Vegans: Production, Ethics, and Market

8. Trends.InGlobalPerspectivesonCheeseTourism(pp.161–178).IGIGlobalScientificPublishing.
9. Fathima, S. (2023). Development of Technology for Soft Cheese (Paneer) from Jackfruit Seed Milk (Doctoral dissertation). Department of Community Science, College of Agriculture, Vellayani.
10. Ojochogu,D.,Ajikola,O. R.,Ovewere,Z., &Imo,H. (2022).Comparative analysis ofthe proximatecomposition of local cheese made from soybean milk and cow milk using different coagulants. UMYU Scientifica, 1(1), 280–285.
11. Hermansen,L.,&Vuong, H.(2025).By-product:A reviewofnutrition,processing,andapplications ofoatpulp. Food Reviews International, 1–38.
12. Magan, L. B., O'Callaghan, T. F., Kelly, A. L., & McCarthy, N. A. (2021). Compositional and functional properties of milk and dairy products derived from cows fed pasture- or concentrate-based diets. Comprehensive Reviews in Food Science and Food Safety, 20(3), 2769–2800.
13. Jung, M., Lee, V., Han, S. O., & Hyeon, J. E. (2024). Advancements in sustainable plant-based alternatives: Exploring proteins, fats, and manufacturing challenges in alternative meat production. Journal of Microbiology and Biotechnology, 34(5), 994–1002.
14. Munshi, M., Arya, P., & Kumar, P. (2022). Recovery and utilization of protein from food industry waste. InFood Processing and Sustainability (Chapter details and publisher info needed).



INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  [ijirset@gmail.com](mailto:ijirset@gmail.com)



[www.ijirset.com](http://www.ijirset.com)

Scan to save the contact details