

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 9; September 2025; Page No. 792-796

Received: 03-07-2025
Accepted: 06-08-2025

Indexed Journal
Peer Reviewed Journal

Assessing the potential of mahua value-added enterprises: Comparative insights from durg forest circle

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DOI: <https://www.doi.org/10.33545/26180723.2025.v8.i9k.2490>

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Abstract

This study examines the economic viability and nutritional benefits of Mahua (*Madhuca longifolia*) value-added products developed under a forest-based livelihood initiative in Rajnandgaon, Chhattisgarh. Seven products Laddu, Cookies, Squash, Jam, Ready-to-Serve (RTS) Beverages, Pickle, and Energy Bar processed by women-led Self-Help Groups (SHGs) were analyzed for profitability and market potential. Financial assessment revealed total revenue of ₹17.06 lakh against a production cost of ₹10.82 lakh, generating a net profit of ₹6.23 lakh with an overall B:C ratio of 1.5:1. Cookies recorded the highest B:C ratio (2.2:1), while Energy Bars yielded the maximum profit (₹2.31 lakh). Nutritionally, these products provide energy, proteins, minerals, antioxidants, probiotics, and hydration, aligning with both traditional diets and modern health trends. The findings highlight Mahua's potential as a sustainable non-timber forest product that supports rural livelihoods, women's empowerment, and ecological sustainability.

Keywords: Mahua processing centre, revenue, B: C ratio, jam, achar, RTS, laddu, cookies

Introduction

Madhuca longifolia (Mahua), a deciduous tree of the Sapotaceae family, is widely distributed across central and eastern India and holds immense cultural, nutritional, and economic significance, particularly among tribal communities. Traditionally valued for food, fodder, and fuel, Mahua flowers are used in liquor preparation and value-added products like laddoos, cookies, jams, and beverages, while its seeds contribute to oil extraction and biodiesel. Rich in bioactive compounds, Mahua exhibits several pharmacological properties, making it suitable for the nutraceutical and wellness industries.

Chhattisgarh, with its 44% forest cover and strong tribal base, is one of the leading Mahua-producing states, generating 1-1.5 lakh MT of flowers annually. However, much of the produce remains underutilized due to limited processing and market linkages. Recent government initiatives such as Van Dhan Vikas Kendras and the "Chhattisgarh Herbal Brand" are promoting value addition, branding, and integration of Self-Help Groups (SHGs) into formal supply chains. Procurement data over the last five years shows fluctuations in volumes and prices, reflecting both market potential and challenges in sustainable utilization. With rising demand for organic and plant-based products, Mahua presents significant opportunities for developing food, nutraceutical, and cosmetic products that can strengthen rural livelihoods and contribute to the

regional economy

Materials and Methods

The study was conducted in the Chhattisgarh plains, where the Durg forest circle was purposively selected for its significant availability of Mahua and its importance to local livelihoods. Within this circle, the Rajnandgaon range was chosen as it plays a central role in Mahua value addition and processing activities. One Mahua processing organization was purposively identified to provide insights into production and value addition. Primary data was collected from the processing center, focusing on costs related to collection, transportation, processing, and marketing, while secondary data was sourced from institutions such as the Chhattisgarh Rajya Krishi Mandi Board and the State Forest Produce Federation. The data was then analyzed using suitable statistical and economic tools in line with the objectives of the study.

Results and discussion

Nutritional and Functional Benefits of Mahua-Based Value-Added Products

1. Mahua Laddu

Mahua Laddu is one of the most popular and culturally accepted products, offering a balanced mix of energy and nutrition. The natural sugars in Mahua flowers provide instant energy, while the inclusion of dry fruits enhances the

product with proteins, dietary fiber, iron, and healthy fats. This combination makes Laddus not only a quick energy booster but also a nutrient-dense sweet that supports hemoglobin levels, digestion, and overall vitality. Positioned as both a traditional delicacy and a healthy snack, Mahua Laddu appeals to a wide consumer base.

2. Mahua Jam

Mahua Jam is rich in antioxidants, vitamin C, and polyphenols, which help combat oxidative stress and strengthen immunity. Unlike conventional jams that rely heavily on synthetic additives and refined sugars, Mahua Jam offers a natural and wholesome alternative with added functional benefits. Regular consumption may contribute to improved gut health, reduced inflammation, and better overall nutrition. It also aligns with consumer preferences for natural, artisanal, and preservative-free spreads, thereby enhancing its market potential.

3. Mahua Cookies

Mahua Cookies combine carbohydrates from flour and Mahua flowers with protein, fiber, and essential minerals, making them a wholesome and convenient snack. Their nutritional profile supports sustained energy release, better satiety, and digestive health. Additionally, the cookies provide micronutrients such as calcium, iron, and magnesium, which are essential for bone health and metabolic functions. By blending traditional Mahua with a modern bakery format, these cookies position themselves as a healthier alternative to conventional packaged biscuits and appeal strongly to urban, health-conscious consumers.

4. Mahua Energy Bar

Mahua Energy Bars are a prime example of innovation-led value addition, designed to cater to the functional food and health snack market. They are nutrient-dense, offering high protein content, omega-3 fatty acids, iron, and B vitamins, often enhanced further with millets, seeds, and nuts. These bars are ideal for athletes, working professionals, and health-conscious consumers seeking quick yet wholesome supplementation. By combining Mahua flowers with superfoods, the Energy Bar represents a scalable product for both mainstream and niche health markets.

5. Mahua Pickle (Achar)

Mahua Pickle leverages both the nutritional properties of Mahua and the functional benefits of traditional Indian spices. Rich in probiotics from the fermentation process, it supports digestive health and improves gut microbiota. The spices used provide anti-inflammatory and antioxidant properties, while also enhancing flavor. However, like most pickles, it is best consumed in moderation due to its sodium content. As a cultural product with functional digestive benefits, Mahua Achar has scope for artisanal branding and positioning in gourmet food segments.

6. Mahua Ready-to-Serve (RTS) Beverages

Mahua RTS beverages act as natural energy drinks, providing hydration along with sugars, antioxidants, and essential nutrients. They are refreshing, quick to consume, and suitable for addressing fatigue in hot climates. Despite being entirely non-alcoholic, consumer misconceptions

linking Mahua with liquor have restricted their wider adoption. With proper branding and awareness campaigns, these beverages can position themselves alongside fruit-based RTS drinks as both healthy and culturally significant alternatives.

7. Mahua Squash

Mahua Squash is a concentrated beverage base offering natural sugars, antioxidants, and hydration benefits. When diluted, it becomes a refreshing drink suitable for all age groups, particularly during the summer months. Its nutritional profile makes it a healthier option compared to synthetic soft drinks. Like RTS beverages, Squash faces consumer perception barriers due to associations with alcohol. However, with improved marketing, clear labeling, and health-oriented promotion, it has the potential to expand into household and institutional markets as a nutritious drink option.

Consumer Acceptance Trends in Mahua-Based Value-Added Products

Among the diverse portfolio of Mahua-based value-added products, Mahua Laddu and Mahua Cookies clearly emerge as the frontrunners in terms of consumer demand and acceptance. Their success is primarily rooted in the combination of familiar taste, cultural resonance, and modern convenience. The Laddu, a traditional sweet in Indian households, seamlessly integrates the flavor and nutritional richness of Mahua flowers, thereby evoking both cultural nostalgia and dietary appeal. Similarly, Mahua Cookies represent a more contemporary adaptation that fits into the fast-paced lifestyles of urban consumers, offering a healthier alternative to conventional packaged snacks. Both products are effectively positioned at the intersection of traditional knowledge and modern consumer preferences, making them attractive to a broad spectrum of buyers who value taste, nutrition, convenience, and authenticity. Their performance highlights the potential of culinary hybrids that preserve indigenous practices while appealing to evolving market trends.

On the other hand, Mahua Jam, Achar (Pickle), and the Energy Bar demonstrate moderate yet steadily growing demand, particularly among niche consumer groups. Health-conscious buyers and individuals seeking innovative food experiences are beginning to embrace these products due to their natural composition, nutritional content, and unique flavor profiles. Mahua Jam and Achar showcase the adaptability of Mahua flowers in preserved food formats, aligning with consumers' increasing interest in artisanal and traditional recipes. The Energy Bar, in particular, represents a strategic innovation, combining Mahua flowers with millets and other local ingredients, thereby catering to the functional food and health snack segment. These products, though not yet mainstream, reflect a transitional stage of consumer acceptance, where curiosity, coupled with the desire for healthier and indigenous alternatives, gradually translates into purchasing behavior. With focused awareness campaigns, attractive packaging, and health-oriented positioning, these products can scale beyond their current niche and gain greater market traction.

In contrast, Mahua Squash and Ready-to-Serve (RTS) beverages continue to experience comparatively low

demand, revealing significant challenges in consumer acceptance. This weaker performance stems from two interlinked issues. First, limited consumer awareness means that many potential buyers remain unfamiliar with the existence, taste, and benefits of these beverages. Second, and more critically, is the deep-seated cultural misconception that Mahua-based drinks are inherently intoxicating. For generations, Mahua has been strongly associated with the production of local liquor, and this perception has created an enduring stigma around its consumption in other forms. As a result, even though Squash and RTS beverages are completely non-alcoholic and nutritionally beneficial, many consumers hesitate to purchase them, fearing undesirable effects. Overcoming this perception barrier requires rebranding, consumer education, and storytelling strategies that reposition Mahua beverages as safe, refreshing, and culturally significant products,

comparable to other fruit-based beverages in the market. Taken together, the demand analysis of Mahua-based value-added products underscores the heterogeneous nature of consumer response, shaped by a blend of taste familiarity, cultural associations, health awareness, and market visibility. Products such as Laddu and Cookies, with their strong consumer base, demonstrate the effectiveness of leveraging cultural acceptance and modern convenience. Meanwhile, mid-range products like Jam, Achar, and Energy Bars highlight the emerging opportunities within health-focused and experimental food markets, where sustained marketing efforts can convert interest into widespread adoption. Beverages such as Squash and RTS, though presently constrained by misconceptions and awareness gaps, offer long-term potential provided that targeted branding, certification, and consumer sensitization strategies are implemented.

Table 1: Comparative Financial Performance of Mahua Value-Added Products (FY2024-25)

S. No.	Product Name	Per Unit Cost (Rs.)	Selling Price Per Unit (Rs.)	Total Production in a Year (Unit)	Total Cost (Rs)	Revenue	Net Profit	B:C Ratio
1	Mahua Laddu	52	95	1550	80,600.00	1,47,250	66,650.00	1.8:1
2	Mahua Cookies	51.44	115	3149	1,61,984.56	3,62,135	2,00,150.44	2.2:1
3	Mahua Jam	54	70	1804	97,416.00	1,26,280	28,864.00	1.3:1
4	Mahua Achar	150.97	235	900	1,35,873.00	2,11,500	75,627.00	1.5:1
5	Mahua Energy Bar	50	70	11570	5,78,500.00	8,09,900	2,31,400.00	1.4:1
6	Mahua R.T.S.	40.30	65	221	8,906.30	14,365	5,458.70	1.6:1
7	Mahua Squash	50.33	90	390	19,628.70	35,100	15,471.30	1.7:
	Total			19584	10,82,908.56	17,06,530	6,23,621.44	1.5:1
	Average			2797.71	1,54,701.22	2,43,790	89,088.78	1.5:1

The financial analysis of the seven Mahua-based value-added products during 2024-2025 reaffirms their strong economic viability and profitability as a forest-based livelihood enterprise. Among the products, Mahua Cookies emerged as the most profitable, recording the highest Benefit-Cost (B:C) ratio of 2.2:1, followed by Mahua Laddu (1.8:1) and Mahua Squash (1.7:1), reflecting their high consumer acceptance and strong commercial potential. Interestingly, the Mahua Energy Bar, despite having a comparatively moderate B:C ratio of 1.4:1, achieved the highest net profit of ₹2,31,400, showcasing the scale advantage and long-term potential of innovative Mahua-based food products in tapping into the growing health-conscious consumer segment.

Other products such as Mahua Achar, RTS beverages, and Jam, though comparatively moderate in performance, contributed positively to the enterprise's overall revenue and demonstrated scope for market development with improved awareness, branding, and consumer education. Collectively,

the enterprise generated a total revenue of ₹17,06,530 against a production cost of ₹10,82,908.56, thereby yielding a net profit of ₹6,23,621.44 with an aggregate B:C ratio of 1.5:1. These findings highlight not only the financial sustainability but also the competitiveness of Mahua-based value-added enterprises as a model of forest-based micro-entrepreneurship.

Beyond the numbers, the analysis underscores the transformative role played by women-led Self-Help Groups (SHGs), who were central in processing and marketing. Their active involvement has created new livelihood opportunities, enhanced household incomes, and fostered community empowerment, while simultaneously preserving traditional ecological knowledge. The success of these enterprises demonstrates the untapped potential of minor forest produce (MFPs) in driving rural economic development, strengthening the resilience of tribal and forest-dependent communities, and contributing to sustainable livelihood promotion.

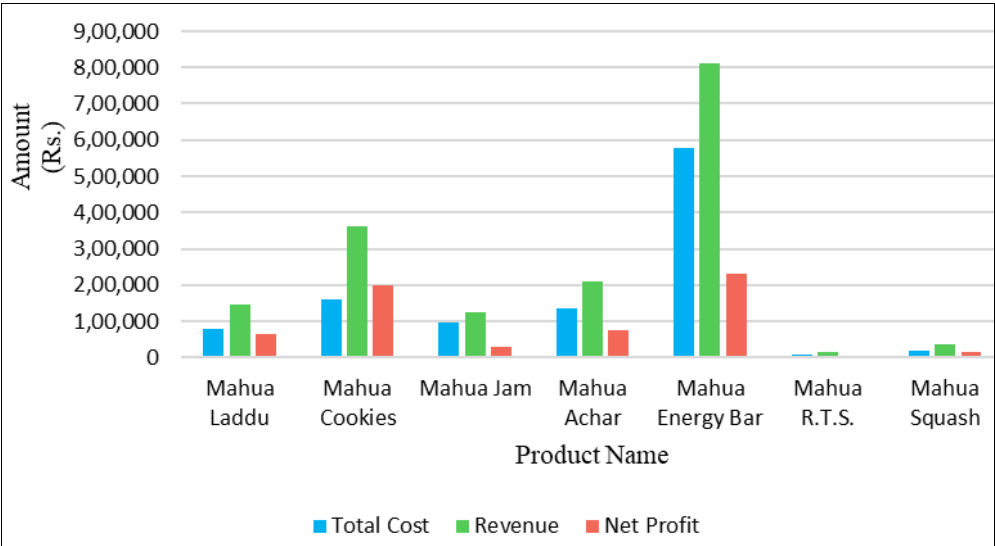


Fig 1: Business Performance Comparison of Mahua Products (FY 2024-25)

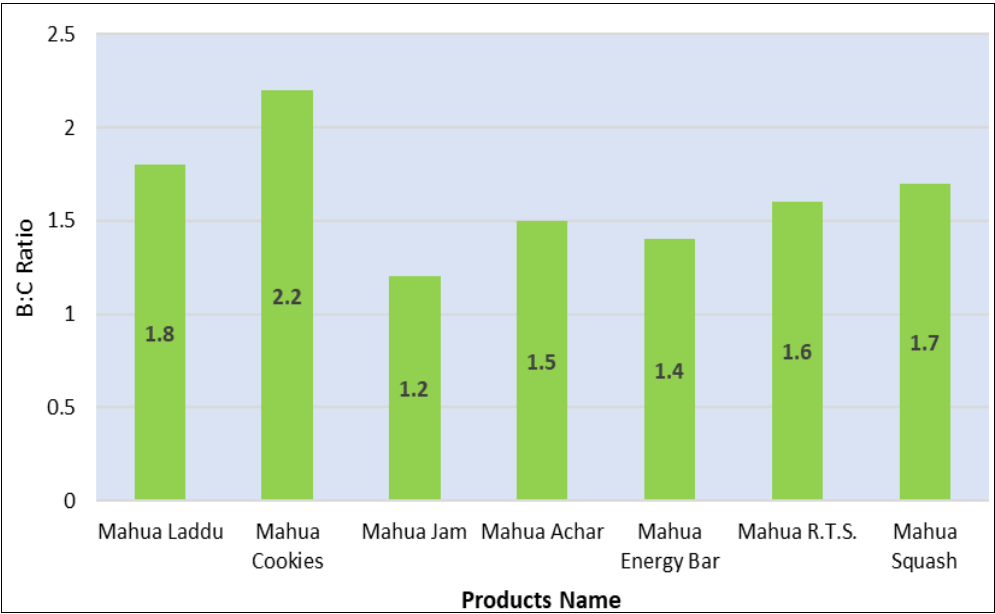


Fig 2: Benefit- Cost Ratio of Mahua value Added Products

Conclusion

The study of Mahua-based value-added products in Durg Forest Circle (2024-2025) confirms their viability as profitable and sustainable forest enterprises. The enterprise generated ₹17.06 lakh revenue against ₹10.82 lakh costs, yielding ₹6.23 lakh net profit and a B:C ratio of 1.5:1. Mahua Cookies and Laddus were the most successful, while innovative items like Energy Bars showed future potential. Consumer demand was strong for traditional products, moderate for niche items, and limited for beverages due to misconceptions. Women-led SHGs played a vital role, strengthening livelihoods and local entrepreneurship. Overall, Mahua enterprises demonstrate strong prospects for rural development and sustainable use of forest resources with better branding, awareness, and market linkages.

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