



Value Addition of Underutilized Fruits Give Fair Return to Growers to Improve their Economic Conditions

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Abstract

The diverse climate in the country creates a perfect setting for cultivating a different kind of fruits. These fruits are plentiful and available throughout the year. In India, a number of fruit crops are not commercially grown, However, they represent a substantial income stream for numerous rural communities (Diengngan and Hasan, 2015). Most small fruits are high in nutritional and therapeutic value and can be cultivated with minimal attention even in wastelands (Kumar, 2016). Fruit crops such as wax apple, cape gooseberry, bael, dragon, wood apple, rambutan, rose apple, carambola, water apple, and durian are examples of underutilized fruit. Underutilized crops are those that aren't farmed commercially or on a large scale, and aren't frequently traded around the world. In terms of research and marketing, these crops are considered lesser-known plant species, yet they have been shown to adapt well to wild and stress-like circumstances. For centuries, various underutilized native fruit crops with healing properties have been employed in traditional medicinal practices like Ayurveda, Homeopathy, and Unani. These crops require the advanced production and protection methods, development of high-yielding varieties, and value addition of crop. Improved collaboration across all entities involved in research, development, and promotion will aid in the widespread adoption of these fruit crops (Kamboj *et al.*, 2020). These fruits exhibit deficiencies in terms of genetic material, traditional knowledge, and germplasm collection. They also suffer from a lack of understanding regarding their potential uses, face various constraints and opportunities, and experience limitations in terms of demand, commercialization, market presence, and revenue creation. Additionally, research and development initiatives are lacking, and there are weaknesses in national capacities and connections between conservation and production efforts. To address these challenges, it is imperative to generate both domestic and

foreign markets have a need for underutilized fruit. Achieving this goal necessitates the development of suitable processing and marketing techniques tailored to these lesser-known fruits. (Diengngan and Hasan, 2015)

Keywords: Underutilized fruit, Value added, Quality, Opportunity, Market

Introduction

Underutilized fruit crops have the capacity to significantly contribute to aspects such as food security, nutritional well-being, public health, income generation, and environmental benefits. "Foods that are less utilized, or region specific, less available, or seldom used, " are known as underutilized food (Williams and Haq, 2013). Jamun, carambola, Aonla, date palm, bael, pomegranate, wood apple, and other Underutilized fruits act as the primary means of support for impoverished populations and fulfill a vital role in alleviating malnutrition (Gajanana *et al.*, 2010). The medicinal, nutritional, and economic potential of the underutilized fruit crops is great, but researchers and locals know very little information about the production practices, types, and excellence of these underutilized fruit crops (Paul and Panda, 2021). Because they are capable of providing both macro and micronutrients, and the consumption of these fruits has demonstrated considerable potential in addressing hidden hunger and promoting adequate nourishment within communities.

Fruit processing is required where appropriate returns to growers are needed to enhance their economic situation. It additionally assists in mitigating the issue of underemployment in the agricultural sector during periods of low demand. Owing to insufficient infrastructure and expertise in efficient management, transportation, promotion, and preservation, seasonal excesses of perishable fruits are only available at certain times of the year in various regions and result in significant wastage. Furthermore, huge quantity of perishable fruits grown during one season result in a market surplus, making them scarce during other seasons (Dutta *et al.*, 2016).

In our increasingly interconnected and globalized world, ending hunger and poverty is not only a moral obligation but also a vital condition for preserving global peace and security. The complex task of providing sustenance for the projected global population of 9 billion in a sustainable world by 2050 can be tackled, in part by embracing greater diversity within agricultural and food production systems. This diversity pertains to both the range of crops cultivated and the variety of strains within each crop (PAR, 2010; FAO, 2011). At present, the majority of our dietary calories come from a limited selection of crops, with approximately 30 species contributing to 95% of the world's food energy (Kamboj *et al.*, 2020; Paul and Panda, 2021). Conversely, there exist around 7,000 edible species, either partially or fully domesticated, underscoring the fact that a significant portion of available food sources is still being underutilized. (Rehm and Espig, 1991; Wilson, 1992).

The majority of indigenous fruit trees are not regularly planted on farms, and information about their fruits and nutritional benefits is sparse. Furthermore, because wild fruits contain high levels of undesirable constituents such as tannins and glycosides, many individuals prefer fruit with a pleasant taste. As a result, less consumption of this kind of fruit (Vino *et al.*, 2015).

Many underutilized fruits are major sources of modern medicine, including cancer, diabetes, and jaundice. Aonla and bahera fruits are utilized in 219 patented pharmaceuticals in India, whereas bael is used in a number of drugs. Aonla is used to make chyavanprash, an ayurvedic medicine, and jamun seeds, which are used to cure diabetes (Paul and Panda, 2021). Ayurvedic medications made from jamun fruit include jamun tail (oil), which is used to treat skin disorders, and jamun guthli, churan, which is used to treat diabetes (Sharma, 1995). Furthermore, reduced incidence of cancer, heart related problems and other chronic illnesses are associated with underutilized fruits. These kinds of fruits are abundant in antioxidants and aid in the modification of metabolic activity (Aune, 2019). Underutilized fruits are highly valued to be utilized by both the wealthy and the poor in big quantities, and may thus give nutritional security to vast populations who cannot afford to buy the fruits; also, Ayurvedic remedies created from these fruit/seeds ought to be properly examined and recognized. (Bal, 2003).

The potential of underutilized fruit crops to play roles in improving food security

- A targeted initiative aimed at assisting economically disadvantaged individuals to meet their essential requirements and generate income.
- To decrease the risk of being overly dependency on a small number of major staple food crops,
- As a means to enhance agricultural sustainability by reducing inputs
- As a way to improve the quality of food,
- As an approach to preserving and honoring cultural and dietary variety,
- An approach to making use of underutilized and unused lands for farming objectives, addressing the growing demand for food (Kour *et al.*, 2018; Mayes *et al.*, 2011).

Nutritional value

In tribal sections of the country, specific nutrient deficiencies, malnutrition, and underweight children are important challenges. The daily nutrient intake is far from satisfactory, with over 70% of the Indian population consuming less than half of the RDA (Anonymous, 2002). When vitamin A, iron, and zinc deficiencies are added together, they form the world's second-largest risk factor for disease. Women's mortality and morbidity rates are also accelerated by nutrient insufficiency. Fruits play a significant role in supplying essential vitamins like carotenoids (A), thiamine (B1), riboflavin (B2), niacin (B3), pyridoxine (B6), ascorbic acid (C), and folacin, along with dietary fiber, minerals, fats, and proteins. (Quebedeaux and Bliss, 1988; Quebedeaux and Eisa, 1990). The majority of tribe food resources are plentiful during a particular season, but they are not all used to their full potential for many reasons. As a result, those living in tribal communities rarely benefit from the tremendous resources available. The only way to solve the situation is to develop value-adding techniques, and provide the market, and educate tribals about the nutritional quality of underutilized foods. The only way to solve the problem

is to develop value-adding techniques, provide a market, and educate tribal communities with information about the nutritional value of less commonly utilized fruit (Nandel and Bhardwaj, 2014).

Table: 1 Composition of important underutilized fruits

Fruits	Moisture (g)	Protein (%)	Fat (g)	Mineral (g)	Fiber (g)	Carbohydrates (g)	Carotene (µg)	Vitamin (mg)	Energy (Cal)
Aonla	81.8	0.5	0.1	0.5	3.4	13.7	9	600	-
Bael	61.5	1.8	0.3	1.7	2.9	31.8	55	8	137
Jamun	83.7	0.7	0.3	0.4	0.9	14.0	48	18	-
Passion fruit	76.3	0.9	0.1	0.7	9.6	12.4	54	25	-
Phalsa	80.8	1.3	0.9	1.1	1.4	14.7	419	22	72
Pomegranate	78.0	1.6	0.1	0.7	5.1	14.5	0	16	-
Tamarind	20.9	3.1	0.1	2.9	5.6	67.4	-	-	283
Wood apple	64.2	7.1	3.7	1.9	5.0	18.1	61	3	-
Rayan	-	0.5	2.4	0.8	-	27.7	495	0.70	134
Custard apple	-	1.6	0.4	0.9	3.1	23.5	-	-	104
Timru	-	-	0.8	0.8	-	26.8	361	-	112
Kair	-	4.24	2.0	-	4.24	18.2	-	-	107

Source: Gopalan *et al.* (1978)

Value addition

Fruits have considerable post-harvest losses (20-40%), and roughly fresh fruits lose between 10 and 15 percent of their market value and customer acceptability when they shrivel and go bad. We can boost supply without expanding the amount of land under cultivation by improving value addition. However, due to their acidic nature and tangy flavor, less utilized fruits are not appropriate for direct sale in their fresh state. The value addition, can assist meet people's nutritional needs while also ensuring economic sustainability (Kumar, 2016). Fruit processing could improve their usage by reducing loss and expanding their marketing opportunities, so improving their contribution to family food nutrition and security (Fentahum and Hager, 2009). As a result, these fruit species' significance will be better recognized, and their conservation will be promoted. In addition, Canning and drying these fruits at home might increase their market value and provide a year-round supply. (Marsh, 1998). Aonla products; Candy, Murabba, Pickle, Mouth freshener, Dry aonla (supari), or Pachan aonla (digestive aonla), Squash, Tamarind products; Tokku (chutney), Pickle, Candy, Dry tamarind (powder), Ber products; Salted ber, Ber powder, Wood apple products; jam, juice and jelly, Bael products; squash, Jam and preserve.

Table 2. Value added products of underutilized fruit

S. no.	Name of the fruit	Products made
1.	Tamarind	Jelly, jam, beverage, candy, sauce, chutney, frozen puree, pickle,
2.	Aonla	Preserve, Jam, candy, juice, glazed fruit, pickle, chutney, canned product
3.	Jamun	Jelly, Jam, canned product, juice/squash, ice cream
4.	Jackfruit	Jack fruit chips and ice cream
5.	Bael	Frozen puree, squash, preserve, juice, jam
6.	Ber	Preserve, Jam, candy, juice, glazed fruit, wine, pickle
7.	Custard apple	Ice cream, Jam, frozen puree
8.	Mulberry	Jam, juice
9.	Wood apple	Jam, jelly, fruit bar

Developing the market potential for the underutilized fruit

The demand for new products, nutritious and with a delicate flavor is constant on the global market. Efforts to develop products from completely unknown sources are constantly being pursued to meet this demand. Unutilized fruits offer an exciting opportunity for new dimensions to be added to the food processing sector. Today, consumers have become more aware of the dietary components and health benefits of their cuisine. Avoiding synthetics and chemicals is standard procedure. food, as well as a choice of therapy and nutrition using nature's resources (Roy, 2000).

One of the biggest challenges that may hinder the growth of profitable, year-round businesses may be a weak supply chain for new fruits. One of the barriers to developing underutilized fruit varieties is a lack of appropriate market demand for its materials, as well as mismatches in cultivation between underused species and at home gardens where it is difficult to find sufficient quantities. The profitability of firms has been diminished by high material costs and the cost of labour. More efficient marketing and a more secure supply of end products will be needed to develop the potential for underutilized fruits on the market. Establish a market for underutilized fruit products and promote new brands. Second, take advantage of brand awareness and diversify the product range. A strong link with the market chain must be developed and maintained. Use of quality packaging materials in order to improve worker efficiency (Singh *et al.*, 2008).

Furthermore, Fruit makes a significant contribution to economic well-being and the eradication of poverty in smallholder households by generating revenue and profits from sales of goods with added value. (Chacha *et al.*, 2022).

Promotion strategies

For any business, effective marketing of its products at lower pricing is critical. The entire process of entrepreneurial development would be broken unless profit is made. Internet marketing is a cost-effective and

efficient way for small businesses to advertise. This is the digital era, and as we may have noticed, the number of people who use the internet regularly basis is increasing. As a result, internet marketing becomes an excellent instrument for promoting your company on the internet. The ecommerce market expands together with the number of individuals utilizing the internet. (Chandra, 2017). Consumers are continually looking for novel, nutritious, delicious, and appealing products. To meet such demand, a steady effort is made to develop items from a variety of sources.

While the market share percent of value-added products of underutilized fruit is modest, certain items have managed to establish a market presence. Consumers have generally embraced the pricing and quality of goods produced from small-scale local processing units. Nonetheless, the labeling needs enhancement to become more fascinating. Consequently, the community's underutilized fruit products have been processed, and a market study has helped identify potential markets for them.

Conclusion

Many small fruits possess significant nutritional and therapeutic value, and they can be cultivated with minimal effort, even in less fertile areas. Therefore, it is worth exploring systematically growing and improving minor crop groups like wood apple, aonla, bael, karonda, lasoda, etc., to optimize utilizing them. Beyond creating profitable businesses for owners, there are numerous reasons for fruit processing, including reducing post-harvest losses, minimizing waste, maintaining quality, preserving the nutritional content of raw materials, ensuring availability of seasonal fruits year-round, providing user-friendly formats, safe storage for emergencies, and innovating new products. Consequently, this approach benefits producers, processors, and consumers in the long term. The most effective approach to address this scenario involves developing value-added techniques, establishing markets, and educating tribal communities with regards to the dietary value of lesser-known foods. Processing and enhancing the value of tribal fruits into more beneficial, palatable, as well convenient goods enhances the economic worth of underutilized resources, while simultaneously enhancing nutritional security for tribal populations.

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