

Jackfruit Seeds: Value Addition and Nutritional Opportunities

*Mrunal Nitinkumar Kambale and Dr. P.U. Ghatge

College of Food Technology, VNMKV, Parbhani, Maharashtra

*Corresponding Author's email: kambalemrunal8@gmail.com

Food Technology is a scientific discipline that deals with the safe processing, preservation, storage, quality control, and value addition of food materials. With the increasing global population, changing dietary patterns, the growing demand for food security, and the need to minimize food waste, the scientific utilization of traditional food resources has become highly important. In this context, jackfruit seeds represent an abundant but underutilized food resource. Jackfruit is widely grown in the tropical regions of India, and the edible pulp of the fruit is commonly consumed. However, the seeds are often discarded during domestic use or industrial processing. In reality, jackfruit seeds are rich in starch, contain moderate amounts of protein, are low in fat, and are a good source of minerals, making them a valuable raw material from a food technology perspective. Due to their naturally high moisture content, these seeds are highly perishable. Therefore, it is essential to develop suitable processing and preservation techniques to enhance their usability and shelf life. From the perspective of food technology, the objective of processing jackfruit seeds is not only to improve their edibility but also to:



- Control enzymatic activity
- Reduce anti-nutritional factors
- Prevent microbial growth
- Extend shelf life

Through thermal processing, drying, milling, and appropriate packaging, safe and high-quality food ingredients can be developed from jackfruit seeds. In recent years, concepts such as sustainable food processing, food waste utilization, and the development of alternative food resources has gained significant importance. Processing jackfruit seeds aligns well with these concepts. Products derived from these seeds, such as flour, snacks, and bakery mixes, are often gluten-free and nutritionally rich, making them suitable for special dietary groups. Therefore, the processing of jackfruit seeds represents an important area of study that integrates nutrition, food safety, economic value addition, and rural agro-based industrial development.

Nutritional Value of Jackfruit Seeds

Jackfruit seeds contain carbohydrates (mainly starch), proteins, dietary fiber, minerals (calcium, phosphorus, iron, potassium), and vitamins (especially B-complex vitamins). The starch present in the seeds is easily digestible and provides a good source of energy.

1. Carbohydrates:

- Jackfruit seeds contain mainly starch (approximately 60–70%).
- The starch is easily digestible and provides quick energy to the body.

- Boiled or roasted seeds provide higher energy value.
- Hence, they are beneficial for labour-intensive populations and traditional diets.

2. Proteins:

- Jackfruit seeds contain 7–13% protein.
- The amino acid profile is moderate.
- They serve as a supplementary protein source for vegetarians.
- They are beneficial for children, elderly individuals, and malnourished populations.

3. Fat:

- The fat content in jackfruit seeds is relatively low (approximately 1–2%).
- Therefore, they are considered a low-fat food ingredient.
- Suitable for heart-healthy diets.

4. Dietary Fiber:

- Jackfruit seeds are rich in dietary fiber.
- Fiber helps improve digestive health.
- Helps prevent constipation.
- Supports gut health.

5. Minerals:

Jackfruit seeds contain important minerals such as:

- **Calcium (Ca)** – essential for strong bones and teeth
- **Phosphorus (P)** – plays an important role in energy metabolism
- **Iron (Fe)** – helps increase hemoglobin levels in blood
- **Potassium (K)** – important for muscle and heart function
- **Magnesium (Mg)** – required for various enzymatic reactions

6. Vitamins:

Jackfruit seeds contain B-complex vitamins (especially B1, B2, and B3) which:

- Assist in energy metabolism
- Support nervous system function
- Help reduce fatigue

7. Anti-Nutritional Factors:

Raw jackfruit seeds contain certain anti-nutritional compounds such as:

- Tannins
- Phytic acid

These compounds can reduce mineral absorption in the body. However, boiling, roasting, and fermentation significantly reduce these anti-nutritional factors.

Health Benefits

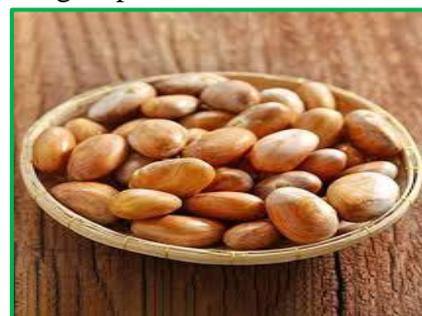
- Moderate glycemic index – beneficial for diabetic individuals when consumed in moderation
- Helpful in weight management
- Provides natural energy
- Suitable for traditional and functional food products

Processing of Jackfruit Seeds

The processing of jackfruit seeds generally involves the following steps:

Cleaning and Sorting: Removal of damaged, infested, or broken seeds.

1. **Boiling or Steaming:** Helps loosen the seed coat and destroy microorganisms.
2. **Peeling:** Removal of the outer brown seed coat.
3. **Drying:** Seeds are dried either under sunlight or in tray dryers under controlled temperature.
4. **Grinding / Flour Preparation:** Dried seeds are ground to produce flour or starch.



5. Packaging and Storage: Proper packaging is necessary to protect the product from moisture and oxygen.

Value Addition Opportunities

Jackfruit seeds are nutritionally rich and can be utilized effectively through food technology to develop a variety of value-added food products.

1. Jackfruit Seed Flour

Jackfruit seeds can be processed into flour through cleaning, boiling/roasting, peeling, drying, and grinding. The resulting flour is gluten-free, starch-rich, and possesses good binding properties.

Applications include:

- Bakery products
- Household food preparations
- Instant mixes

It can also be used as a partial substitute for wheat flour.

2. Roasted and Processed Snacks-

Jackfruit seeds can be roasted and seasoned with salt or spices to develop healthy snack products.

Advantages:

- Low fat
- High satiety value
- Natural flavor

With proper packaging, these snacks can have an extended shelf life.

Bakery and Confectionery Products:

Jackfruit seed flour can be used in:

- Biscuits
- Cakes
- Bread
- Cookies
- Traditional food products

These products have enhanced nutritional value and can be marketed as functional foods. They are particularly beneficial for gluten-sensitive consumers.

Instant Mixes and Ready-to-Cook Products:

Jackfruit seed flour can be incorporated into:

- Instant dosa or idli mix
- Upma mix
- Soup mixes

These products offer convenience, quick preparation, and extended shelf life, making them highly suitable for urban markets.

Starch Extraction and Industrial Uses

Due to their high starch content, jackfruit seeds can be used for starch extraction.

Applications include:

- Thickening agent in food products
- Binding agent
- Use in soups, sauces, and desserts

Additionally, jackfruit seed starch has potential applications in:

- Pharmaceutical industries
- Biodegradable packaging materials

Traditional and Innovative Food Products:

Jackfruit seeds can be used to develop products such as:

- Ladoo

- Chakli
- Bhaji mixes
- Papad
- Various innovative health foods

Combining **traditional knowledge with modern food technology** can lead to the development of unique marketable products.

Nutritional Supplements and Functional Foods:

Since jackfruit seeds are a source of **protein, fiber, and minerals**, they can be utilized for developing:

- Nutritional supplements
- School feeding programs
- Foods for elderly individuals
- Sports nutrition products

Conclusion:

From a food technology perspective, the processing of jackfruit seeds represents a valuable integration of nutrition, food safety, value addition, and sustainable development. Although jackfruit seeds are abundantly available, they are relatively underutilized in traditional food systems and food processing industries. Due to their starch-rich composition, moderate protein content, low fat levels, and gluten-free nature, jackfruit seeds are a promising raw material for food processing applications. Through appropriate scientific processing steps such as cleaning, thermal treatment, drying, grinding, and packaging, anti-nutritional factors can be reduced, enzymatic activity can be controlled, and microbial safety can be ensured. This allows jackfruit seeds to be converted into safe, stable, and long-lasting food ingredients. Adoption of quality management systems such as GMP (Good Manufacturing Practices) and HACCP (Hazard Analysis and Critical Control Points) can further ensure product safety and quality.



Value-added products derived from jackfruit seeds—such as flour, snacks, bakery products, instant mixes, and starch—are not only nutritionally rich but also aligned with the growing consumer demand for healthy and functional foods, particularly gluten-free products. From a small-scale industry perspective, jackfruit seed processing offers opportunities for low investment, utilization of local raw materials, rural employment generation, and women entrepreneurship. Efficient utilization of such resources also contributes to food waste reduction and sustainable food systems. Overall, the processing and value addition of jackfruit seeds is not merely a reuse of a traditional food component, but a promising strategy for alternative food sources, economic development, and food security in the future. Therefore, greater emphasis on research, training, and industry–academia collaboration is essential to expand the development and commercialization of jackfruit seed-based food products.