

Processing and Value Addition to Jack Fruit (*Artocarpus Heterophyllus*) Seed

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Jackfruit (*Artocarpus heterophyllus*) is one of the important underutilized fruits belonging to the family Moraceae. It is a tropical fruit native to South and Southeast Asia, renowned for its unique flavor, impressive size, and diverse culinary uses. Jackfruit is commonly called as chakka in Malayalam from which the English name Jackfruit is derived. In Hindi and Urdu, it is as called kathhal, in Tamil-pala, in Kannada - halasinahannu, in Telugu - panasapandu and in Marathi and Konkani - phanos. The ancient Indian language Sanskrit refers to jackfruit as "Atibruhatphala".

Jackfruit is divided into two parts i.e edible (pulp and seed) and inedible (rind and rachis) where inedible weight contributes approximately 47.5% of total fruit weight. The nutritional profile of seed flour includes 6.14g of moisture, 1.33g of ash, 11.43g of protein, 1.82g of fat, 2.51g of crude fiber, 76.77g of carbohydrates, and provides 369 kcal of energy (Reddy *et al.*, 2022). Seeds make up around 10 to 15% of the total fruit weight and have high carbohydrate and protein contents (Ocloo *et al.* 2010). Jackfruit seeds are rich in protein, dietary fiber, essential minerals such as iron, calcium, and potassium, and antioxidants, making them a highly nutritious byproduct of the fruit. (Ranasinghe *et al.* 2019).

While the flesh of the jackfruit is commonly consumed and the seed readily germinates, it is difficult to store it with present storage facilities in many underdeveloped countries. As a result, a huge amount of jackfruit seed is wasted without consuming the seeds often go overlooked despite their substantial nutritional value.

In recent years, there has been a growing awareness of the health benefits associated with dietary choices, leading to an increased demand for bakery products that offer nutritional benefits beyond basic sustenance. Traditional bakery staples like maida (refined wheat flour) and wheat flour, although versatile, often lack the nutritional density required to meet modern dietary needs. This has paved the way for the incorporation of composite flours, which combine multiple types of flour to enhance the nutritional profile of baked goods.

The development of jackfruit seed flour products represents a significant step towards creating more nutritious bakery products. By incorporating jackfruit seed flour into bakery products such as bread, biscuits, cupcakes, doughnuts, muffins, not only cater to the taste preferences of consumers but also provide added healthier alternative to traditional options, aligning with contemporary health trends and dietary recommendations. This shift towards nutritional flour substitutes addresses the growing demand for functional foods, supporting better health outcomes through everyday dietary choices.

Processing of Jackfruit Seed flour:

Jackfruit seed flour can be prepared through several methods: sun drying the seeds and then grinding them into flour; boiling the seeds, followed by drying and grinding; or using a lye peeling procedure before drying and grinding. Below, the outline the lye peeling procedure for extracting jackfruit seed flour, a method that effectively removes the outer skin of the seeds, enhancing the efficiency of the drying and grinding processes.

Lye Peeling Procedure for Jackfruit Seed Flour Extraction

1. Preparation of Lye Solution: Dissolve sodium hydroxide (NaOH) in water to create a lye solution with a concentration of 3%. Heat the solution to 90-95°C.

2. Peeling Process: Submerge the jackfruit seeds in the heated lye solution for 2-3 minutes, or until the outer skin starts to peel away easily. Stir the solution constantly to ensure all seeds are uniformly exposed to the lye.

3. Neutralization and Rinsing: Transfer the seeds immediately to cold water to stop the lye action. Rinse the seeds thoroughly in cold water to remove any residual lye, repeating as necessary to ensure complete removal.

4. Manual Peeling: Manually remove the softened outer skin from the seeds.

5. Neutralization Check: Taste a small piece of seed to check for any remaining lye. If a soapy or bitter taste persists, rinse the seeds again until the taste is neutralized.

6. Drying: Use a low-temperature oven (50-60°C) to ensure uniform drying.

7. Grinding: Grind the dried seeds into a fine powder using a grinder or flour mill. (Tulyathan 2002).

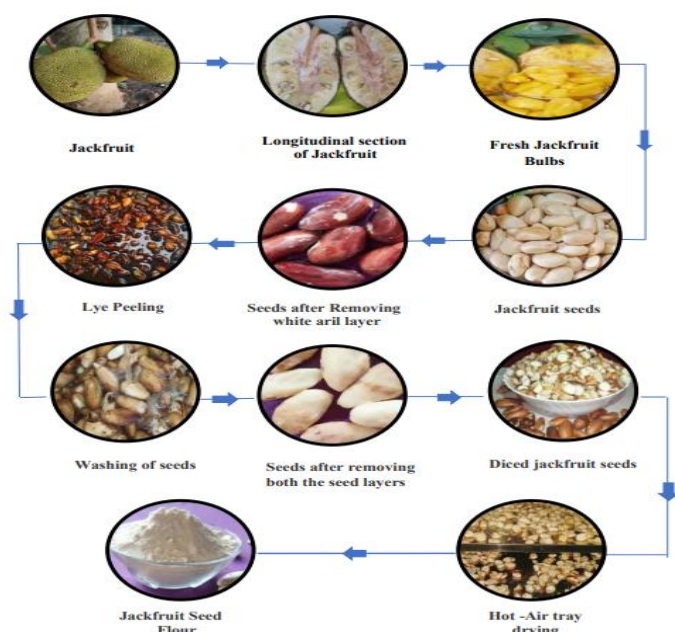


Fig 1: Processing of Jackfruit Seed flour

Source: Processing and value addition to Jack fruit (*Artocarpus heterophyllus*) seed

Value Addition of Jackfruit seed flour

Value addition involves transforming a food commodity to increase its value. This enhancement can be accomplished by adding new ingredients, applying advanced food processing techniques, or changing the packaging. These modifications make the products more attractive and convenient for consumers. Examples of value-added products include breakfast cereals, jams, ice creams, juices, yogurts, cheeses, pickles, concentrates, sauces, ketchup, and extruded snacks.

Culinary Uses

In the culinary realm, jackfruit seed flour is a game-changer. Its mild, nutty flavor and adaptable nature make it an excellent substitute for traditional flours, particularly for those adhering to gluten-free diets. From enriching bread and pastries to creating nutritious snacks and supplements, jackfruit seed flour opens up a world of possibilities in the kitchen. They can be boiled, roasted, or ground into flour, offering versatility in both traditional and modern recipes.

- **Flour Production:** Jackfruit seed flour can be used as a gluten-free alternative in baking. It is ideal for making bread, cookies, and pastries,

catering to the growing demand for gluten-free products.

- **Snack Foods:** Roasted jackfruit seeds can be seasoned and consumed as a healthy snack. Their high protein content makes them an excellent option for those looking to boost their protein intake.
- **Nutritional Supplements:** The high nutrient content of jackfruit seeds makes them a potential ingredient in nutritional supplements and protein powders.

Bakery Products

The bakery sector is one of the fastest-growing organized food industries in India. Baked goods are becoming increasingly popular due to their convenience, availability in a variety of flavors and textures, affordability, and high nutritional value. A significant benefit of bakery products is the ease with which they can be enriched with functional ingredients. Consequently, bakery products serve as an effective vehicle for delivering health-promoting ingredients to consumers. Research has shown that a variety of bakery items, including biscuits (Islam et al., 2015), cookies, bread, cakes, muffins, and others, have been developed by incorporating various amounts of jackfruit seed flour.

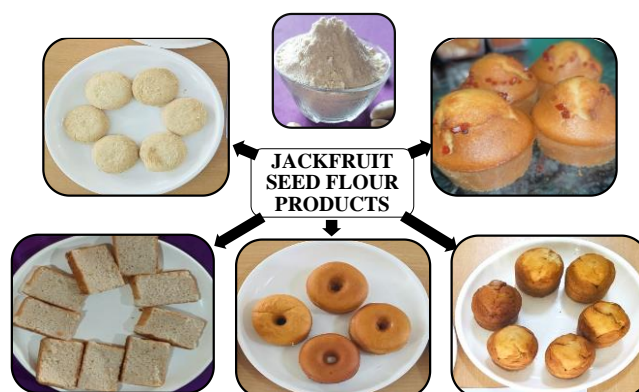


Fig 2: Jackfruit seed flour-based bakery products

Source: Processing and value addition to Jack fruit (*Artocarpus heterophyllus*) seed.

Traditional Products

Jackfruit seed flour has long been used to make a wide range of traditional, healthful, and delicious items. Incorporating this flour into ordinary meals like chapatis, halwa, idiyappam, puttu, dosas, and murukku not only increases their nutritional content, but also adds new flavours and textures. Chapatis cooked with jackfruit seed flour include more protein and fibre, whereas sweet foods like halwa become

richer and more nutrient-dense. Idiyappam and dosas benefit from the flour's fermentable qualities, which improves texture and flavour. Puttu, coated with grated coconut, is transformed into a healthful steamed delight, while murukku is given a healthier twist while preserving its traditional crunch. These traditional applications highlight the variety and health advantages of jackfruit seed flour, demonstrating its potential in both everyday and festive dishes.

Extruded products

As a continuous technique for cooking, mixing, shearing, and shaping, extrusion cooking technology is crucial to many food processing sectors. Extruded foods are popular because they are convenient, affordable, visually appealing, and have a pleasing texture. Adding various proportions of jackfruit seed flour to pasta, noodles enhances their nutrient content and incorporates functional properties. This enrichment not only boosts their nutritional value but also introduces beneficial compounds inherent in jackfruit seeds. Additionally, jackfruit seed flour can be utilized in the production of extruded products such as breakfast cereals, snack pellets, and crispy flatbreads, further expanding the range of nutritious and appealing food options.

Conclusion

Jackfruit seed flour represents an exciting and underutilized resource that promises significant health and culinary benefits. As the world increasingly seeks out nutritious, sustainable, and versatile ingredients, jackfruit seed flour emerges as a standout contender. Packed with essential nutrients like protein, fiber, vitamins, and minerals, it offers a robust

nutritional profile that supports digestive health, boosts immunity, and enhances overall well-being.

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