



Waffle Ice Cream Based on Jackfruit Seed Flour: OPTIMIZATION OF INGREDIENT CONTENT USING RESPONSE SURFACE METHODOLOGY

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Abstract:

Jackfruit seeds have excellent nutritional quality, so they can help obtain healthy and nutritious food products. In this research, some wheat flour was replaced with jackfruit seed flour as the base ingredient for waffle cone ice cream. The amount of wheat flour added to the dough is the same as the amount of jackfruit seed flour added. Jackfruit seed flour was added after the effectiveness of using response surface methodology in the batter base for waffle ice cream. The waffle ice cream cone was made from 100% wheat flour, was considered a control, and was used to compare the waffle ice cream cone supplemented with jackfruit seed flour. Replacing wheat flour with jackfruit seed flour affects the nutritional content and characteristics of the waffle cone cream for protein content, ice cream permeability density, crunchiness, and overall acceptability. Protein content increased (14.55%) after adding jackfruit seed flour to 80% of the control level. The cone added with 60% jackfruit seed flour resulted in higher overall crunchiness and acceptability scores than other waffle ice cream cones because jackfruit seed flour has a high water/oil absorption capacity, jackfruit seed flour can be used to make other value-added food products as a substitute for wheat flour in whole or part.

Keywords: Jackfruit Seeds, Ice Cream Funnel, Protein Content, Jackfruit Seed Flour

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INTRODUCTION

Jackfruit, Latin *Heterophyllum Artocarpus*, is the family *Moraceae* (native to the Western Ghats in India) and is considered the world's fruit (SEMBIRING, 2019). Generally, jackfruit is grown in Asia and other countries, including India (Siregar, 2022). Combined and fruity intact, this type of fruit consists of skin parts, bone ribs, meat (yellow, gold, or white), and seeds (up to 500 pieces in One fruit). 2. Seed contain 10–15% of the total fruit weight and is considered rich in carbohydrates (esp starch) and protein. 3 Composition nutrition seed jackfruit shows water content 21.10–71.92%; fiber 1.56–3.96%; ash 2.12–0.89%; protein 10.09–18.12%; fat 4.29% and content carbohydrates 7.89% (4,5,6). Jacalin is The main protein content in seeds and is helpful in jackfruit in elevating the immune system body man (SWADAYA et al., n.d.).

Seed jackfruit has content metabolites secondary to others (Andyarini & Hidayati, 2017), such as saponins, phytonutrients, lignin, and isoflavones, which are beneficial in preventing cancer, hypertension, aging, and ulcers (DAN, 2021) and many more. Again, Because behavior the antioxidant. It is known as seed jackfruit. Alone Not yet used in industry, even wasted vain so just. However, several publicly processed seed jackfruit steamed and dried, sometimes used in Cook local level House ladder as food light and processed, become curry. 3.9. Natural seeds nature No can endure dryness and aging

and germinate with a fast moment of fruit maturity. So from that is the seed's own age, keep it very short because the content is high in carbohydrates (mainly starch, 60–80%, in dry form). Moreover, protein content may be used as a culture by microorganisms^{3,10}.

As a result, seeds cannot be stored fresh in time, not enough for One week, and rot, increasing loss post-harvest (Tahir, 2023). Therefore, several stages are carried out to increase power savings, use, and grind. Flour results milling seed jackfruit has great potential and can used as an alternative or mark plus in various foods (Purbasari et al., 2014). Flour seed jackfruit can replace flour wheat For bread improvers, rolled bread crust (chapatti), pancakes, biscuits butter, and noodles (Gustiawan et al., 2018). They mix flour seed jackfruit into product extrusions like snacks, noodles, vada (fried foods), and vermicelli. Low-gluten bread is made after the replacement process is carried out with flour wheat with flour seed jackfruit in levels 5, 10, and 20%³. Likewise, Butol Butol and Meethal et al. also replace flour wheat with various proportions (10–30%) of flour seed jackfruit in bread cakes and snack bars (Gustiawan et al., 2018).

Textured wafer waffles are cone-shaped bowls made from flour wheat smooth called ice cream cones, making it easy to hold ice cream without a bowl. Marchiony developed the first ice cream cone or wafer in Italy in 1896. There are 2 types of Basic ice cream cones available based on the manufacturing process. The first is a rolling cone, i.e., baked waffles in a pan and rolled to form a cone after baking. One of the other types of cones is those poured into various mold shapes, preferably cone-shaped, then baked until the texture is crisp (MAYANGSARI, 2017). Several Other ice cream cone variations are also available, including wafers, waffle cones, sugar cones, pretzels, and layered cones chocolate.

For the first time, it was using flour seed. Jackfruit contains jacalin, thought to upgrade the body's immunity, and other components such as fiber food, carbohydrates, minerals, B complex vitamins, and essential bioactive for a healthy man. Because of the seeds, jackfruit is rich in starch, which makes it resistant to the body, controls blood sugar, and maintains Gut health, so it contains properties in the flour. This makes it far better to replace flour with wheat. Of course, ice cream suggests floured waffle cone seeds from jackfruit will be more beneficial for health than flour, so if consumed, it will reduce the lack of nutrition. Therefore, we focus on developing cones for ice cream using flour seed jackfruit as a replacement for flour wheat to get more nutritious cones (rich in protein and low in gluten) and minimize loss post-harvest.

METHOD

Method study is a bunch of regulations, activities, and procedures used by perpetrators something discipline knowledge. The writer used the following method of research:

Method Response Surface

Method surface response is a bunch of techniques that are helpful statistics for analyzing problems where several variables freely influence variable response and goals. Finally, it is For optimizing variable response. Method This was first proposed in 1951 by Box and Wilson (Egi Endrian, 2021).

Methodology response surface used To determine the optimal combination of substitute flour seed For ice cream development waffle. Variable optimized independent are: Flour Jackfruit seeds (X1; 40–80 g), and water content (X2; 200–300ml). The magnitude of 2 variables independent This was taken after laboratory tests were carried out. Influence second variable free X1 (amount flour seeds), and X2 (amount of water added For form mix), protein content, crunchiness, ice cream permeability, hardness, and acceptability whole investigated use Composite rotatable design center. A total of 20 trials were done, and 5 points were repeated at the point center. Data was analyzed using device Design-

Expert software (version 7.0.0) and polynomials degrees. The second is generalized using the method square smallest.

$Y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_{11}x_1^2 + \beta_{22}x_2^2 + \beta_{12}x_1x_2$ Polynomial model coefficients is ethnic group depicted constant as β_0 ; linear terms as β_1 , and β_2 ; ethnic group square as β_{11} , and β_{22} ; and terms interactive as β_{12} (Eq. The predicted value was analyzed For coefficient determination (R^2), error standard (SE), nonconformity, and F value. The surface response is used To know the interaction between two variables independent of the response. Different boundaries are set for independent and dependent variables along with interest relative. Function desire is used For optimizing fitted polynomials. Optimal conditions are tested and compared with the experiment on the value prediction variable.

RESULTS AND DISCUSSION

Material Plant

Jackfruit with the Name Latin *Artocarpus heterophyllus* L. collected from garden fruits at Khusroobagh (below Department Horticulture and Processing Food, Government of Uttar Pradesh) Prayagraj, India, from May to July 2017 for 10-12 weeks after flower blossom. Seed from cultivars Hadiyava chosen For Study This. Fruit is cut and opened, And the seeds are taken.¹⁸

Preparation Flour

Flour seed jackfruit is made with A little variation method described by A. Mukprasirt & K.¹⁹ Sajjaanantakul, a seed isolated from fruit cooked, washed, and cleaned, and lining white part on removed Manually. The seed was then peeled with an alkaline solution (2.5% NaOH solution and acid citrate 2.5%) and washed with distilled water to remove the remainder of the material's chemistry. After washing, the seed is cut into pieces and dried in the oven at 45°C for < 13% moisture content. Already, seeds are dry-ground using a grinder laboratory and sieved using a sieve size of 300 mesh, so the obtained flour is later saved in receptacle-tight air for further needs. At the same time, flour wheat was purchased from the local market of Allahabad and sieved using a size 300 mesh to get even flour.

Composition Approximate Flour

Flour wheat and flour seed jackfruit contain water content 11.27 and 6.82%, protein 11.27 and 15.69%, fat 1.33 and 0.66%, ash 0.71 and 2.85%, and fiber rough 1.85 and 3.04%.

Content Composition of Nutritional Value Jackfruit Seeds

Composition Chemistry	Nutritional Value Jackfruit Seed Flour
Water	12.40
Protein (g)	12,19
Fat (g)	1.12
Crude fiber (g)	2.74
Ash (g)	3.24
Electra material No Nitrogen	68.8
Starch	56.21

Content Composition of Nutritional Value Flour Wheat

Nutrient content	Flour
Energy (kcal)	333
Protein (g)	9.0
Fat (g)	1.0
Carbohydrates (g)	77.2
Calcium (mg)	22
Phosphorus (mg)	150
Iron (mg)	1.3
Vitamin C (mg)	0
Water (g)	11.8

Flour Jackfruit Seeds

Processing product half So is one of the methods to preserve the results of harvest, especially in commodities with high haveer content, such as tubers and fruit. Another advantage of processing product half so, as material flexible standards For industry processing Go ahead, be safe in distribution, as well as save space and cost storage. Technology-making flour wheat is one of the alternative product processes half, so it is recommended Because it is more long-lasting inside storage, is easy to mix (made composite), molded, has enriched nutrition, and is cooked faster by the demands of practical modern life.

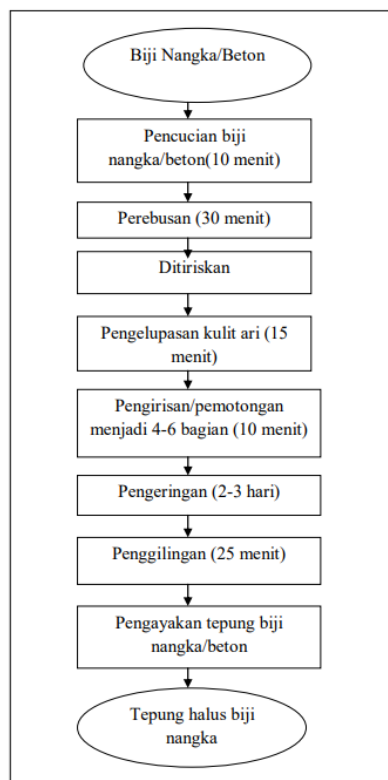
I am making processed flour seed jackfruit through several processing stages to produce flour quality with No smells (NANGKA & KURANG, n.d.). Making process flour seed, the first jackfruit is wash seed jackfruit. After washing, the jackfruit seeds are boiled with charcoal shell coconut to remove the smell at a temperature of 1100C for not more than 30 minutes. After boiling, the jackfruit seeds were separated from the remainder of the meat, but the fruit was still stuck. Then, seed jackfruit is sliced (cut small) to make drying easier (Rahman, 2018).

The drying process of flour seed jackfruit is done in several ways, including by drying in the sun, the food below ray, the so-called sun drying, or using hot artificial form air from the oven or a tool dryer device for dry food. Drying below the scorching sun Can be effective because the temperature reaches a range (of 35-450C). The climate of a tropical region is a source of potential energy (Kanugrahan & Sujarwanto, 2021). That can also be dried using a Cabinet Dryer oven at a temperature of 600C for 2 hours (Shabrina & Susanto, 2017). Drying process This aims To reduce the water content in the jackfruit seeds.

Several constraints that affect the drying process include temperature, the humidity of the air, the environment, speed Of air drying, the percentage of desired water level achieved, power drying, the efficiency of the machine dryer, and capacity drying (Wicaksono, 2019). Too fast drying can damage

the material because the surface material is too fast dry so that No can balance with the speed movement of water in materials going to the surface (Prayitna, 2015).

Arrangement temperature and duration of time drying are done with notice contact between the tool dryer with tool heating or Good form Genre air hot nor tool heating other. Although the pressure below 0 or $\frac{1}{4}$ or water can change to become steam, for standard nutrition, it is recommended to use a machine with a temperature of No more than around 850C. Stage furthermore is grinding a piece of seed jackfruit already dry until the details are smooth, using a dry blender or tool grinder like machine flour rice. Details fine. Then, sift. Use a 60-mesh sieve three times until you produce the desired flour. Making process flour seed jackfruit can seen in the flow diagram as follows:



CONCLUSION

In a study, replacing flour wheat with flour seed jackfruit in the ingredients of a basic ice cream cone delivers results in positive quality nutrition and characteristics of cream waffle cone. Protein content increases after the addition of flour seed jackfruit, reaching enhancement amounting to 14.55%. Cone with 60% flour seed jackfruit shows crispness and acceptance more overall. It is good compared to the control made from 100% flour wheat. In general, research concludes that using flour seed jackfruit as a replacement part of flour wheat can increase the quality of nutrition and characteristics of ice cream cones. This matter shows the potency of flour seed jackfruit as a material addition worth tall in product food, especially as an alternative replacement for wheat in a whole or part. With marked capacity absorption of high water/oil, flour seed jackfruit can become an attractive choice for a diversification product that is more healthy and nutritious.

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