

Acceptability of incorporation of jackfruit seed flour in cakes

C. Lalchhandami, Ch. Nganthoibi and Natasha R. Marak

This study was conducted to determine the influence of incorporation of jackfruit seed flour in cakes. Jackfruit being abundantly available in Meghalaya during the spring-summer season is one of the most popular fruit in the state. However, the seeds often tend to be discarded or underutilised. Incorporation of jackfruit seed flour in recipes such as cakes will serve as a rich source of protein, starch and dietary fibres and can also be regarded as an abundant yet cheap source of the said nutrients. The seeds of mature, unripe jackfruit were used for making the cakes. Three variations of cakes with the incorporation of different amounts of the seed flour *i.e.*, 20 per cent, 30 per cent and 40 per cent by replacing refined wheat flour were compared with a control. The cakes were evaluated on their sensory characteristics *i.e.*, colour, appearance, texture, taste, aroma and overall acceptability. It was observed that incorporation of the seed flour at 30 per cent was the most acceptable with no affect on the sensory characteristics. It was concluded that refined wheat flour can be substituted with jackfruit seed flour at 30 per cent in preparation of cakes.

Key Words : Enriched cakes, Jackfruit seed flour, Seed flour utilization

How to cite this article : Lalchhandami, C., Nganthoibi, Ch. and Marak, Natasha R. (2018). Acceptability of incorporation of jackfruit seed flour in cakes. *Food Sci. Res. J.*, 9(2): 245-249, DOI : 10.15740/HAS/FSRJ/9.2/245-249. Copyright@ 2018: Hind Agri-Horticultural Society.

INTRODUCTION

Jackfruit (*Artocarpus heterophyllus*), a member of the family Moraceae is widely available and abundantly available in tropical areas such as India, Bangladesh and South-East Asia. The tree reaches 28-80 feet in height and the weight of a single fruit is approximately 3.5-10 kg. (Swami *et al.*, 2012). Jackfruit varies in shape and size, ranging from round to oblong, depending on the tropic

where it grows. Jackfruit consists of rind (outer cover), core, rags (fibrous but not very sweet), avrils (the main part which is commonly eaten) and seeds. Each avril contains a seed. Both the avril and seeds are edible and the rags are rarely consumed. Jackfruit can be eaten either in the raw form (when cooked) or when it turns ripe. The skin of unripe jackfruit must be peeled and discarded, and then the whole fruit can be chopped into edible pieces and cooked to make different recipes. The seeds of ripe jackfruit can be eaten when boiled in water for about 25 minutes. It is loaded with nutrients such as protein, B vitamins, potassium, calcium and zinc. However, the seeds which are often discarded are healthy too. Jackfruit seeds are rich in nutrients such as protein, starch and dietary fibre. The seeds are also rich in riboflavin and thiamine, which help convert the food that we eat to energy. The seeds also have small amounts of minerals like magnesium, zinc, potassium, iron, calcium and copper.

MEMBERS OF RESEARCH FORUM

Author for correspondence :

C. Lalchhandami, Department of Food and Nutrition, College of Home Science, Central Agricultural University, Sangsanggre, Tura (Meghalaya) India (Email : clalchhandami1338@gmail.com)

Associate Authors' :

Ch. Nganthoibi and Natasha R. Marak, Department of Food Science and Nutrition, College of Home Science, Central Agricultural University, Sangsanggre, Tura (Meghalaya) India (Email : singhpapak9642@gmail.com; natasha.marak@gmail.com)

Refined flour has been called the “glue of the gut”. It is made by the separation of fibre rich bran from whole wheat flour. By removing the bran of whole wheat, 97 per cent of fibre is lost from refined flour decreasing its nutritional values. Refining of whole wheat flour removes important nutrients such as B vitamins, beneficial unsaturated fatty acids, calcium, iron, magnesium, phosphorus and Vitamin E (Gowri *et al.*, 2015). Processed foods like white flour are widely available but mostly unavoidable. They are high in empty calories. Foods made from refined flour depletes the body’s reserve of nutrients to aid they own absorption. Refined flour is harmful to the body as it is the primary cause of most diseases in the 21st Century. Refined flour is high in glycaemic index, causing sharp insulin response, which with prolonged consumption causes inflammation, insulin resistance and eventually Type II Diabetes Mellitus. (Mukherjee, 2016). Acidity is another problem. All the nutrients get removed during the refining process and it becomes acidic in nature, which forces the body to pull calcium from bones to keep things in balance, which affects bone density. Over-acidity is one of the major causes arthritis and other chronic illnesses. (Manhajan, 2016). Gluten is a naturally protein composite found primarily in wheat. People suffering from celiac disease produce an intestinal immune response when gluten has is consumed leading to the inability to absorb nutrients, as well as weakening of the intestinal wall (Edward, 2015). Wheat flour is one of the main ingredients of baking industry. Hence, replacing refined wheat flour with jackfruit seed flour will make a composite effect

on the nutritional and flavour aspects of bakery products such as cakes. As a jackfruit is cheap and abundantly available in Meghalaya, it will ensure a low cost product for the lower income group. Cake is one of the most palatable and popular bakery products for all ages. So, preparation of cake with mixed flour that include wheat flour and jackfruit seed flour will serve as a good source of nutrition for all age group. Cake is considered to be one type of air-leavened product in the baking industry. The ingredients used for batter preparation, aeration of batters and processing conditions are some of the factors that determine the quality of cakes. High volume, uniform crumb structure, softness and long shelf life with tolerance to staling are the qualities of a good cake (Gelinias *et al.*, 1999).

Nutritional value of jackfruit :

Table A proximate composition of tender fruit, ripe fruit and seeds of jackfruits on the basis of fresh weight (per 100g) (Swami *et al.*, 2012).

Health benefits of jackfruit seeds (Ghosh, 2018).

- High in protein
- Prevents indigestion
- Good eyesight
- Prevents anaemia
- Cures mental stress
- Prevents constipation
- Boosts the immune system
- Prevents cancer
- Provides strength to the
- Lowers heart disease.

Table A: Proximate composition of tender fruit, ripe fruit and seeds of jackfruits on the basis of fresh weight (per 100 g) (Swami *et al.*, 2012)

Composition	Tender jackfruit	Ripe jackfruit	Jackfruit seed
Water (g)	76.2-85.2	72.0-94.0	51.0-64.5
Protein (g)	2.0-2.6	1.2-1.9	6.6-7.04
Fat (g)	0.1-0.6	0.1-0.4	0.40-0.43
Carbohydrate (g)	9.4-11.5	16.0-25.4	25.8-38.4
Fibre (g)	2.6-3.6	1.0-1.5	1.0-1.5
Total sugar (g)	-	20.6	-
Total mineral (g)	0.9	0.87-0.9	0.9-1.2
Vitamin A (IU)	30	175-540	01/10/17
Thiamin (mg)	0.05-0.15	0.03-0.09	0.25
Vitamin C (mg)	12.0-14.0	7.0-10.0	11
Riboflavin (mg)	0.05-0.2	0.05-0.4	0.11-0.3
Energy (kcal)	50-210	88-410	133-139

Composition	%
Moisture	14.00
Protein (g)	9.00
Fat (g)	1.10
Crude fibre (g)	2.55
Total mineral (g)	3.01
Total carbohydrate (g)	70.26
Calorific value (kcal)	327

METHODOLOGY

The study was carried out at College of Home Science, Central Agricultural University, Sangsangre, Tura, Meghalaya in the year 2018.

Equipments:

Measuring scale, bowls, spatula, whisker, butter paper, cake tins, oven, cooling rack, skewer.

Ingredients:

Matured, unripe jackfruits were purchased from the local market in Tura, Meghalaya. The seeds were then separated from the bulbs and boiled for 10-15 minutes. The outer cover of the seeds was discarded and the seeds were dried for 24 hours by air drying. The dried seeds were ground to flour by using grinder. Other ingredients

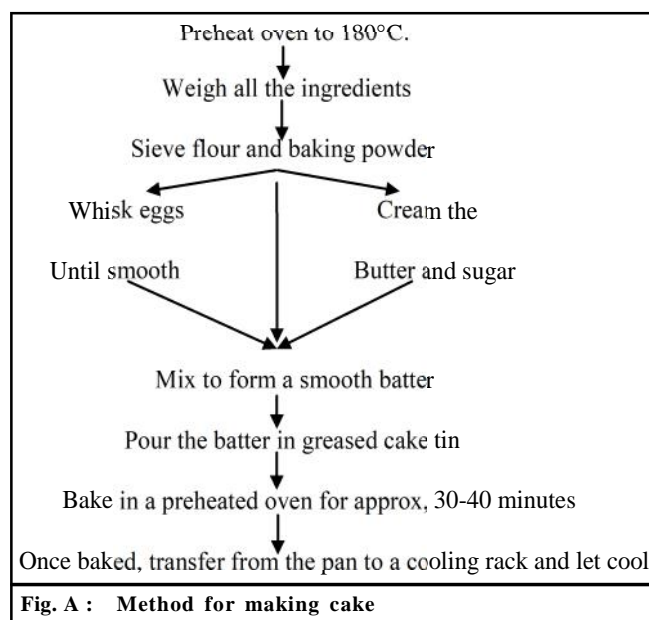
Ingredients	Amount
Refined flour	100g
Sugar	100g
Butter	100g
Eggs	3 nos.
anilla essence	Few drops
Baking powder	1tsp

Ingredients	Amount
Refined flour	70g
Jackfruit seed flour	30g
Sugar	100g
Butter	100g
Eggs	3 nos.
Vanilla essence	Few drops
Baking powder	1tsp

such as refined flour, sugar, butter, eggs, vanilla essence and baking powder were also purchased from the local market.

Sensory evaluation:

Three variations of cakes were incorporated with different amounts of jackfruit seed flour at 20, 30 and 40 per cent along with a control. All the cakes were coded and served to a panel of 20 members for evaluation of sensory characteristics of the product such as colour, appearance, texture, taste aroma and overall acceptability.



Numerical scoring test:

The cakes were rated on 10 point numerical score (10 as excellent and 2 as poor).

Rating	Numerical score
Excellent	8.0-10
Very good	8.1-8.0
Good	4.1-6.0
Fair	2.1-4.0
Poor	1-2.0

Hedonic scale :

The cake was rated using the hedonic scale from 1-9.

Like extremely	9
Like very much	8
Like moderately	7
Like slightly	6
Neither like nor dislike	5
Dislike slightly	4
Dislike moderately	3
Dislike very much	2
Dislike extremely	1

OBSERVATIONS AND ASSESSMENT

Sensory evaluation of cakes prepared with different amounts of jackfruit seed flour as compared to the control is given in Fig. 1. From the results, it was observed that the cake made with 30 per cent jackfruit seed flour was most acceptable and hence, can be popularised in the market. A study on incorporation of barley and finger millet flour in the preparation of cake showed that maida can be replaced with 10 per cent barley and 10 per cent

finger millet flour (Sangeeta and Chopra, 2013). A study on addition of amaranth flour at different levels in cakes found that the overall acceptability scores of 40 per cent amaranth flour cakes were maximum (Shyam and Raghuvanshi, 2015). A study on incorporation of coconut flour in cakes concluded that the substitution of refined wheat flour with 20 per cent coconut flour and scored highest acceptability. Since jackfruit is abundantly available in this region, using jackfruit seeds will not only improve the nutritional value but will also improve the local economy by increasing the usage of value added products from local jackfruit. Similar work related to the present investigation was also carried out by Chowdhury *et al.* (2012); Islam *et al.* (2015); Khan *et al.* (2016) and Mondal *et al.* (2013).

Conclusion:

From the above project, it can be concluded that incorporation of jackfruit seed flour at 30 per cent in formulating cakes is acceptable to a point where changes in the colour, appearance, texture, taste, aroma and overall acceptability will not be affected and will also add to the

Product code	Colour	Appearance	Texture	Taste	Aroma	Overall acceptability
C123	7.75±0.91	7.65±0.87	7.5±1.05	7.8±0.83	7.65±0.93	7.75±0.85
J201	7.35±1.03	7.45±1.05	6.65±1.42	7±1.37	7.05±1.14	7.35±1.03
J302	7.5±1	7.5±0.94	7.35±1.08	7.4±1.14	7.4±1.18	7.55±0.99
J403	7.2±0.95	7.4±0.94	7.05±1.05	7.15±1.03	7.15±0.93	7.36±0.95

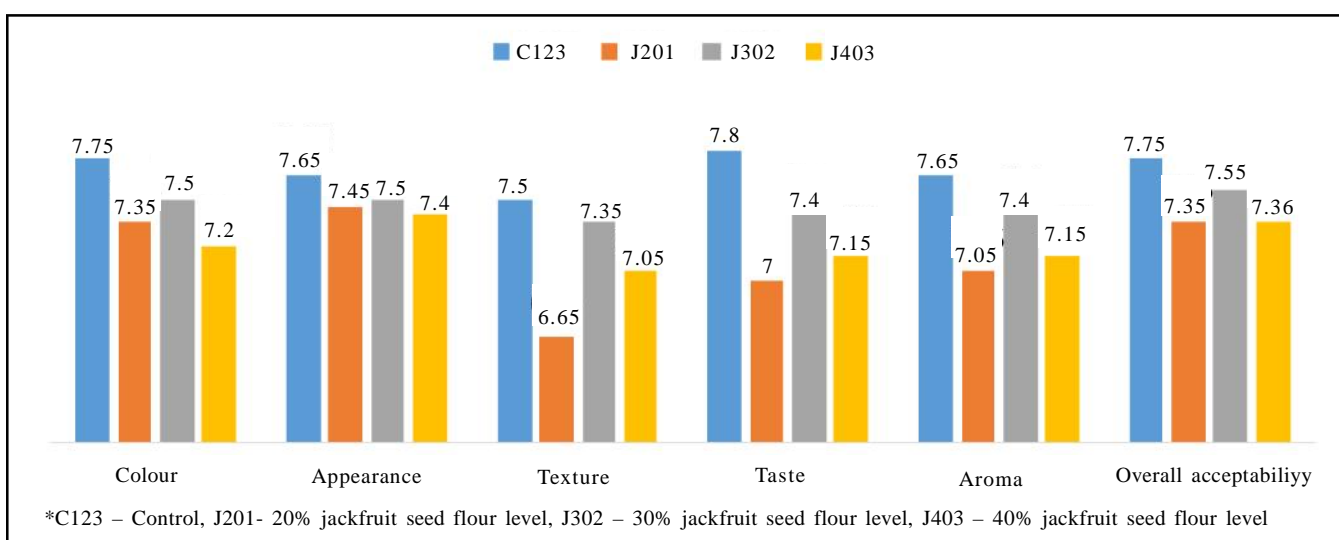


Fig. 1 : Numerical test results

nutritional benefits. Hence, cakes made by replacing refined wheat flour with jackfruit seed flour at 30 per cent can be popularised in the market.

LITERATURE CITED

- Arpit, S. and John, D. (2015).** Effects of different levels of jackfruit seed flour on the quality characteristics of chocolate cake; *Res. J. Agric. & Forestry Sci.*, **3** (11): 6-9.
- Chowdhury, A.R., Bhattacharyya, A.K. and Chattopadhyay, P. (2012).** Study on functional properties of raw and blended jackfruit seed flour (a non-conventional source) for food application, *Indian J. Nat. Prod. & Resour.*, **3** (3): 347-353.
- Gelinas, P.G., Roy, G. and Guillet, M. (1999).** Relative effects of ingredients on cake staling based on an accelerated shelf-life test. *J. Food Sci.*, **64** (5): 937-940.
- Gowri, R., Narayanan, N., Karthick, B., Jeyakumar, S., Malathi, N., Karthika, K.S. and Jeyashanmugapriya, S. (2015).** Hazards of white poison; *World J. Pharmaceutical Res.*, **4** (8): 2733-2739.
- Islam, Md. S., Begum, R., Khatun, M. and Dey, K.C. (2015).** A study on nutritional and functional properties analysis of jackfruit seed flour and value addition to biscuit. *Internat. J. Engg. Res. & Technol.*, **4**: 139-147.
- Khan, S.A., Saqib, M.N. and Alim, M.A. (2016).** Evaluation of quality characteristics of composite cake prepared from mixed jackfruit seed flour and wheat flour. Department of Food Technology and Rural Industries, Bangladesh Agricultural University.
- Mondal, C., Remme, R.N., Mamun, A.A., Sultana, S., Ali, M.H. and Mannan, M.A. (2013).** Product development from jackfruit (*Artocarpus heterophyllus*) and analysis of nutritional quality of the processed products. *IOSR J. Agric. & Vet. Sci.*, **4**: 76-84.
- Mukherjee, A. (2016).** Why is maida bad for health?
- Sangeeta, S. and Chopra, C.S. (2013).** Studies on incorporation of barley and finger millet in the preparation of cake. *Food Sci. Res. J.*, **4** (2): 121-125.
- Shyam, S.R. and Raghuvanshi, S. (2015).** Standardisation of cakes by using different levels of Amaranth flour and its acceptability, *Internat. J. Sci. & Res.*, **4** (6): 1859-1861.
- Swami, S.B., Thakor, N.J., Haldankar, P.M. and Kalse, S.B. (2012).** Jackfruit and its many functional components as related to human health: A Review. *Comprehensive reviews. Food Sci. & Food Safety*, **11**: 565-576.

WEBLIOGRAPHY

- Edward (2015).** Do you know these 9 facts about gluten? www.globalhealingcenter.com.
- Ghosh, N. (2018).** 10 Mind-blowing health benefits of jackfruit seeds, www.boldsky.com.
- Manhajan, S. (2016).** Maida (White flour) – Is it really good for our health?, www.practo.com.

Received : 19.05.2018; Revised: 18.07.2018; Accepted : 18.08.2018