

Development of coconut milk residue and jackfruit seed enriched biscuit

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■ **ABSTRACT** : The research was conducted on development of coconut milk residue and jackfruit seed enriched biscuits. Biscuit were prepared with different combination of refined flour, jackfruit seed flour and coconut milk residue flour with two different temperature of baking. The coconut milk residue flour and jackfruit seed flour has high fibres content 46.50 per cent and 3.34 per cent, respectively. Coconut milk residue is by product of coconut milk processing industries such as virgin coconut oil processing industries, flavoured coconut milk industries and coconut milk powder producing industries. Generally jackfruit seed and coconut milk residue thrown as waste and coconut milk residue also used to feeding animals. Coconut milk residue and jackfruit seed have many nutritional and beneficial properties to human health. The total yield of the jackfruit seed flour exclusive of weight of the white arils (2 %), brown spermoderm (8.16 %), handling losses represented 13.34 per cent and when passed through mesh flour yield was documented as 67.50 g. The biscuit containing 50:20:30 and 50:30:20 combination of refined flour, coconut flour and jackfruit seed flour scores more in sensory evaluation. The biscuit colour which are baked at 180 °C had good colour and appearance than biscuit baked at 200 °C. On addition of coconut sugar instead of common sugar the colour of biscuit is improved. The moisture content of coconut and jackfruit seed biscuit is about 1- 4 per cent. Spread ratio of coconut and jackfruit seed based biscuit is in range of 8 to 10. The colour of biscuit indicated that, the control biscuit were significantly whiter than the rest.

■ **KEY WORDS** : Coconut milk residue, Jackfruit seed, Enriched biscuit

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Coconut : The coconut tree (*Cocos nucifera*) is a member of the family Arecaceae (palm family) and the only species of the genus *Cocos*. The coconut is one of the most important crop and a perfect gift to mankind. It has used as the source of food, beverage, oil seed, fibres, timber, health products, medicine and omen in the life of people from historical period. India is the third largest coconut producing country in the world. The four Southern states, Kerala,

Karnataka, Tamil Nadu and Andhra Pradesh are the main growing areas in the country. In the North East, it is mostly grown in Assam and Tripura. Coconut production in Kerala plays an important role in the state economy and culture of Kerala in south western India. Kerala is actually named after the coconut tree with "Kera" meaning Coconut tree and "Alam" meaning land so means "Land of Coconut Trees". Today Kerala produces roughly 45 per cent of India's coconuts, with some 92

per cent of total production lying in the southern Indian states and Kerala's neighbours.

Some of the main products are coconut water, copra, coconut oil, raw kernel and coconut cake, coconut biscuit, coconut chips, coconut milk etc. Coconut milk residue is by product of coconut milk processing industries such as virgin coconut oil processing industries, flavoured coconut milk industries and coconut milk powder producing industries. Generally coconut milk residue is thrown as a waste or used for animal feed. The coconut milk residue is dietary rich product. Coconut flour is extremely high in fibre with almost double the amount found in wheat bran. This flour can be used much like wheat flour to make a multitude of delicious breads, pies, cookies, cakes, snacks and desserts. It contains more calorie free fibre than other wheat alternatives. Coconut flour also provides a good source of protein. While coconut flour does not contain gluten (the type of protein found in many grains) it does not lack protein. It contains more protein than enriched flour, cornmeal and also as much as wheat flour. Coconut flour provides many health benefits. It can improve digestion, help regulate blood sugar, protect against diabetes, help prevent heart disease and cancer and aid in weight loss. (Ramaswamy, 2014).

Jackfruit:

Jackfruit (*Artocarpus heterophyllus* Lam.) is one of the evergreen trees of family moraceae in tropical areas and widely grown in Asia including India. The ripe fruit 3 contains flavorful yellow sweet bulbs and seeds. The seed is 2-4 cm in long and 1.5-2.5 cm in diameter. Upto 500 seeds can be found in a single fruit (Islam *et al.*, 2015). Seeds make-up around 10 to 15 per cent of the total fruit weight and have high carbohydrate and protein contents (Tulyathan *et al.*, 2002). The nutritional content of jackfruit seed is moisture content 61.8 per cent (wb), protein (11.85 %), fibre (3.19 %) and carbohydrate (26.20 %). The calorific value is 382.79 kcal/100g. The ash and fat content (dry matter basis) is 0.15 per cent and 1.006 per cent, respectively (Gupta *et al.*, 2011). The jackfruit seed flour contains an appreciable value of calcium (3087 mg/kg), Iron (130.74 mg/kg), potassium (14781 mg/kg), sodium (60.66 mg/kg), copper (10.45 mg/kg) and manganese (1.12 mg/kg). The jackfruit seed flour contains high water absorption capacity (25 %), fat absorption capacity (17.0 %) and bulk density (0.80 g/cm³) is reported (Ocloo *et al.*, 2010).

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Seeds are normally discarded or steamed and eaten as a snack or used in some local dishes (Tulyathan *et al.*, 2002). As the seeds are recalcitrant, they germinate immediately after maturity. Therefore, fresh seeds cannot be kept for long time. As a result, large amounts of the total seed remain unused. If these seeds are dried to safe storable moisture content, these can be preserved for longer duration which can be utilised by converting into flour. However, seed flour can be an alternative product to be used in some food stuffs such as white bread, cake, extrudate product and it can also used as thickening and stabilizing agent. As jackfruit is highly seasonal and seeds have shorter shelf-life, hence, go waste during the seasonal glut.

Functional properties of flour are greatly affecting the behaviour of food system and its acceptability for consumption and during storage. The functional properties *i.e.* bulk density, water absorption capacity, oil absorption capacity are the intrinsic physico-chemical characteristics which may affect the behaviour of food systems during storage (Shobha *et al.*, 2014). Water absorption capacity is an important functional characteristic in the development of ready to eat food from cereal grains and high water absorption capacity may assure product cohesiveness (Shobha *et al.*, 2007). The higher dispersibility of meal in water indicated its ability to reconstitute (Jolaoso *et al.*, 2012). Foaming

capacity is important for flour used in many leavening food products such as baked food items, cakes and biscuits (Nithiyantham *et al.*, 2013). The seed flour can be an alternative intermediary product, which can be stored and utilized both for value addition and to blend with other grain flours without affecting the functional and sensory profile of the final product. The jackfruit seed flour may also be blended with wheat flour to explore the potential of low cost flour from jackfruit seed as an alternative raw material for bakery and confectionary products.

METHODOLOGY

The materials and methods used for research are recorded as follows.

Material:

The main raw material in this research are coconut milk residue and jackfruit seed flour which is incorporating in wheat flour by replacing different levels.

Treatment details:

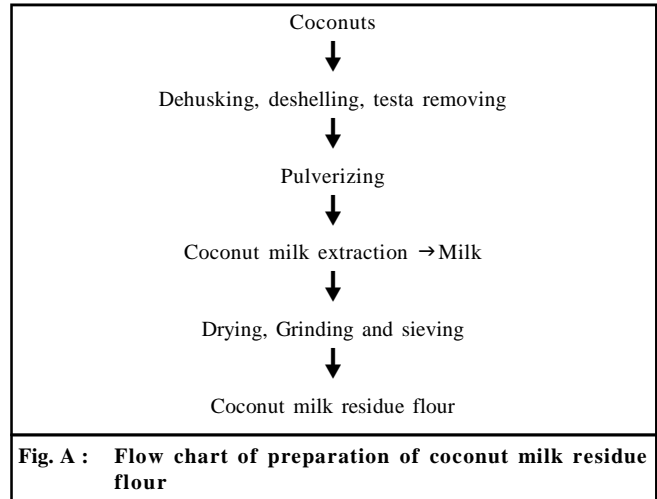
Details of different treatments for making of coconut milk residue and jackfruit seed enriched biscuits.

In 215.5 g of sample for all of treatments sugar, fat were taken as 50 g each. Whereas water and essence were 10 ml and 3 ml, respectively. The baking powder was taken as 2.5 g. Whereas sugar, fat, water, baking powder and essence was taken as 50, 50, 10, 2.5 and 3g, respectively in all treatment.

Preparation of coconut milk residue flour:

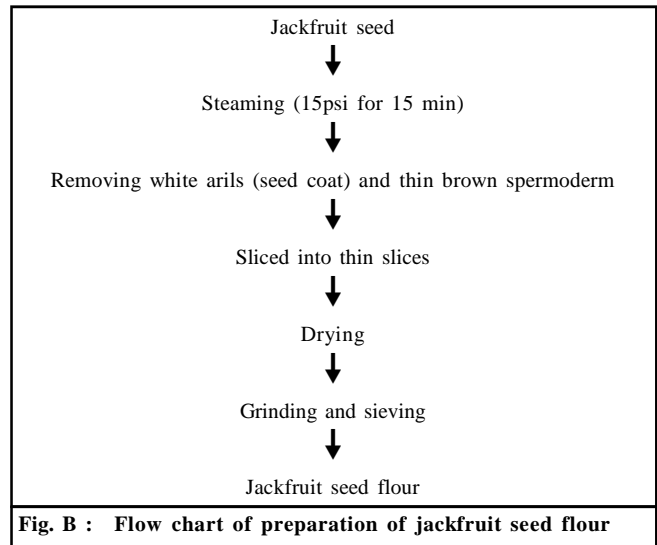
Coconut milk residue is by-product after coconut milk extraction. To prepare coconut milk residue we had take some new fresh coconut. The coconut are dehusked, deshelled and after testa is removed. Then the testa removed coconut are pulverized and milk is extracted from the pulverized coconut. The coconut milk extract is dried in dryer for 70°C. The dried coconut milk residue is grinded and sieved then we got a coconut milk

residue flour. Flow chart of preparation of coconut milk residue flour is as follow:



Preparation of jackfruit seed flour:

Fresh jackfruit seed are taken from local market. Then jackfruit seed are steamed for 15 psi for 15 minutes. The outer white aril and inner brown endosperm of jackfruit seed is removed by manually. Then jackfruit

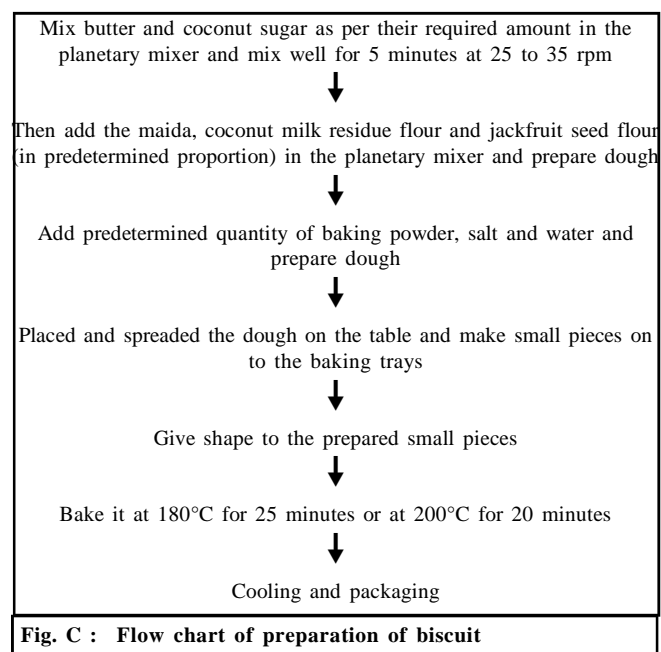


Material %	Different treatments												
	Temperature 180°C						Temperature 200°C						
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈	T ₉	T ₁₀	T ₁₁	T ₁₂	T ₁₃
Refined flour	100	50	50	50	50	50	50	50	50	50	50	50	50
Coconut milk residue flour	0	50	40	30	20	10	0	50	40	30	20	10	0
Jackfruit seed flour	0	0	10	20	30	40	50	0	10	20	30	40	50

seeds are sliced into thin size manually. The sliced jackfruit seed are dried at 70°C for 5-6 hrs. The dried jackfruit seeds are grinded and sieved then we got jackfruit seed flour. Flow chart of preparation of jackfruit seed flour is as follow:

Biscuit making process:

The coconut milk residue flour and jack seed flour was utilized in the preparation of convenience food like biscuits at different proportions to ascertain the acceptable level of incorporation. The biscuit are baked at two temperature 180°C and 200°C in microwave oven at convection mode. The wheat flour, fat, salt, baking



powder and coconut sugar were procured from local market. Procedure for making biscuit is as follow:

Physical analysis of biscuits:

Biscuit diameter:

Diameter (D) of biscuits was determined by using vernier caliper.

Biscuit thickness:

The thickness (T) of the biscuits was determined by using vernier caliper.

Biscuit spread ratio:

Biscuit spread was determined from the diameter and thickness, using the following formula:

$$\text{Spread} = \frac{D}{T}$$

Sensory evaluation:

The biscuits were evaluated for organoleptic characters like appearance, colour, texture, taste, aroma and overall acceptability by scoring method using 9 point hedonic scale. The evaluation was achieved by selected partially judges from CPCRI institute. The judges were given a score card and requested to evaluate the biscuits. The most acceptable proportion of jack seed flour biscuit was considered for the consumer acceptability trail.

RESULTS AND DISCUSSION

The result includes physical parameters of biscuit, sensory evaluation result and result of proximate analysis of biscuit.

Table 1 : Physical parameters of biscuit

Treatment code	Diameter	Thickness	Spread ratio
T ₁	5.25	0.58	9.13
T ₂	5.25	0.65	8.07
T ₃	5.25	0.60	8.75
T ₄	5.25	0.58	9.13
T ₅	5.25	0.58	9.13
T ₆	5.25	0.6	8.75
T ₇	5.25	0.58	9.13
T ₈	5.25	0.60	8.75
T ₉	5.25	0.50	10.50
T ₁₀	5.25	0.50	10.50
T ₁₁	5.25	0.53	10.00
T ₁₂	5.25	0.55	9.54
T ₁₃	5.25	0.62	8.40

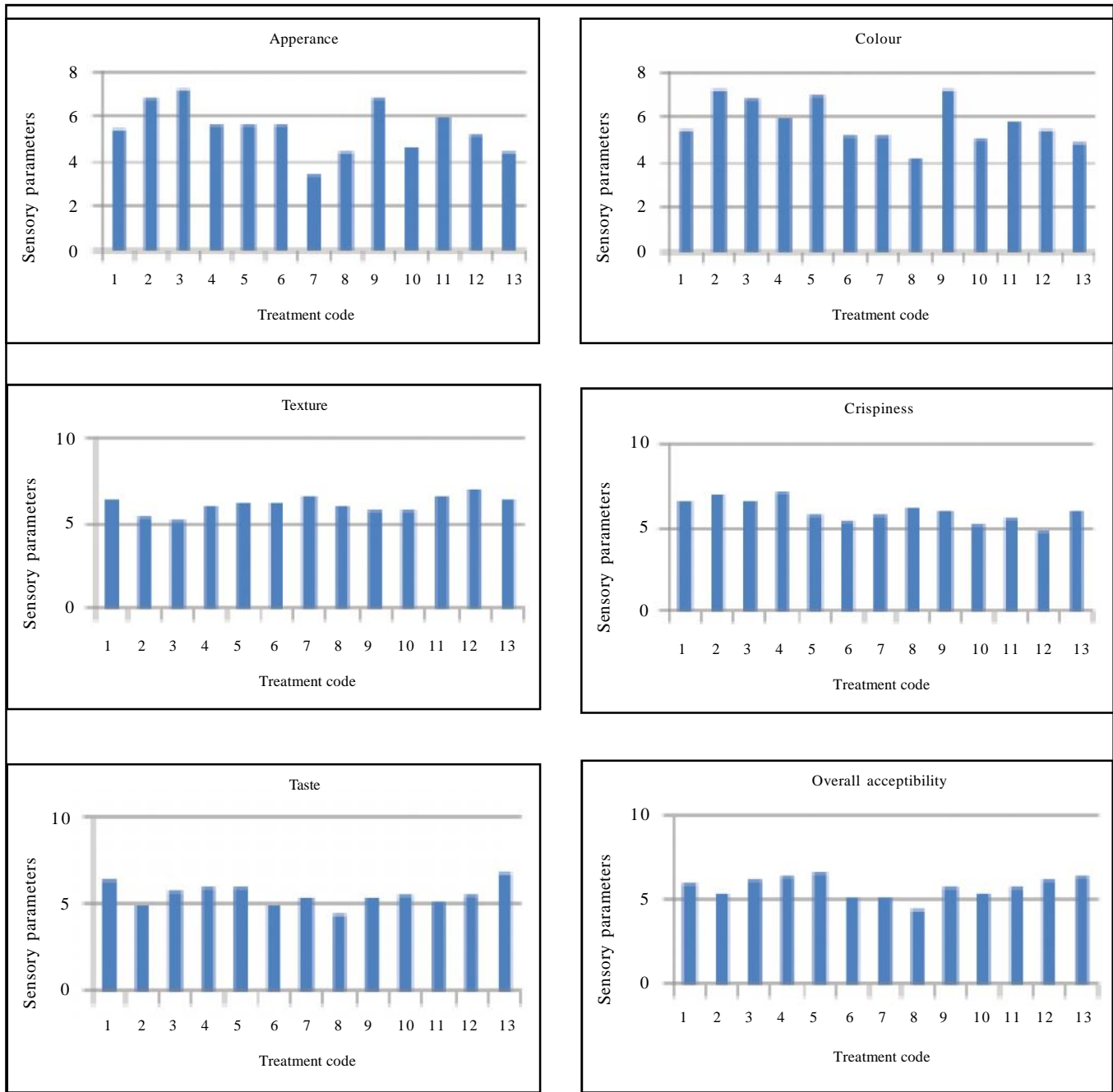


Fig. 1 : Sensory scores of coconut and jackfruit based biscuits

Physical analysis of biscuit:

The physical parameters of biscuits are diameter, thickness and spread ratio of the biscuit. The diameter and thickness is measured as per method described as in methodology. The observation of physical parameter is as follow:

Sensory evaluation of biscuit:

The colour 50 per cent coconut milk residue flour incorporated biscuits scored highest (7.2) value for its extremely good colour. Similarly, very good score (7.2) was recorded by 40 per cent coconut milk residue flour and 10 per cent jackfruit seed flour incorporated biscuits. Conversely, 40 per cent coconut flour and 10 per cent

seed flour based biscuits scored the similar value (7.2) for their very good appearance.

The 10 per cent coconut milk residue flour and 40 per cent jack seed flour incorporated biscuits recorded (7) good texture profile. The 50 per cent jackfruit seed flour based biscuits documented (6.6) moderately good texture.

The taste of 20 per cent coconut flour and 30 per cent jackfruit seed flour biscuits scored highest value of 7.5 compared to different levels of jack seed flour incorporated biscuits. The 30 per cent coconut flour and 20 per cent jackfruit seed flour based biscuits scored 7 for their good taste.

The overall acceptability of biscuits showed that, the 20 per cent coconut flour and 30 per cent jackfruit seed flour composite biscuits scored higher value (7) with very good acceptability. The 30 per cent coconut flour and 20 per cent jackfruit seed flour based biscuits recorded the value of 6.5 for its moderately good acceptability.

Conclusion:

From the present investigation, following conclusions can be drawn:

– Coconut milk residue can be effectively processed into flour.

– Coconut milk residue is good source of dietary fibre so we can improve digestibility of biscuit by adding coconut milk residue as flour.

– The seeds of jackfruit can be effectively processed into flour.

– Jackfruit seed flour can be incorporated to baked biscuits and cakes to enhance their organoleptic qualities like colour, flavour and taste.

– The biscuit composition of 50 per cent wheat flour, 20 per cent coconut milk residue and 30 per cent jackfruit seed flour is best combination among all treatments.

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