

Utilization of finger millets and soy flour in the preparation of papad

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■ Research chronicle : Received : 15.12.2014; Revised : 18.04.2015; Accepted : 30.04.2015

SUMMARY :

A popular wafer like product, papad was prepared by substituting black gram flour with finger millet and soy flour. Papad also known as appalam or papadam, a popular snack item of India, is essentially a thin wafer like product, that is consumed in roasted (dry) or deep fat fried from that resembles thin wafer. It is made into a circular shape with thickness generally varied from 0.3 to 2 mm and is dried by different means to a moisture level of 14–15 per cent. The study was also conducted to determine the chemical composition, texture and flavour of the papads. Five different types of papads were prepared T₀, T₁, T₂, T₃ and T₄ they are T₀ (control papad), T₁ (10% finger millet, 10% soybean, 80% black gram papad), T₂ (15% finger millet, 15% soybean, 70% black gram papad), T₃ (20% finger millet, 20% soybean, 60% black gram papad) and T₄ (25% finger millet, 25% soybean, 50% black gram papad). Sensory evaluation indicated that the overall acceptability scores of Finger millet and soy papad T₂ were highest for fried papad. Nutritional value of T₂ was also noticed to be higher when compared with control sample. The proximate analysis showed that the sample T₂ had moisture content of 10.20 per cent, protein content of 27.12 per cent, fat content of 3.21 per cent, ash content of 1.81 per cent and total carbohydrates content of 57.66 per cent, respectively. The prepared papads were packed in plastic bags. The shelf-life study of prepared papad indicate that papad can be stored up to two months. The study showed that different level of finger millet and soy flour can be incorporated to prepare papads.

KEY WORDS : Papad, Papad khar, Finger millet, Black gram, Proximate analysis

How to cite this paper : Rafat, Siddiqui, Ajmal, Mohammed and Aleem, Z. (2015). Utilization of finger millets and soy flour in the preparation of papad. *Internat. J. Proc. & Post Harvest Technol.*, 6 (1) : 41-47.

Snack foods have long been a part of diets both in developing and developed countries (Garg and Dahiya, 2003). Papad is a famous traditional snack

food of india which is generally made from dough of cereal/pulse/edible starch flour separately or in blends along with salt, spices, edible oil and additive, papad khar

- chemically a combination of carbonate, bicarbonates, sulfates and chlorides. Studies have reported possibilities of incorporating certain ingredients such as soy flour, cheese powder, cooked unripe banana and cooked colocasia into papads (Siddaraju *et al.*, 2008). Supplementation of legume flours with cereal flours has been reported to improve the nutritional value of mixture and products thereof (Garg and Dahiya, 2003). Some varieties of papads are made from vegetables, egg, jackfruit, banana or sweet potato and strimps have also been used in papad recipes (Chowdhury *et al.*, 2009). Supplementation of legume flours with cereal flours has been reported to improve the nutritional value of mixture and products thereof (Garg and Dahiya, 2003). Some varieties of papads are made from vegetables, egg, jackfruit, banana or sweet potato and strimps have also been used in papad recipes (Chowdhury *et al.*, 2009). Papads are roasted or fried and served as cocktail snacks and with meals. A variety of papads are made by the same procedure using other dals, pohe and even jackfruit. *Nerehappala* refer to rice papads. Fermented batter of soaked rice is used for the preparation of *Nerehappalaby* spreading the batter into thin circular disc shape in an oil smeared plate (Shwetha and Nirmala, 2012).

Finger millet, *Eleusine coracana* L., is also known as African millet, koracan, ragi (India), wimbi (Swahili), bulo (Uganda) and telebun (Sudan). It is an important staple food in parts of eastern and central Africa and India. It is the principal cereal grain in northern and parts of western Uganda and northeastern Zambia. Finger millet contains protein ranging from 6-14 per cent, fat 1-1.4 per cent, tryptophan, cystine, methioine, with high biological value crucial to health and growth and hence finger millet is an important preventative against malnutrition. The methionine level ranging around 5 per cent of protein – is of special benefit, noably for those who depend on plant foods for their protein or for use in

eaning foods and in many other cereal products (Sawant *et al.*, 2010).

Soyabean *Glycine max* belongs to the legume family. It is a remarkable source of protein for both animals and human consumption and is also a leading source of edible oils and fats (Sanful and Darko, 2010). Soybeans are rich in protein and are a cost-effective alternative to animals and fish as a source of dietary protein. Their oil content is higher than that of cereal grains and most other legumes, hence they are a good source of calories (Stauffer, 2008). Soybean is called meat of the field from ancient time. On average, dry soybean contains roughly 40 per cent protein, 20 per cent oil, 35 per cent soluble (sucrose, raffinose, stachyose, etc.) and insoluble (dietary fibre) carbohydrate and 5 per cent ash. Fresh soybean has approximately 14 per cent moisture. Lipid and protein are the two major components in soybean. Soybean oil is low in saturated fat, rich in the essential fatty acids and is an excellent source of vitamin E (Jooyandeh, 2011).

EXPERIMENTAL METHODS

The present investigation was carried out in M.I.P. College of Food Technology, Aundha, Hingoli during the academic year 2013-14. All necessary ingredients were procured from the local market of Hingoli and required machineries were available in the department of Food Science and Technology M.I.P. College of Food Technology, Hingoli (M.S.).

The flour of finger millets and the soya bean were prepared by traditional milling process. After flour preparation the papad was prepared.

Preparation of papads:

Finger millet flour, soybean flour and black gram flour were blended in different ratios. Additives like spice mix and salt were added and kneaded for 7-8 mins with

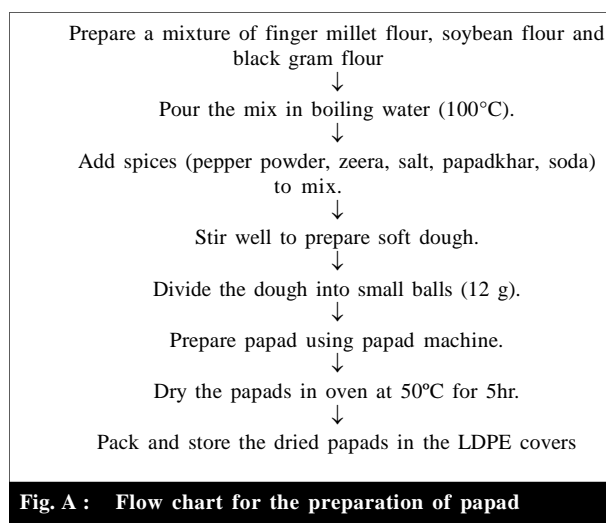
Table A : Formulation of papads

Ingredients	T ₀ (control)	T ₁	T ₂	T ₃	T ₄
Finger millet	0 g	10 g	15 g	20 g	25 g
Soybean	0 g	10 g	15 g	20 g	25 g
Black gram	100 g	80 g	70 g	60 g	50 g
Cumin	0.5 g	0.5 g	0.5 g	0.5 g	0.5 g
Black pepper	0.5 g	0.5 g	0.5 g	0.5 g	0.5 g
Oil	15 g	15 g	15 g	15 g	15 g
Salt	0.6 g	0.6 g	0.6 g	0.6 g	0.6 g
Water	50 ml	50 ml	50 ml	50 ml	50 ml

sufficient water to prepare dough. Dough was allowed to stand for 30 mins for development and was made into small balls weighing approx 10 g. The balls were pressed into flat discs of 10-12 cm with the help of roller pin. Black gram flour papads (control sample) were also prepared. Papads were dried in and packed in LDPE bag and stored. The flow sheet of the process is given below:

Papad :

Flow chart for the preparation of papad (Fig. A).



In the present study 5 different samples of papads were:

- T₀ (control papad),
- T₁ (10% finger millet, 10% soybean, 80% black gram papad),
- T₂ (15% finger millet, 15% soybean, 70% black gram papad),
- T₃ (20% finger millet, 20% soybean, 60% black gram papad) and
- T₄ (25% finger millet, 25% soybean, 50% black gram papad) (Table A).

All the proximate analysis of the prepared raw papad were done according to methods given by AOAC (1984). Physical properties like weight diameter expansion percentage frying time were tested in the respective department Vidyaleti *et al.* (2004).

The developed papads were fried and served to a group of 30 semi-trained panelist for the evaluation of colour, texture, taste, aroma and overall acceptability on

a 9 point hedonic scale with a scores ranging from 9-1 where scores 9 to 1 represented like extremely and dislike extremely, respectively was used for evaluating the developed papad.

EXPERIMENTAL FINDINGS AND ANALYSIS

The findings of the present study as well as relevant discussion have been presented in Tables 1 to 5 and Fig. 1 and 2.

Sensory analysis :

The mean acceptability score obtained by the sensory evaluation of papadare in Table 1. Among different variations of papads, control papad has got 8.6 followed by T₂ *i.e.* 8.7 and least score to T₄ *i.e.* 6.8. The variation sample T₂ was selected to be good.

Table 2 proximate composition of raw materials :

The moisture, protein, fat, ash and total carbohydrate content of finger millet were 9.7 per cent, 8.125 per cent, 1.4 per cent, 0.98 per cent and 79.795 per cent, respectively. The moisture, protein, fat, ash and total carbohydrate content of soybean were 8.26 per cent, 33.125 per cent, 19.56 per cent, 3.78 and 35.28, respectively. The moisture, protein, fat, ash and total carbohydrate content of black gram flour were 9.65 per cent, 22.5 per cent, 1.4 per cent, 0.9 per cent and 63.55 per cent, respectively.

Proximate composition of papad :

In the present study 5 different samples of papads were T₀ (control papad), T₁ (10% finger millet, 10% soybean, 80% black gram papad), T₂ (15% finger millet, 15% soybean, 70% black gram papad), T₃ (20% finger millet, 20% soybean, 60% black gram papad) and T₄ (25% finger millet, 25% soybean, 50% black gram papad). The proximate composition of these papads is a follow:

Moisture content :

The moisture content of 5 different papad samples processed with different levels of finger millet flour, soybean flour and black gram flour was in the range of 10.38 to 10.12 per cent. The result showed in table that the moisture content gradually decreased due to increase of finger millet and soybean flour. The table also showed

Table 1 : Sensory evaluation of papads

Variation	Appearance (9)	Colour (9)	Flavour (9)	Texture (9)	Taste (9)	Overall acceptability (9)
T ₀	8.3	8.9	8.5	8.4	9	8.6
T ₁	8.0	8.1	7.8	8	8.1	8
T ₂	8.8	8.3	8.9	9	8.7	8.7
T ₃	7.5	8	7.5	8	7.8	7.7
T ₄	7	6.5	7	7.5	6	6.8

Table 2 : Proximate composition of finger millet, soybean and blackgram

Sr. No.	Nutrients	Finger millet	Soybean	Blackgram
1.	Moisture	9.7	8.26	9.65
2.	Protein	8.125	33.125	24.5
3.	Fat	1.4	19.56	1.4
4.	Ash	0.98	3.78	0.9
5.	Carbohydrate	79.795	35.28	63.55

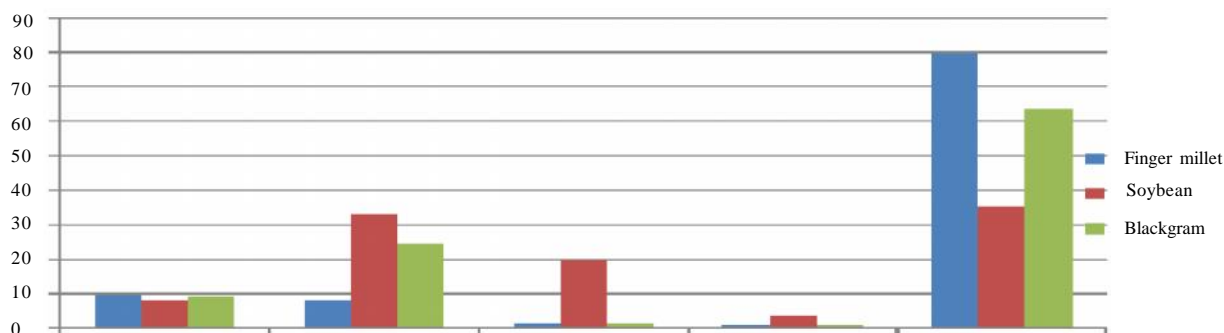


Fig. 1 : Proximate composition of finger millet, soybean and blackgram

Table 3 : Proximate composition of papads

Sr. No.	Papad samples	Moisture (%)	Protein (%)	Fat (%)	Ash (%)	Carbohydrates (%)
1.	T ₀ (control)	10.38	23.18	1.06	1.48	63.9
2.	T ₁	10.29	25.60	2.63	1.68	59.8
3.	T ₂	10.20	27.12	3.21	1.81	57.66
4.	T ₃	10.18	27.96	4.55	1.89	55.33
5.	T ₄	10.12	28.63	5.21	1.94	54.10

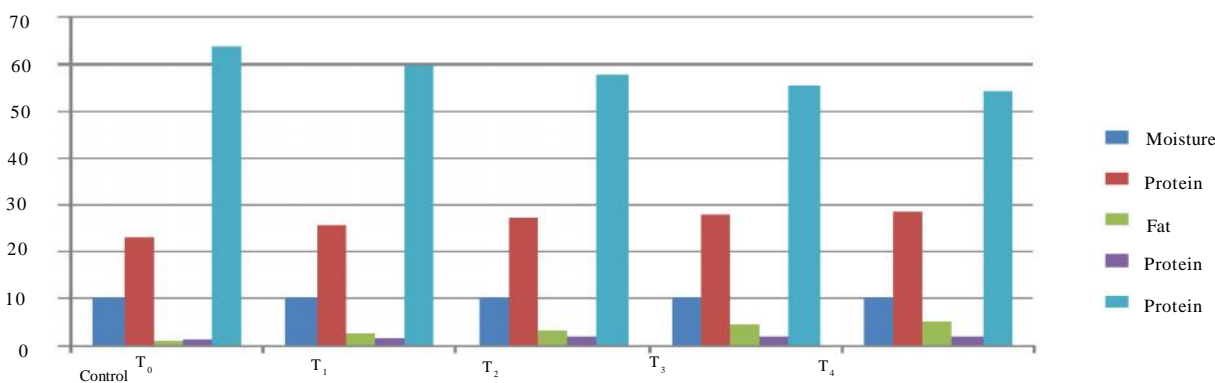


Fig. 2 : Proximate composition of papad

that the moisture content of control papad was higher than those of rest.

Protein content :

The protein content of 5 different papad sample T₀, T₁, T₂, T₃ and T₄ were 23.18, 25.60, 27.12, 27.96 and 28.63 per cent, respectively. The result also shows that the protein content was slightly increased due to increase of finger millet and soybean flour.

Fat content :

The fat content of processed papad samples T₀, T₁, T₂, T₃ and T₄ were 1.06, 2.63, 3.21, 4.55 and 5.21 per

cent, respectively. From table, it is evident that the fat content of finger millet and soybean papad and control papad were different. Fat content was the highest (5.21%) in sample T₄ and the lowest (1.06%) in sample T₀, which was control sample.

Ash content :

The ash (minerals) content of different papad samples T₀, T₁, T₂, T₃ and T₄ were 1.48, 1.68, 1.81, 1.89 and 1.94 per cent, respectively. The maximum ash was found in sample T₄ and lowest in sample T₀ (control). Increased addition of finger millet and soybean flour in different samples gave increased ash content

Table 4 : Physical properties of papads

Variations	Wt. of papads (g) (10)	Diameter of papad (cm)	Frying time (sec)	% Expansion
T ₀	79	14.5	10	4.5
T ₁	81	14	12	4.5
T ₂	80	15	11	4.6
T ₃	78	14	11	4.5
T ₄	83	13.5	12	4.5

Table 5 : The effect of storage time the papads

Period of storage (days)	Papad sample	Moisture %	Texture	Flavour	Remarks
0	T ₀	10.38			
	T ₁	10.29			
	T ₂	10.20	Crisp	Good	Good
	T ₃	10.18			
	T ₄	10.12			
15	T ₀	10.40			
	T ₁	10.32			
	T ₂	10.28	Crisp	Good	Good
	T ₃	10.24			
	T ₄	10.17			
30	T ₀	10.35			
	T ₁	10.37			
	T ₂	10.25	Crisp	Good	Good
	T ₃	10.26			
	T ₄	10.23			
45	T ₁	10.43			
	T ₂	10.41			
	T ₃	10.34	Crisp	Good	Good
	T ₄	10.27			
	T ₀	10.44			
60	T ₁	10.47			
	T ₂	10.56	Less Crisp	Good	Fair
	T ₃	10.30			
	T ₄	10.42			
	T ₀	10.35			

of samples.

Total carbohydrate content (by difference) :

The total carbohydrate content of different samples T₀, T₁, T₂, T₃ and T₄ were 63.9, 59.8, 57.66, 55.33 and 54.1 per cent, respectively. From table, it may be noted that the total carbohydrate content of papad (control) was higher than that of rest. The variations in the carbohydrate content among papad samples may result from the difference in the level of protein, fat, ash and moisture content.

Physical analysis of papad :

Storage study of papads :

The storage study of the prepared papad revealed

that the Papad can be use for eating up to two months without any detoreative effect on the sensory quality attributes particularly on the crispiness.

Conclusion :

It may be concluded that finger millet flour and soybean flour can be blended up to 15:15 ratio with black gram flour to prepare papad of good quality even though there is slight variation in nutrient composition. The protein and fat quality were improved due to the complimentary effect of millet and legumes. Papad prepared from finger millet and soybean was acceptable initially as well as storage period of 2 months. Hence, finger millet and soybean can be a good substitute in traditional product like papad and other similar product.

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