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# Effect of Addition of Various Proportion Finger Millet on Chemical, Sensory and Microbial Properties of Sorghum Papads

BUTTI PRABHAKAR\*, and D R MORE

College of Food Technology, Vasantrya Naik Marathwada  
Krishi Vidyapeeth, Parbhani, M.H.

### Abstract

This research work was conducted in the laboratory of College of Food Technology, Vasantrya Naik Marathwada Krishi Vidyapeeth, Parbhani to evaluate effect of addition of various proportion finger millet on chemical, sensory and microbial properties of sorghum papad. Papads were prepared from *Parbhani moti* sorghum variety by incorporating finger millet flour. Finger millet flour was added to sorghum flour as 10, 20, 30, 40, and 50% with other ingredients. Sorghum-finger millet papad was analyzed for proximate composition, organoleptic and microbial evaluation. The result revealed that Sorghum-finger millet papad prepared with 40% finger millet flour were found good acceptability with change in sensory and microbial properties of stored products.



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and Sorghum papad.

### Introduction


Sorghum [*Sorghum bicolor* (L.) Moench] popularly called as jowar, is the "king of millets" and is the fifth in importance among the world's cereals after wheat, rice, maize and barley<sup>1</sup>. Sorghum provides a good basis for gluten-free products and recommended as safe for celiac patients. Therefore, the future promise of sorghum in the developed world is for wheat substitution for people with celiac disease or allergies

to gluten<sup>2</sup>. Finger millet (*Eleusine coracana*) can be stored for long periods without insect damage and thus it can be important during famine<sup>4</sup>. It is rich in calcium, phosphorus and iron, the calcium content is higher than in the common cereals and millets.

Papad is indigenous traditional snack item with thin wafer like product prepared from variety of ingredients. These are generally made from blend of pulse flour, cereal flour and edible starches with

**CONTACT** Butti Prabhakar ✉ butti.prabhakar@gmail.com 📍 College of Food Technology, Vasantrya Naik Marathwada Krishi Vidyapeeth, Parbhani, M.H.

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other ingredients. A variety of papads are available in India, which are produced from a great diversity of ingredients<sup>8</sup>. Generally, cereal papads are prepared from gelatinized flour prepared of soaked grains. The present study illustrated the chemical and physical analysis and organoleptic studies of papads prepared from Sorghum-finger millet flour.

### Materials And Methods

Sorghum variety Parbhani Moti and Finger millet were procured from Sorghum Research Station Parbhani, Maharashtra. Refined vegetable oil, papad khar and spice mix were procured from local market. Chemicals (analytical grade), glass wares, equipments like domestic mixer (for grinding of sorghum and finger millet grains), texturometer (Stable Micro System TAXT 2 plus), colour measuring instrument–Colorflex EZ, cabinet drier, required during experiments were used from laboratory.

Freshly prepared Sorghum-finger millet papads were evaluated for chemical, microbial characteristics and sensory judgments were made through rating products on a 9 point Hedonic scale. Microbial analysis was done to study the microbial quality of sorghum-finger millet papad by using pour plate technique. The analysis was done at the interval of one month after the preparation of sorghum-finger millet papad with concentration of Papad Khar was kept as constant.

### Standardization Of Formula For Preparation Of Sorghum-Finger Millet Papad

Standardization of formula (ingredients in g/100g) for preparation of sorghum-finger millet *papad* was formulated by maintaining variations in *Parbhani Moti*, finger millet compositions and by maintaining constant compositions of other ingredients (*Papad khar*, black pepper, sesame seeds and asafetida).

**Table 1: Standardization of formula (ingredients in g/100g) for preparation of sorghum-finger millet papad**

Particulars	Formula No.1	Formula No. 2	Formula No. 3	Formula No. 4	Formula No. 5	Formula No. 6
Sorghum	100	90	80	70	60	50
Finger millet	0	10	20	30	40	50
Papad khar	2	2	2	2	2	2
Black pepper	0.1	0.1	0.1	0.1	0.1	0.1
Sesame seeds	2	2	2	2	2	2
Asafoetida	0.05	0.05	0.05	0.05	0.05	0.05

**Table 2: Nutritional composition of raw sorghum-finger millet papad**

Sr. No.	Sorghum-finger millet papads	Moisture (%)	Fat (%)	Protein (%)	Carbohydrate (%)	Ash (%)
1	S0 (100:00)	9	1.05	12.64	76.77	0.54
2	S1 (90:10)	9.01	1.01	11.78	77.52	0.68
3	S2 (80:20)	9.14	0.98	10.93	78.12	0.83
4	S3 (70:30)	9.21	0.94	10.08	78.8	0.97
5	S4 (60:40)	9.22	0.91	9.22	79.53	1.12
6	S5 (50:50)	9.25	0.88	8.39	80.21	1.27
Mean		9.1	0.9	10.5	78.4	0.9
SE ±		0.2582	0.0073	0.0064	0.0263	0.0064
CD (P=05)		0.7783	0.022	0.0195	0.0793	0.195

**Results And Discussion****Nutritional Composition Of Papad**

It is observed from table.2 that moisture content was range from 9 to 9.25 %, fat (0.88 to 1.05 %), protein (8.39 to 12.64%), carbohydrate (76.77 to 80.21%) and ash (0.54 to 1.27%). The maximum values for moisture, fat, protein, carbohydrate and ash were 9.25, 1.05, 12.64, 80.21 and 1.27 %, respectively whereas, minimum values were 9, 0.88, 8.39, 76.77 and 0.54 %, respectively.

**Effect Of Finger Millet On Mineral Content Of Papad**

The mineral composition of the raw sorghum-finger millet *papad* was analyzed and it indicates calcium content of control ( $S_0$ ) was 3.35 mg/100g, but the calcium content for  $S_1$ ,  $S_2$ ,  $S_3$ ,  $S_4$  and  $S_5$  *papad* were 21.3, 45.27, 78.4, 111.6 and 144.8 mg/100g, respectively. Iron content of control ( $S_0$ ) was 3.2 mg/100g, but the iron content for  $S_1$ ,  $S_2$ ,  $S_3$ ,  $S_4$  and  $S_5$  *papads* were 3.27, 3.32, 3.41, 3.47 and 3.54

**Table 3: Mineral composition of raw sorghum-finger millet papad**

Sr. No.	Particulars	Mineral (mg/100g)	
		Calcium (Ca)	Iron (Fe)
1	Parbhani Moti grains	3.33	11.32
2	Finger millet grains	344	3.9
3	S0 (100:00)	3.35	3.2
4	S1 (90:10)	21.3	3.27
5	S2 (80:20)	45.2	3.32
6	S3 (70:30)	78.4	3.41
7	S4 (60:40)	111.6	3.47
8	S5 (50:50)	144.8	3.54
	SE $\pm$	0.135	0.0263
	CD (P=05)	0.4068	0.0793

**Table 4: Evaluation of colour of papad**

Sorghum-finger millet papads*	L*	a*	b*
S0 (100:00)	36.58	0.23	9.57
S1 (90:10)	34.05	5.6	9.04
S2 (80:20)	21.34	4.54	6.42
S3 (70:30)	24.4	4.74	5.51
S4 (60:40)	23.11	3.92	4.58
S5 (50:50)	23.19	2.76	1.91
SE $\pm$	0.0711	0.0398	0.0057
CD (P=05)	0.2143	0.1202	0.0174

Note: Each value is a mean of three determinations

**Table 5: Microbial quality of papad**

Sr. No.	Storage period (months)	Total bacterial count (CFU/g)	Total yeast and mould count (CFU/g)
1	1 month	1.1 x 10 <sup>2</sup>	1.5 x 10 <sup>2</sup>
2	2 months	4.2 x 10 <sup>2</sup>	3.2 x 10 <sup>2</sup>
3	3 months	5.7 x 10 <sup>2</sup>	5.2 x 10 <sup>2</sup>

and surface growth

mg/100g, respectively. Results indicated that calcium and iron content increase with increasing the finger millet concentrations and similar results were found

**Table 6: Mean sensory score values for the papads prepared from three days soaked grains**

Sorghum-finger millet papads	Appearance	Colour	Flavour	Taste	Texture	Overall acceptability
S0 (100:00)	8.3	9	8.3	8.4	8.1	8.3
S1 (90:10)	7.1	7.6	7.7	8.1	7.9	8.1
S2 (80:20)	7.5	7.4	7.5	7.8	8.2	8.1
S3 (70:30)	7.3	7.1	7.1	7.9	8.1	8.2
S4 (60:40)	7.4	6.9	7.6	7.6	8.3	8.4
S5 (50:50)	7.5	6.9	7.6	7.9	8.1	8.2
Mean	7.36	7.18	7.5	7.86	8.12	8.2
SE ±	0.073	0.2772	0.3619	0.28	0.1678	0.1169
CD (P=05)	0.22	0.8356	1.0907	0.86	0.5059	0.3523

Note: Each value is a mean of three determinations

by others<sup>7</sup>. It may be concluded that finger millet and sorghum were rich sources of calcium (Ca) iron (Fe) those could act as a source of dietary mineral (Ca and Fe) and hence in fortification of food stuffs<sup>4</sup>.

#### Effect Of Finger Millet On Colour Of Papad

Colour of the *papads* is important parameter for the acceptability of the papad. The color of the papad showed variation based on the replacement of finger millet. The L\*, a\*, b\* values are shown in table 4. The L\* correspond to lightness decreased gradually as finger millet concentrations increased. The positive values of b\* indicates yellowness was decreased as finger millet concentration increased. However a\* value indicates redness of papad was gradually increased as finger millet concentrations increased because of the red hue of grain coating of finger millet. It can be concluded from the results that finger millet contributes much to color values of the product. L\*, a\*, b\* Values are means of three replicates, control 0 g/100 g. Values in the same column with different letters are significantly different at  $p < 0.05$ .

L\*, a\* and b\* values of the sorghum millet papads were compared with L\*, a\* and b\* values of standard white reference tile. L\* (lightness), a\* (redness and greenness) and b\* (yellowness and blueness) values of the standard white reference tile are 97.67, 0.08 and 1.54, respectively<sup>5</sup>. In sorghum and finger millet, phenolic compounds, particularly anthocyanins and

condensed tannins are major contributors of colour of the grains<sup>1</sup>.

#### Effect Of Storage On Microbial Quality Of Papad

Samples of sorghum-finger millet *papad* with three months storage period tend to have higher mean bacterial counts  $5.7 \times 10^2$  CFU/g than those with two months  $4.2 \times 10^2$  CFU/g and one month  $1.1 \times 10^2$  CFU/g.

Total yeast and mould counts were highest  $5.2 \times 10^2$  (CFU/g) in three months stored *papad* than two months  $3.2 \times 10^2$  (CFU/g) and one month  $1.5 \times 10^2$  CFU/g. There was growth of molds on the surface of papad with three months storage period. The growth of bacteria, yeast and mould were in increasing order as storage period increased. As the results showed that three months stored *papad* samples were contaminated by bacteria, yeast and mould due to increase in moisture content in *papads* with increase in storage period<sup>3</sup>.

#### Organoleptic Evaluation Of Papad

Mean appearance scores ranged from 7.1 to 8.3. S<sub>0</sub> papad scored highest appearance score (8.3). Mean colour scores ranged from 6.9 to 9.0. S<sub>0</sub> papad scored maximum colour scores (9.0). The mean flavour scores ranged from 7.1 to 8.3. S<sub>0</sub> *papads* scored higher flavour scores (8.3).

The mean taste score ranged from 7.6 to 8.4. S<sub>0</sub>

papad scored highest taste scores (8.4). The mean overall acceptability scores ranged from 8.1 to 8.4 with mean of 8.22. S<sub>4</sub> papad scored highest overall acceptability.

Sorghum papads incorporated with different proportions of finger millet were organoleptically evaluated and the best one (sample S<sub>4</sub>) was selected and result was in accordance with results of other study<sup>6</sup>.

### Conclusion

It is concluded that the chemical properties like moisture content was ranged from 9 to 9.25 %, fat (0.88 to 1.05 %), protein (8.39 to 12.64%), carbohydrate (76.77 to 80.21%) and ash (0.54 to 1.27%). Calcium and iron content increase with increasing the finger millet concentrations. Three months stored papad was contaminated by bacteria,

yeast and mould due to increase in moisture content in *papads* with increase in storage period. Sorghum papad (S<sub>4</sub>) prepared with 60% sorghum flour and 40% finger millet flour was selected based on organoleptic analysis.

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### References

1. Awika, J.M. and Rooney L.W. Sorghum phytochemicals and their potential aspects on human health. *Phytochemistry*, vol. **65**: pp.1199-1221 (2004).
2. Bogue, J. and Sorenson D. The Marketing of Gluten-free Cereal Products. *Gluten-free Cereal Products and Beverages, Elsevier Inc*, New York, pp.393-412 (2008).
3. Chandru R., Ranganna, B., Palanimuthu V., Munishamanna K.B. and Subramanyam, S. Biochemical and microbial changes associated with storage of value added ready to cook finger millet flour. *Mysore Journal of Agriculture Science*, pp.255- 259 (2010).
4. FAO. Sorghum and millets in human nutrition. FAO Food and nutrition Series No. 27. Rome, Italy: FAO. 64 pp (1995).
5. Ganjloo, A., Rahman R.A., Bakar., Osman A. and Bimkr M. Modelling the kinetics of Peroxidase inactivation and colour changes of seedless guava (*Psidium guajava* L.) during thermal treatments. *World Applied Science Journal* . Vol. **7**(1), pp:105-112 (2009).
6. Nazni, P. and Pradheepa S. Physico-chemical analysis and organoleptic evaluation of papads prepared from jowar millet flour. *International Journal of Current Research*. Vol. **3**, pp.033-037 (2010).
7. Usha, A., Sripriya, G. and Chandra, T.S. Changes in carbohydrate, Free amino acids, organic acids, phytate and HCL Extractability of Minerals during germination and fermentation of finger millet (*Elusine coracana*). *Food Chem.* vol. **58**: pp.345-350 (1997).
8. Veena, B., Reddy B. S. and Sunand Sharan. Effect of Incorporation of Soy Flour on the Quality of Papad. *Journal of Biology, Agriculture and Healthcare* Vol. **2**(5) (2012).