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Formulation and organoleptic evaluation of legume blend papad

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Abstract

In the present study papad were prepared by incorporating moth bean in black gram in different variations by keeping in view the nutritional value of moth bean. The prepared papad were then evaluated for sensory characteristics. The result of sensory evaluation showed that sample T₃ which has 70% of black gram, 30% of moth bean and additional 20 g of spice mix was well accepted. The proximate composition of selected (T₃) legume blend papad showed that moisture content varied from 5.72±0.12%, fat 5.37±0.25%, protein 18.68±0.18%, ash 7.22±0.08%, crude fiber 0.7±0.1% and carbohydrate 62.64±0.19%. The mineral result revealed that the selected sample has zinc 1.77, iron 4.2, potassium 683, phosphorus 376 and calcium 223 mg/100 g which was higher compared to the control sample.

Keywords: Legume, papad, nutritional composition, mineral content, sensory evaluation

Introduction

Papad is a conventional Indian snack item that is scrumptious and is often served as a side dish with meals and as crackers in soups. In current years, it has won recognition as India's precise contribution to worldwide menu. Papads are often ate up after roasting or frying and have a flavour similar to crunchy wafers. The papad industry in India is primarily a cottage industry and was specifically started for the social welfare of women by women empowerment. (Awalgaonkar *et al.*, 2015) [3,4].

Black gram are regarded as a one of the most good source of high-quality protein having healthy digestibility and are also rich in dietarily important minerals and water-soluble vitamins (Vadgave, 2010) [14]. Black gram (*Vigna mungo* L.) belongs to family Fabaceae sub family Papilionaceae, is being grown as one of the principal pulse crops. Black gram in India is a highly valued pulse which contributes a wonderful taste to South India dish like 'Vada' and 'Dal makhni' of North India. It contains on average 10.9% moisture, 24% protein, 1.4% fat, 0.9% fibre and 59.6% carbohydrate as main component (Sharon *et al.*, 2015) [10,11].

Black gram consists of moisture 10.7%; carbohydrates: 57.06%; protein: 23.7%; fat: 1.5%; crude fibre: 0.7%; and ash: 3.3% and mineral composition of black gram accounts of calcium, phosphorus, and iron each 138, 370, and 3.7 mg/100 g, respectively (Kamboj and Nanda, 2017) [6]. Black gram papad is a commercial product in India, and there are wide variations in its quality (Senthil *et al.*, 2006) [9].

Moth bean grains have 9.6 mg of iron per 100 grams, 24.1% protein, 0.8% crude fiber, 3% ash and 1.3% fat (Fatema *et al.*, 2011) [5]. One of the legumes that can withstand a dry spell is moth bean (*Vigna aconitifolia* L.). It is a member of the Fabaceae family, which is frequently cultivated in dry and semiarid environments. The resilient moth bean, also known as matki, mat bean, dew bean or Turkish gram. Rajasthan, the driest state in India, contributes over 86% of the nation's acreage to moth bean cultivation (NAS, 1979) [8].

Moth bean contains 23.7 gram of protein, 2.8 gram of fat, 3.0 gram of ash, 10.3 gram of moisture, 4.3 gram of fibre, 8.3 gram of iron, and 1.8 gram of vitamin C per 100 grams respectively (Singh *et al.*, 2018) [15].

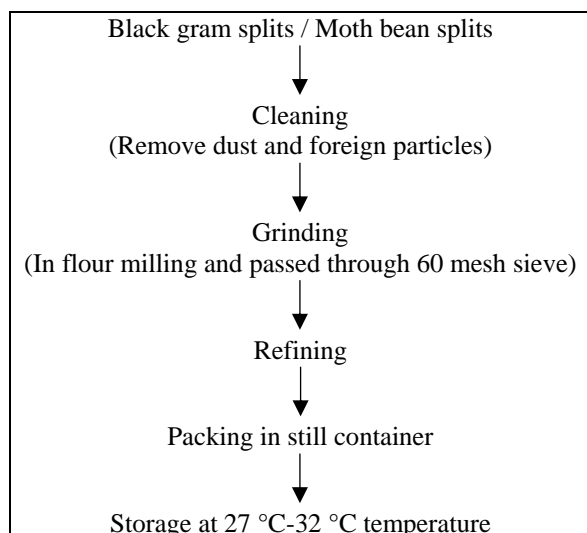
Materials and Methods

Raw Materials

Raw materials required during present investigation were procured from local market of Parbhani such as black gram splits, moth bean splits, black pepper powder, edible common salt, edible oil, papadkhar, compound asafoetida etc.

Preparation of Black gram flour (BGF) and Moth bean flour (MBF)

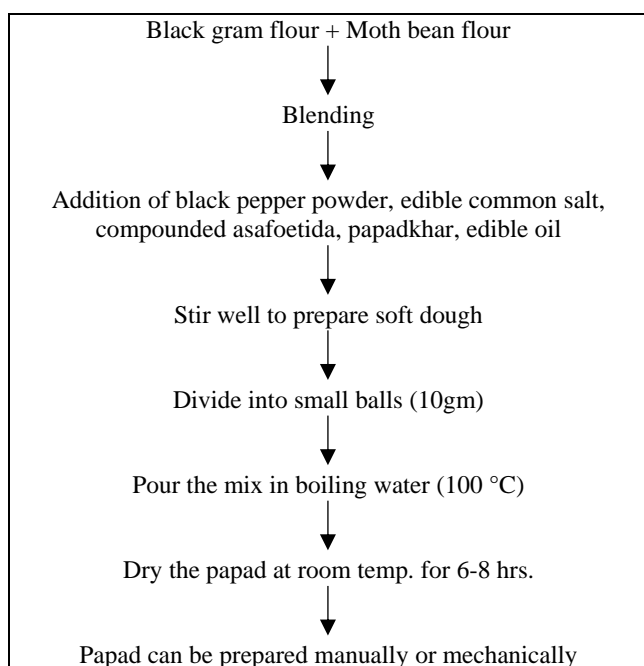
The clean and healthy seeds of black gram splits and moth bean splits were taken for preparation of Black gram flour (BGF) and Moth bean flour (MBF). The seeds were dehulled in order to separate out hulls and dal. The split dhal obtained was finely ground in a flour milling and passed through a 60-mesh size sieve as shown in flowing flow sheet 1.



Flow sheet 1: Preparation of Black gram and Moth bean flour

Preparation of legume blend papad

Black gram flour (BGF) and Moth bean flour (Moth bean) were combined in various combination with constant components such black pepper powder (0.5 g), edible common salt (0.5 g), compounded asafoetida (0.5 g), edible oil (15 ml), and papadkhar (3.5 g) listed in Table 1. The dough is then divided into small balls of 10 g each and kneaded with the addition of water (50 ml) to create papads of the same size. The detailed approach utilised to prepare legume blend papad is shown in flow sheet 2 below, according to the method given by Siddique *et al.*, (2015) [16].



Flow sheet 2: Preparation of legume blend papad

Different formulation of legume blend papad

Legume blend papad with incorporation of moth bean in black gram with constant spice mix including black pepper powder, papad khar, edible common salt and edible oil. Similar formulations for papad prepared from black gram and garden cressseeds were also formulated by Talpade *et al.*, (2018) [13]. In the control sample of moth bean splits were not incorporated. The formulation for the five samples are presented in Table 1.

Table 1: Different formulation of legume blend papad

Treatments	Black gram	Moth bean	Spice mix
T ₀	100	0	20
T ₁	90	10	20
T ₂	80	20	20
T ₃	70	30	20
T ₄	60	40	20

Sensory evaluation

The papad samples were subjected to sensory evaluations by 10 semi trained panelists using 9-point Hedonic scale (from 1=extremely dislike to 9 = extremely like) was used to determine the preference in Appearance and colour, taste, texture, flavor and overall acceptability. (as per method given by Laura *et al.*, 2013) [7].

Proximate composition

Proximate analysis of legume blend papad were analysed including moisture, fat, protein, carbohydrate, crude fiber, ash and mineral by the method given by AOAC, 2005 [6].

Mineral analysis

A defatted sample weighing two gram was kept at 550 °C. On a heated plate, strong hydrochloric acid (HCL) was then used to digest the resulting ash. The digested material was then filtered using Whatman No. 42 filter paper, and the final volume was made to 100 ml with distilled water. This volume was then utilised for analysis of Fe, Cu, Zn and Mn using atomic absorption spectroscopy.

Result and Discussion

Sensory evaluation

Sensory evaluation of legume blend papad was carried out with the help of trained and semi trained panel members using the 9-point Hedonic scale. The mean score of different organoleptic characteristics of the legume blend papad with prepared product for the formulations are summarised in the Table 2.

Table 2: Sensory evaluation of legume blend

Sample Code	Sensory Attributes					Overall Acceptability
	Appearance	Colour	After Taste	Flavour	Texture	
T ₀	8.5	8.6	8.3	8.7	8.5	8.5
T ₁	8.2	8.2	8.0	8.4	8.2	8.2
T ₂	8.5	8.5	8.5	8.5	8.0	8.4
T ₃	9.0	8.8	8.9	8.8	8.7	8.8
T ₄	8.4	8.4	8.4	8.2	8.2	8.3
SE±	0.0745	0.0680	0.1210	0.1162	0.1083	0.1621
CD at 5%	0.2192	0.2193	0.3668	0.3383	0.3090	0.4863

Data given in table 2 showed that sensory evaluation of fried papad prepared with addition of different level of moth bean splits viz., 10, 20, 30 and 40 percent respectively. There was significant effect of incorporation of popped sorghum flour on colour, texture and taste of papad. Data revealed that there was highest overall acceptability score (8.8) for the T₃ sample with compare to control. For the parameters like color, flavour and texture sample T₃ showed the highest score. While sample T₁ showed the lowest score for all the parameters with overall acceptability score (8.2).

Proximate analysis

Proximate composition helps to analyse the nutritional composition of the sample. Proximate composition of the selected (T₃) sample was carried out and parameters like moisture, protein, fat, carbohydrate, crude fiber and ash content were evaluated. The obtained results are presented in the table 3 as below.

Table 3: Proximate composition of selected sample

Chemical parameter %	*Value/100 g
Moisture	5.72±0.12
Fat	5.37±0.25
Protein	18.68±0.18
Ash	7.22±0.08
Crude fiber	0.7±0.1
Carbohydrate	62.64±0.19

*Each value represents the average of three determinations

According to the data of Table 3 the sample T₃ consist of moisture 5.72±0.12%, fat 5.37±0.25%, protein 18.68±0.18%, ash 7.22±0.08%, crude fiber 0.7±0.1% and carbohydrate 62.64±0.19%. Results for chemical composition of papad were similar with finding reported by Agrawal *et al.*, (2016) [1].

Mineral composition

The minerals like zinc, magnesium, iron and copper were analysed for all the samples and the obtained data is summarized in the Table 4.

Table 4: Mineral composition of selected sample

Minerals	*Value Mg/100 g
Zinc	1.77
Phosphorus	376
Iron	4.2
Potassium	683
Calcium	223

The mineral values of sample T₃ with respect to zinc, phosphorus, iron, potassium and calcium are observed 1.77, 376, 4.2, 683 and 223 mg/100 g, respectively. Finding for mineral composition are in accordance with results of Talpade, 2018 [13].

Conclusion

In light of the fact and figures of the present investigation it can be finally concluded that black gram and moth bean contains essential nutrients like carbohydrates, fats, protein, dietary fiber and essential minerals make it potential ingredients in formulation of papad. Papad prepared using 30% moth bean and 70% black had highest sensory value

which signifies that along with being nutritious it also can be a tasteful appetizer.

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