

STUDY ON THE EFFECT OF PRESERVATIVE ON THE STORAGE QUALITY OF SPICED PAPADS

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ABSTRACT

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The experiment was conducted in the Postharvest Technology Division under Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur during 2005-2006 to optimize the preservative for safe storage of spiced papads preparing from blended flours of 50% blackgram and 50% mungbean. The post-processing development of contaminating microorganisms present in stored spiced papads was controlled effectively with 100ppm, 200ppm, 300ppm and 400ppm of potassium meta-bi-sulphite (KMS). Among these preservatives, 200ppm KMS showed better sensory quality attributes in respect of colour, flavour, texture and taste during four months of storage at room temperature.

Keywords: Spiced papad, sensory evaluation, microbial infestation

INTRODUCTION

Papad is one of the popular snack items and widely consumed in most of the country. It is consumed either as such often frying or roasting or as adjunct along with vegetable soups and curries. In Bangladesh, papad is consumed after often frying. It is usually made from a blend of cereal flour, edible starch and pulse flour with common salt, spices, edible oil, alkaline and mucilaginous additives (Miaruddin, *et al.*, 2006). Some varieties of papads are made from vegetables, egg, jackfruit, banana or sweet potato and strimps have also been used in papad recipes. The main varieties of papads are those made from i) blackgram (spiced/unspiced), ii) mungbean (spiced/unspiced), iii) lentil (spiced/unspiced), iv) Rice flour and v) Potato. The market survey revealed that papads are mainly prepared from blackgram dhal, blends of blackgram and mungbean, rice flour or blackgram and lentil. Microbiological safety and quality of food depend on the control of food poisoning and food spoilage organisms and condition that may kill them or prevent their development during production, processing, preservation and marketing (Tiwari and Grewal, 1999). In some cases, where the processing facilities are either inadequate or lacking, the microflora may increase in number with subsequent handling, resulting in food borne infections to the consumer (Barrett, 1986). Mould growth was observed in Indian commercial papads at about 18 percent moisture level (Bahasubrahmanyam *et al.*, 1960). Balasubrahmanyam *et al.*, 1974) studied the factors responsible for changes in colour and pH of papads during storage under accelerated conditions. Use of fumigation in the prevention of insect infestation and mould growth in South Indian papads was reported by Narasimhan *et al.*, 1972). The present study was undertaken to optimize the preservative for safe storage of spiced papads preparing from blended flours of blackgram and mungbean.

MATERIALS AND METHODS

The experiment was conducted in the Postharvest Technology Division under Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur during 2005-2006. Good quality blackgram (*Phaseolus mungo* L.) and mungbean (*Vigna mungo*) procured from local market, were ground in a commercial hammer mill into flour, and then sieved through 80 mesh. Fifty per cent blackgram and 50% mungbean flours were used to prepare papads. Common salt, Spices (cumin seeds, black pepper, asafoetida, red chilli powder), Sodium carbonate, Refined mustard oil/ Refined vegetables oil (Soya bean), Yoghourt and Kattely were used as raw materials in all treatments. Those were purchased from local market. Different levels of potassium meta-bi-sulphite (KMS) were also used as a preservative as per following treatments-

T₁= Mixed flour with 0ppm KMS

T₂= Mixed flour with 100 ppm KMS

T₃= Mixed flour with 200ppm KMS

T₄= Mixed flour with 300ppm KMS

T₅= Mixed flour with 400ppm KMS

Preparation of dough

One hundred parts blended mixed blackgram and mungbean flour (1:1) with 8 parts common salt, 1.2 parts cumin seeds, 2.0 parts black pepper, 0.1 parts, asafoetida, 0.8 parts red chilli powder, 1.0 part sodium carbonate, 5-8 parts

yoghurt and 0.1 part kattely were kneaded with required amount of water (33-42 ml) to prepared dough of optimum characteristics. Refined mustard oil 4-5 parts were added during kneading and rolling. Kneading time (manual kneading) for papads varied from 7-8 minutes.

Rolling of papads and drying

Dough was divided into small balls of 12-16 g and rolled on circular plate having smooth surface with a wooden pin (roller) to give disc of about 0.8–0.9 mm thickness and 12-14 cm diameter. Papads were dried in the sun to a desired moisture level and packed in polypropylene bags and stored them at ambient temperature for evaluated the quality after every 2 months.

Estimation of moisture and protein

The percent of moisture in the sample was estimated by the standard procedure as recommended by Hall (1970) and the percentage of protein ($N \times 6.25$) present in the samples was determined by Microkjeldhal method as recommended by the AOAC (1980).

Physico-chemical characteristics of papads

Physico-chemical analyses (pH, quality characteristics) of papads prepared from mixed blackgram-mungbean flour were carried out by using ISI methods (1972).

Sensory evaluation of papads

Raw (dried) papads and those fried in refined vegetables oil (soybean) at $190 \pm 5^{\circ}\text{C}$ were examined by a panel of judges comprising of scientific staff as per the method described by Govindarajan *et al.*, (1972) for their quality parameters like color, aroma, taste, texture and overall acceptability. For statistical analysis of sensory data, a 1-9 point hedonic scale was used to assess the degree of acceptability of papads. The highest score is 9 'like extremely' and 'dislike extremely' is the lowest score of 1. The data were analyzed for ANOVA in completely randomized design (CRD) under computerized statistical methods of M-stat and least significant difference (LSD) was used to compare the means. The results were evaluated by Analysis of variance and Duncan's New Multiple Range Test procedures of the Statistical Analysis System (SAS, 1985).

RESULTS AND DISCUSSION

Effect of chemical composition and microbial infestation of stored papads

Data presented in Table 1 revealed that the moisture content of papads packed in polyethylene bags slightly decreased in T₁, T₂, T₃, T₄ and T₅ for the first two months of storage and it was 11.20%, 11.30%, 11.25%, 11.15% and 11.27% respectively. After the next two months, it was slightly increased in all treatments. This may be due to variation in atmospheric relative humidity that ranged from 42 to 65% during first two months and 55-85% during next two months of storage period. The initial protein content in T₁, T₂, T₃, T₄ and T₅ was observed 23.26%, 23.25%, 23.27%, 23.22% and 23.29% respectively, after the next two months, it was observed 23.27%, 23.26%, 23.29%, 23.25% and 23.30% respectively. There was very little changed in protein content during four months of storage at room temperature. Initially the pH was found 7.5, 7.5, 7.6, 7.7 and 7.7 in T₁, T₂, T₃, T₄ and T₅ respectively. The pH of the papads was gradually decreased in all treatments during storage periods. From the Table 2, it was observed that all the treatments were free from insect and microbial infestation up to two months of storage. After four months of storage T₁ (aspergillus) and T₂ (bacteria) were infested by micro organism. The other treatments were free from insect and microbial infestation up to four months of storage (Table 2).

Table 1. physico chemical parameter of spiced papads during storage

Treatments	Moisture (%)			Protein (%)			pH		
	0 m	2 m	4 m	0 m	2 m	4 m	0 m	2 m	4 m
T ₁	11.30	11.20	11.37	23.26	23.27	23.26	7.5	7.2	7.0
T ₂	11.35	11.30	11.40	23.25	23.26	23.25	7.5	7.3	7.0
T ₃	11.32	11.25	11.39	23.27	23.29	23.28	7.6	7.3	6.9
T ₄	11.27	11.15	11.35	23.22	23.25	23.24	7.7	7.4	7.2
T ₅	11.35	11.27	11.39	23.29	23.30	23.30	7.7	7.4	7.2

Note: m=Month

Table 2. Microbial infestation of stored papads

Treatments	Storage period (month)		
	0	2	4
T ₁	-	-	+ a and + b
T ₂	-	-	+ a and + b
T ₃	-	-	-
T ₄	-	-	-
T ₅	-	-	-

Note: a = aspergillus, b = bacteria

Quality characteristics and sensory evaluation of spiced papads

Spiced papads samples were evaluated for quality parameters such as visual colour, texture and odor by panel presented in Table 3. Mixed dhal flour with 200ppm KMS was performed yellowish colour with crispy and dissolving texture and good appetizing and rest of them developed off flavour. The effect of KMS on sensory test parameter for stored papads revealed that it had a positive effect (Table 3). From the visual observation of papads, it was found that addition of KMS improving the colour of the papads. Data present in Table 4 revealed that the T₃ (8.25) had the higher score for overall acceptability considering colour, flavour, texture and taste followed by T₄ (7.32) and T₅ (7.23).

Table 3. Quality characteristics of spiced papads

Treatments	Colour	Texture	Odor
T ₁	Light brown	Hard and brittle	Off flavour
T ₂	Straw yellow	Hard and brittle	Appetizing
T ₃	Yellowish	Crisp and dissolving	Appetizing
T ₄	Deep brown	Hard and brittle	Slight off flavour
T ₅	Deep brown	Brittle and dissolving	Slight off flavour

Table 4. Sensory evaluation of fried papads after four months of storage

Treatments	Colour	Flavour	Texture	Taste	overall acceptability
T ₁	5.63 ^c	6.77 ^c	7.22 ^a	7.22 ^b	6.81 ^c
T ₂	6.68 ^b	7.25 ^b	7.20 ^a	7.12 ^c	7.02 ^b
T ₃	7.69 ^a	8.35 ^a	7.58 ^a	8.59 ^a	8.25 ^a
T ₄	7.29 ^a	7.35 ^b	7.33 ^a	7.26 ^b	7.32 ^b
T ₅	7.02 ^a	7.33 ^b	7.20 ^a	7.32 ^b	7.23 ^b

CONCLUSION

In conclusion, it may be stated that the addition of KMS (200ppm) with equally mixed blackgram and mungbean dhal flour gave papads of acceptable quality for 4 months of storage at room temperature. No micro organism was grown in stored papads. It was fully safety to consumer.

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