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Studies on Development, Quality Evaluation and Packaging Materials on the Storage Stability of Snack Food (SEV)

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Abstract

Study was conducted on development, quality evaluation and storage stability of snack food prepared by using different proportions of multipurpose flour (wheat flour, gram flour and cowpea flour). The main objective of fortification of cowpea flour in the wheat and gram flour was to increase nutritional value of snack food. The cowpea flour was mixed in different proportion (10, 20, and 30%) and then samples were evaluated at the beginning and at interval of 15, 30, 45, 60, 75, and 90 days for chemical, sensory and microbiological analysis in order to study the storage stability of the product. It was found that storage stability of 20% cowpea packed in combination film CF sample C20 snack food had the adequate and standard amount of fat content 29.04 to 22.04, protein content 14.08 to 14.01, free fatty acid (FFA) 0.15 to 0.37 and given maximum acceptability of the product.

Keywords: Sev, Packaging materials, Storage, Physiochemical analysis, sensory analysis.

1. Introduction

Ready-To-Eat Snacks and Namkeen are generally considered as take away food and usually preferred as hunger quencher and are eaten whenever the consumers are hungry. The sev snack preparation is mainly composed of wheat flour, rice flour and enriched by gram flour. Indian snack food industry comprises of many Indian as well

as MNCs. The Indian snack food market is of the order of 400,000 tones. This wide range of products is categorized under potato/Banana chips, Namkeen and Fun Foods. In India the consumption of snacks food is increasing day by day. Size and shape are most important aspect for acceptability, convenience in use, and cognizance of provenance, decorative nature and so on, that they considered jointly. The packaging of food is one of the prime requisites to improve and monitor the producer to consumer food production system. It forms an integral part of manufacturing process providing the link between the processor and the consumer. In fact, it plays a dominant role in the total food manufacturing activity and in marketing sector. Snack food have to be packed in attractive packaging so as to given impression of wholesomeness and freshness to increase sales appeal and it should be hygienic. With growing concern of diet, weight control and general health, government bodies are recommending to the peoples and making a conscious effort to eat healthier, natural snacks such as fruit, vegetable, nuts and cereal grains while avoiding high-calorie, low-calorie nutrient junk food. In light of above discussions, a study on the development of snack foods was undertaken from multipurpose flour (MPF) wheat flour, gram flour and cow pea flour.

2. Materials and Methods

The snack food was formulated by taking different combination of multipurpose flour (MPF). Quality of snack food was evaluated on the basis of nutritional, physio-chemical and sensory characteristics. The experimental setup and detailed methodology are being described below.

2.1 Materials Used

The wheat flour, gram flour, cowpea flour, spices, refined oil, salt and various types of packaging materials such as HDPE and metalex foil pouch (CF) packaging material were used.

2.2 Experimental setup

A number of equipments and apparatuses were required. These included sev making machine, digital pH meter, electronic balance, heat sealing machine, hot air oven and Soxhlet apparatus.

2.3 Evaluation of Physico-chemical properties of Snack Food

pH, moisture, fat content**,** protein content**,** ash content, free fatty acid (FFA), of snack food samples were evaluated. Some formulae are:

$$Fat\ content(\%) = \frac{Weight \text{ of fat in the sample}}{Weight\ of\ the\ sample} X100$$

$$N(\%) = \frac{(Sample - blank)X14Xvolume \text{ made up digest}}{Aliquot \text{ of digestXweight of sampleX1000}} X100$$

$$\text{Pr}otein \text{ content=6.25XN(\%)}$$

$$FFA(\%) = \frac{V\ X\ N\ X\ F}{W\ X 1000}\ X 100$$

W = weight of sample taken, V = volume of NaOH used for titration, N = Normality of NaOH solution

F = Equivalent weight (282g) of free fatty acid (oleic acid).

Evaluation of sensory characteristics: Sensory attributes including color, flavor, texture, taste and crispness of snack food were evaluated by Hedonic Ratting Test as recommended by Ranganna (1994). Hedonic Rating test was used for evaluation of sensory characteristics. Snack food samples were immediately packed in packaging material viz. high density polyethylene (HDPE) and combination film (CF) packaging material after preparation. Packaging material were sealed and stored at ambient temperature. The quality characteristics were evaluated for fresh and stored sample during ambient storage periodically after every 15^{th} days for 90^{th} days.

3. Results and Discussion

The sample of snack food prepared from only wheat and gram flour was regarded as control sample, while the remaining three samples were prepared by incorporation of different level of cowpea in same levels of MPF. The samples were named as H0, H10, H20, and H30 when packed in the HDPE packaging material, and C0, C10, C20 and C30 when packed in CF packaging material. It was found that the shape of snack food was thin cylindrical shape and the diameter of the sample was 1mm. The quality parameters were determined in the fresh condition and also periodically evaluated after every 15 days during ambient storage.

3.1 Physico-chemical properties of snack food samples (in fresh condition) prepared with different combination of MPF

The different physico- chemical properties of fresh snack food sample have been given in Table 1. The results of sensory evaluation revealed that all sensory attributes of all four-fried snack food samples in fresh condition were found between 8.1 to 8.5, 8.0 to 8.3, 7.9 to 8.3, 7.8 to 8.1, 7.4 to 7.5 and 7.9 to 8.3 respectively. It is also important to note that the OAA (over all acceptability) of all fried snack food samples namely A1, A2, A3 and A4 were found 8.3, 8.3, 8.1 and 7.9 respectively at fresh condition.

3.2 Effect of packaging materials and ambient storage on the quality of snack food samples

The snack food samples prepared from different combination of multipurpose flour incorporated with cowpea flour and were packed in two different packaging materials, HDPE and CF. The results of ambient storage study of moisture content, pH, fat content, FFA and protein content of all three samples have been presented in figure 1,2,3,4 and 5 respectively. It was concluded that incorporation of cow pea flour affected the moisture content of snack food samples. The increase in moisture content of snack food samples was slow. It was also concluded that packaging material also affected the moisture content of snack food sample. It was also concluded that the pH values of all snack food samples had slightly decreasing trend. Perhaps this was due to

hydrolysis/oxidation of fat to fatty acid. In advanced stage of oxidation, rancidity in food samples is developed. It is important to note that the pH decreasing rate was slightly more in the case of HDPE packaging than CF packaging. It was found that the decrease is slow in the case of snack food samples based on MPF and incorporated with CP than snack food sample based on only MPF. The main reason of decreasing fat content is oxidation of fat into fatty acids simultaneously with the time of storage. It was concluded that the fat contents of fried snack food samples packed in combination film packaging material decreased at lesser rate as compared to its counterpart samples packed in HDPE. FFA of all four-snack food samples was found to increase during three months of ambient storage. The increase in free fatty acid of control snack food sample H0 (A1 packed in HDPE) was found more during three month of ambient storage as compared to snack food samples. As cowpea flour has low fat content and moisture, which help in preventing oxidation of fat into free fatty acids due to its antioxidant property of cowpea flour. It was found that the FFA increased slowly for snack food samples packed in CF as compared to counterpart samples packed in HDPE. Protein value of snack food samples found higher than A1 due to high protein content of cowpea flour and this remains constant during 3months of ambient storage. Sensory attributes of all kind of snack food samples packed in two different packaging materials [HDPE (APS) and CF (APS)] were evaluated in fresh condition and after three-months of ambient storage. The sensory attribute of these different samples of snack food were in order C30>H30 >C20>H20>C10>H10>C0>H0.

Table 1: Physico-chemical properties of snack food samples.

Constituent	Sample code (Wheat flour: gram flour: cowpea flour)			
	A1 (1:1)	A2(1:1:10%)	A3(1:1:20%)	A4(1:1:30%)
Moisture content %	2.04	1.97	1.91	1.84
Fat content %	30.37	29.64	29.04	28.37
pH	7.71	7.57	7.57	7.54
Protein content %	12.64	13.94	14.11	15.14
Ash content %	3.14	3.61	3.84	4.10
FFA %	0.17	0.16	0.15	0.15

Table 2: Sensory Evaluation of Snack food values.

Sample code	Color	Flavor	Texture	Taste	Crispiness	Buying Intention	OAA
A1	8.5	8.0	7.8	8.3	7.4	8.3	8.3
A2	8.5	8.0	8.0	8.3	7.4	8.3	8.3
A3	8.3	8.2	8.0	8.1	7.4	8.1	8.1
A4	8.1	8.3	8.1	7.9	7.5	7.9	7.9

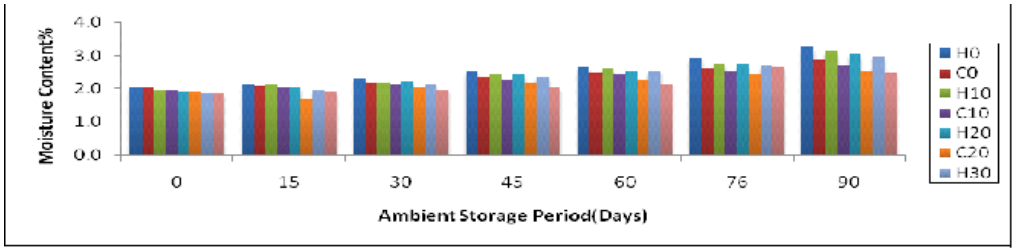

Fig. 1 Effect of packaging materials and ambient storage on moisture content of snack food samples prepared from different combination of MPF .

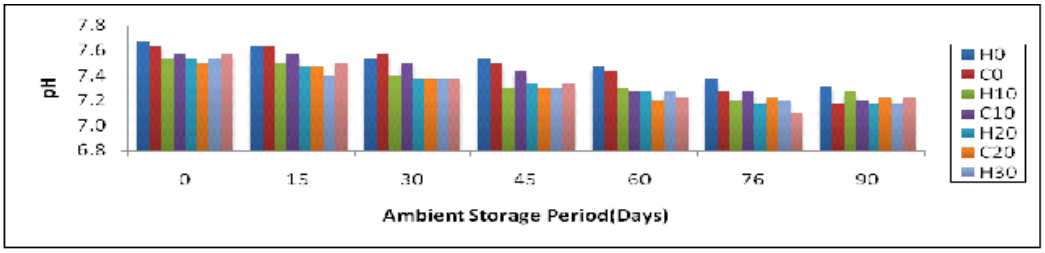

Fig 2 Effect of packaging materials and ambient storage on pH of snack food samples

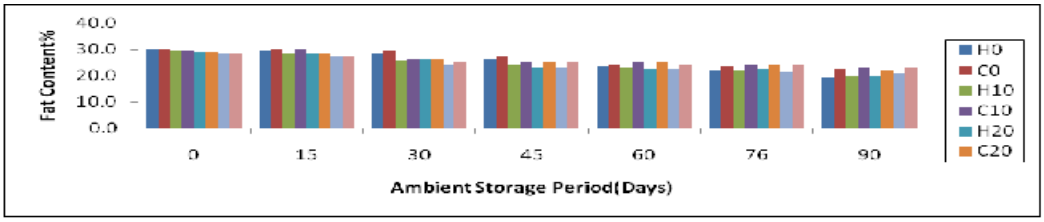

Fig 3 Effect of packaging materials and ambient storage on fat content of snack food samples

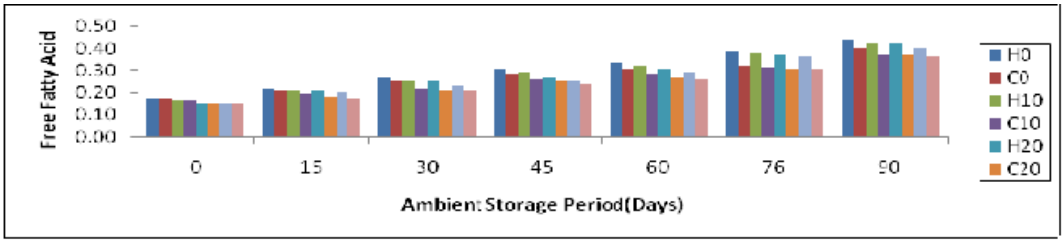

Fig 4 Effect of packaging materials/system and ambient storage on FFA of snack food samples

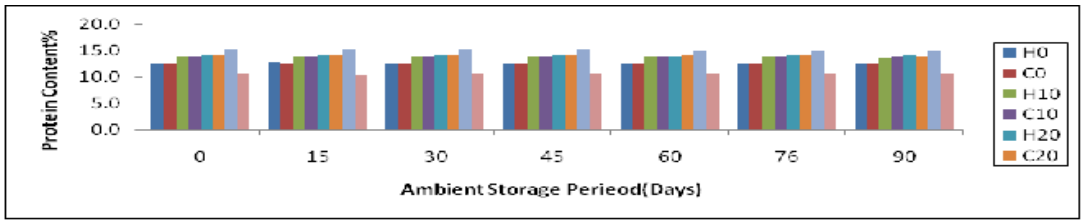

Fig 5 Effect of packaging materials/system and ambient storage on protein of snack food samples

Table 3: Effect of Packaging materials and ambient storage on sensory attributes of snack food prepared after 90 days of ambient storage.

Sample code	Color	Flavor	Texture	Taste	Crispiness	Buying intention	OAA
H0	7.6	7.1	6.8	6.8	6.5	6.8	7.1
C0	7.6	7.4	7.1	7.1	6.7	6.1	7.1
H10	7.7	7.3	7.4	7.0	6.6	7.0	7.3
C10	7.9	7.4	7.4	7.2	6.7	7.2	7.4
H20	7.7	7.4	7.2	7.2	6.6	7.2	7.3
C20	7.8	7.5	7.5	7.0	6.7	7.6	7.4
H30	7.3	7.6	7.3	6.7	6.6	6.7	7.4
C30	7.5	7.6	7.3	6.8	6.5	7.5	7.2

4. Conclusion

Snack food samples based on MPF and cowpea flour were found crisper in texture as compared to control snack food sample. The MPF and cowpea flour based snack food samples were found to be best in sensory quality. Thus based on ranking data, snack food samples exhibited a more suitable nutritional and sensory profile than control snack food samples. Combination film was found to be most suitable packaging material for maintaining quality of snack foods. The sensory evaluation of snack food samples established that colour, taste, texture, flavour and crispness of these snack food samples were acceptable to the panel and panelist awarded the comparative scores to different snack food samples. To conduct study on ambient storage behavior all four samples of snack food were packed in two different packaging materials viz. the sample H0,H10,H20 and H30 packed in high-density polyethylene (HDPE) and the sample C0,C10,C20 and C30 packed in combination film (CF) the with atmospheric packaging (APS). The snack food samples were rated as C20>C10>H20>H10>C30>H30>C0>H0 after 90 days of ambient storage. Thus these snack food samples could be of great help in improving the health snack food consumers by serving as good supplements and provide a new way of consumption of such legumes which cannot be consumed directly but has high nutritive value.

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