

Storage Characteristics of Apricot Incorporated Rice Based Extrudate

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ABSTRACT

The effect of storage on quality of apricot incorporated rice based extrudate packed in high density polyethylene bags at ambient temperature was examined. The extrudate using ingredients: broken rice flour and apricot powder in the proportion of 90:10 respectively was developed under optimized conditions of 15% moisture content, 450 rpm screw speed and 170°C barrel temperature. The stored extruded snack was evaluated for free fatty acids, total plate count and organoleptic attributes at an interval of 30 days for three months. During storage, it was observed that free fatty acid of the sample increased while overall acceptability decreased over time. The extruded snack showed no significant change in total plate count.

Key words: Apricot powder, Broken rice flour, Extrudate, Storage.

1. Introduction

Extrusion cooking being popular in the food sector can be used to create novel food products that might not be possible with other processing techniques such as ready to eat snack foods [1]. Extrudates have extended storage stability as they are microbiologically safe owing to low moisture thus need no refrigeration [2]. The rice brokens, a by-product of modern rice milling process, contain nutritive value similar to whole rice and are available readily at relatively lower cost. Rice flour due to its bland taste, attractive white colour, hypoallergenicity and ease of digestion is an attractive ingredient in the extrusion industry [3]. There is an increasing consumer demand for value added food products, especially fruit, vegetables and other functional foods [4]. Enrichment of extruded snacks with nutritionally valuable ingredients is increasingly practised by many studies, wherein the addition of protein and fibre rich ingredients like legumes or whey protein is leading, and the addition of fruits and vegetables is studied to a lesser extent [5]. Whilst the nutritional qualities of the products are a key consideration, the snack also needs to be acceptable to its target market. Acceptability of snacks mainly depends on the organoleptic properties, usually measured in terms of texture, taste and appearance [6]. Storage studies are an important parameter to analyse the quality characteristics and product behaviour during storage. It helps in analysing the shelf life of the product and estimating the "Best before date". Sensory studies of the product are as important as estimating the nutritional and quality parameters of the products. If a product is nutritionally superior but has less acceptability in terms of taste and flavour, then the product does not hold any commercial significance. The present investigation was carried out to determine the effect of packaging on keeping quality parameters viz free fatty acids, total plate count and overall acceptability of extruded snacks stored under ambient conditions for three months.

2. Materials and Methods

Paddy was milled in Division of *Food Science and Technology* using Rubber roller based rice mill. Rice brokens were ground in a lab mill (model 3303 perten, Sweden) to a fineness that passes through 200µm sieve. Dried apricot was ground into powder using grinder (*Black and Decker FG 550*). The blend of rice and apricot powder was extruded at pre-optimized conditions i.e. 15% moisture, 450 rpm screw speed and 170°C barrel temperature. The extrudate was stored in HDPE for three months. Extruded product was evaluated at an interval of one month for free fatty acids, total plate count and sensory quality.

Standard AOAC procedure was followed with slight modification for free fatty acid determination. Sensory evaluation of snacks was done by a panel of semi-trained judges using 5-point scale. Total plate count was studied by standard serial dilution plate count method using nutrient agar [7], Martin's lose Bengal agar [8].

3. Extrusion processing

The extrusion was performed using a co-rotating intermeshing twin screw extruder model BC 21 (Clextral, Firminy, France). The barrel consisted of four zones heated electrically. The temperature distribution inside barrel varied from low at the zone next to the feeding to high at zone next to die. Temperature of the 1st, 2nd, and 3rd was maintained at 20, 30 and 40°C, respectively, throughout the study; while the temperature in last zone (compression and die section) was varied. The extruder was equipped with torque indicator which showed percent of torque in proportion the current drawn by drive motor. The raw material was fed

into the extruder with a single-screw volumetric feeder. The extruder was thoroughly calibrated with respect to combinations of feed rate and screw speed to be used. The feed rate was varied for optimum functioning of extruder barrel corresponding to screw speed. Water pump injected water directly into extruder barrel to achieve desired moisture content of feed material. A cutter with four bladed knives and a die made of stainless steel were used for shaping the extrudates.

4. Storability of extruded snacks

4.1 Free fatty acids

The mean values of free fatty acids at the zero month and after 3 months were recorded as 0.009 to 0.014% respectively (Table 1). During storage, the free fatty acids showed a gradual increase. The increase in free fatty acids was within permissible limits. Increase in free fatty acids is due to deterioration of fat during storage by activity of lipase enzyme which split off the fat into free fatty acids and glycerol in the presence of catalyst like moisture, light and heat. Similar decrease in fat content in extruded snack due to development of rancidity because of lipid hydrolysis during storage was observed by Balfour *et al.* [9].

4.2 Total plate count

With the storage, not much difference in total plate count of extrudates was observed. The microbiological change as measured by TPC in the extruded snacks stored at ambient temperature condition did not show significant increase during storage period of 3 months. This indicates the extrudates were microbiologically safe during the storage period. These results are in alignment with those of Hussain *et al.* [10].

4.3 Overall acceptability

Organoleptic evaluation of the extruded product was carried out every month during storage. A slight decrease in overall acceptability of extruded snack product was observed during three months of storage. The sensory evaluation of extruded snacks revealed that colour, taste, texture, appearance and overall quality were in acceptable range during a storage period of three months

Table 1: Effect of Storage Period on Free Fatty Acids, Total Plate Count and Overall Acceptability of extruded Snacks

Storage period	Free fatty acids (%)	Total plate count (cfu/g)	Overall acceptability
0	0.009	0.00	4.60
1	0.010	0.00	4.40
2	0.013	3.00	4.10
3	0.014	5.00	3.90
CD($p \leq 0.05$)	0.010	0.482	0.084

5. Conclusion

Storage studies revealed that rice and apricot extruded products showed no significant changes in quality and overall acceptability during three months of storage. All the quality parameters were within acceptable limits. It can be concluded that rice based apricot incorporated extruded products are fit for consumption when stored in HDPE for three months.

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