

Microbiological Analysis of Ready to Cook Curry

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ABSTRACT

Due to urbanization, the changes in traditional family structure and busy lifestyle have influenced the eating pattern. Nowadays, a large number of people are shifting from rural to urban areas and this has been providing a huge impetus to prefer Ready to Cook (RTC) food products. The objectives were to solve the problems of production losses and fluctuation of vegetables prices. It can be overcome by drying the vegetables and by formulating a shelf stable product which can be stored longer and sold later on. Water is the most important factor for the high perishability of vegetables the simplest method of processing, is drying them in order to decrease their moisture content up to the level of 5 % and water activity 0.20, where microbial growth is not favorable. The preservation of vegetables has been done as dried product to overcome the problems associated with vegetables. The research project was conducted to develop such a ready to cook product which fits the busy lifestyle of people as well as does not compromise on part of their health. The materials and methods were as, ready to cook curry was prepared by washing, cutting, boiling (till vegetables gets soft) and blanching (5 min in 5% brine solution) and then drying five seasonal vegetables: carrot, peas, potato, cauliflower, beans in hot air dryer at 65±5°C for 10-12 hr. A standardized gravy mix powder (onion, garlic, spices and herbs) was used to add flavor. The results decided the serving size for one person i.e. sachet contained 25 g dried vegetables, 10 g gravy mix powder and 200 ml water was added. The recipe was finalized after trials. The curry was ready in approximately 5 minutes in pressure cooker. The conclusion was generated as, microbiological scores of the formulated product indicated that the product remained well acceptable up to 4 months when packed in LDPE pouches under atmospheric conditions. However, the shelf life of four months at 25°C for a dried product is by all means considered good by the general expectations of dried foods and keeping the quality of dried foods reported in the literature.

Keywords: Cook curry, Shelf life studies, Yeast and mould count, Sensory evaluation

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INTRODUCTION

Due to urbanization, the changes in traditional family structure and busy lifestyle have influenced the eating pattern. Nowadays, a large number of people are shifting from rural to urban areas and this has been providing a huge impetus to prefer Ready to Cook (RTC) food products. The problems of production losses and fluctuation of the vegetable prices on the market can be overcome if the vegetables are processed during the harvest period to increase their storage stability, so that they can be stored longer and be used or sold during the post-harvest period. Keeping in mind that, water is the most important factor for the high perishability of vegetables the simplest method of processing, is drying them in order to decrease their moisture content up to the level of 5 % and water activity 0.20, where microbial growth is not favorable.

Fruits and vegetables are pretreated by blanching them in boiling water or steam with subsequent cooling in water before drying. It stops the enzyme action which causes loss of

color and flavor changes during drying and storage. Blanched vegetables rehydrate much faster, are more tender, as they are already slightly cooked require less cooking time.

Drying of paneer has also been reported by to increase its shelf life [5]. A study was conducted on sensory and microbiological analysis of mushroom fortified biscuits[1]. The microbiological results indicated least bacterial and fungal count in 10% mushroom powder incorporated biscuits. The study conducted on guava fruit products, the microbial analysis revealed no fungal and microbiological growth on the developed product formulated using processed guava fruit[4].

A study was conducted on vegetable and fruit-based food products. This study showed that different processing methods are employed to increase the palatability of vegetables and fruits and also to increase their shelf life[3]. Reconstitution is achieved by soaking the dried product in hot water. Till now no attempts have been made to develop ready to cook curry from dried vegetables. Ready To reconstitute foods have an inherent benefit of decent shelf life, without refrigeration which makes them available at a large number of retail outlets and suitable for export market. Thus keeping in mind the changing lifestyle, increased need for RTC foods, the present study was carried out to develop nutritious RTC Curry from dried vegetables.

MATERIAL AND METHODS

Raw material and chemicals

The present study was conducted in the laboratory of the Department of Food Technology, GJUS&T, Hisar. Seasonal vegetables were selected i.e. Potato, carrot, beans, cauliflower, peas and procured from the local market. All chemicals used in the study were of analytical grade.

Pre-processing treatments

In present investigation, all the vegetables selected were fresh, firm, free from dust, blemishes, insect damage or mechanical injury. After that, all vegetables were washed with clean water, peeled and cut. Carrots were cut into slices with a thickness of 0.5 cm. Beans were cut with a length of 2 cm. Potato into the form of cubes. Each small branch of cauliflower was simply taken out. Peas were shelled.

In the next step, vegetables were divided into two lots. One was blanched in 5% brine solution for 5 min. After blanching the vegetables were dipped in cold water and excess water was removed with a filter paper. The second lot of vegetables was boiled until vegetables become soft.

Preparation of the product

The preparation of the product mainly consisted of making the dried vegetables [2] and preparing the dry blend of curry mix powder, in which rehydrated vegetables were to be put to make it a complete delicacy.

Microbiological analysis

Total viable count

The total number of viable bacteria in dried vegetables was enumerated by the standard plate count method using nutrient agar. The plates were incubated at $37 \pm 1^\circ\text{C}$ for 48 hours and after that enumeration was done.

Yeast and mould count

The yeast and mould count in dried vegetables were enumerated following the standard method for yeast and mould count using potato dextrose agar. The plates were incubated at $25 \pm 1^\circ\text{C}$ for 48 hours.

Shelf life studies

A newly developed product must have a fairly extended shelf life, so that product could withstand the long journeys during marketing and stay for a long time in the seller's shelf or in consumers household. The newly developed ready to cook curry from dried vegetables must have an extended shelf life at ambient temperature, owing to its dehydrated nature. A variety of spoilage changes are expected to occur in the product as the storage period progresses. These changes are temperature dependent, as already testified in the literature. However, considering the low water activity of the dried vegetables and curry powder in the dehydrated form, it is reasonable to expect a fairly good shelf life of the ready to cook product made with this technique. In this part of studies, the objectives were to evaluate the shelf life of the experimental product and to study the kinetics of chemical changes during

storage. For this purpose, the experimental product, i.e dried vegetables, and curry powder were packed in one LDPE pouch at room temperature. The product was evaluated on the basis of microbiological changes and sensory changes during storage after a period of 2 months interval.

Sensory evaluation

The prepared RTC of both lots were evaluated for its acceptability on a 9 point hedonic rating scale. Sensory evaluation of RTC curry was done by presenting approximately 25 g of hot reconstituted vegetables curry to semi-trained panelists selected from faculty of food technology department. Panel members were directed to judge each sample on basis of appearance, odor, taste and flavor to find the overall acceptability and indicate their degree of liking on a 9- point Hedonic scale.

Statistical analysis

The data generated during the formulation of RTC Curry were statistically analyzed using IBM SPSS software for Analysis of variance. Significant differences among the means of the samples for the chemical and physical measurements were determined by one way analysis of variance using Duncan's multiple range comparison at 95 percent of confidence.

RESULTS AND DISCUSSION

The present study was undertaken with a prime motive to develop a technology to preserve vegetables using a concept of low moisture foods. To make it as a complete convenience food, curry part was also included with it. In the course of designing of these products, several phenomenon's were expected to be understood and answered too. In order to realize such a necessity, the project was carried out in two phases, viz. basic studies and product development. In the former, some of the basic aspects such as drying behaviors, rehydration etc, that were hitherto unexplored, have been investigated. With the help of data so obtained, product development was preceded up to the stage of shelf life. Results obtained during the study are presented and discussed in this chapter.

Microbiological Analysis

The bacterial count (cfu/g) and mold count (cfu/g) of two samples at storage of 0, 2 and 4 months of storage intervals are presented in tables. The bacterial and mold count of different samples estimated after 24 and 48 hrs of incubation were found to be very low. This may be due to a lower moisture content of dried vegetables. However, the negligible microbial count may be due to contamination during handling of the samples, from the packaging material or environmental air.

Table 1: Effect of storage on bacterial count (cfu/g) of dehydrated vegetables

Sample	Zero Day	60 Days	120 days
Boiled	0.3×10^3	3×10^4	1.3×10^5
Blanched	1.3×10^3	2.6×10^4	3×10^3

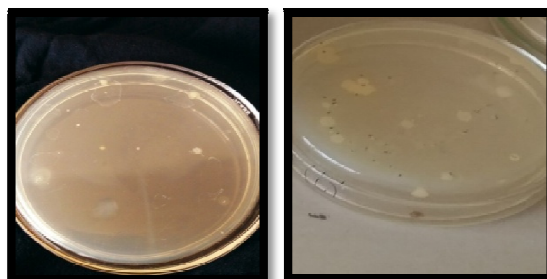


Fig 1: Bacterial count on 120 days in decimal fraction of 0.01 Sample A and Sample B

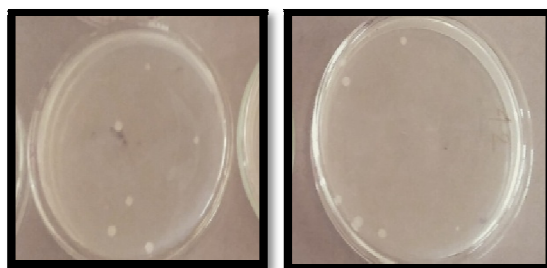


Fig 2: Yeast and Mould count in 120 days in decimal fraction of 0.01 Sample A and Sample B

Table 2: Effect of storage on yeast and mold count (cfu/g) of dehydrated vegetables

Sample	0 Day	60 Days	120 Days
Boiled	Nil	2.2×10^3	5.1×10^3
Blanched	9×10^3	1.3×10^4	2.3×10^5

Table 3: Sensory scores of RTC curry during storage at room temperature

Sensory Characteristics	Zero Day		60 Days		120 days	
	Boiled	Blanched	Boiled	Blanched	Boiled	Blanched
Appearance	7.4	8.1	7.1	7.9	6.9	7.8
Taste	7.1	8.1	6.9	8.0	6.6	7.8
Texture	7.9	8.1	7.6	7.7	7.4	7.4
Aroma	7.8	8.2	7.5	8.0	7.2	7.8
Overall Acceptability	7.7	8.1	7.2	7.9	7.0	7.7

Analysis of shelf life studies

Statistical analysis of the microbiological analysis for ready to cook product during storage (Table 3) reveals that sensory scores for all the attributes varied significantly ($P < 0.05$) with the progress of storage period. The temperature of storage had also significant effect ($P < 0.05$) on the sensory scores of the reconstituted product. The interaction between temperature and period of storage was also significant ($P < 0.05$).

Microbiological scores of the formulated product indicated that the product remained well acceptable up to 4 months when packed in LDPE pouches under atmospheric conditions. However, the shelf life of four months at 25°C for a dried product is by all means considered good by the general expectations of dried foods and keeping the quality of dried foods reported in the literature.

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CONFLICTS OF INTEREST

I declare that I have no conflicts of interest.

RESEARCH INVOLVING HUMAN PARTICIPANTS AND/OR ANIMALS

Not applicable.

INFORMED CONSENT

I gave the informed consent in writing.

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