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Standardization of process for preparation of instant Halwa Mix from unmarketable potatoes

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ABSTRACT

Unmarketable potatoes due to their small size are difficult to handle and so fetch low price to the growers and are considered as waste. The processing of unmarketable potatoes could prevent colossal losses, adds value to the produce and gives better returns to the growers. In present investigation, efforts were made to utilize unmarketable potatoes in preparation of instant Halwa mix. Physical properties of unmarketable potatoes and chemical properties of potatoes found to be acceptable in utilization of developing food product due to high carbohydrate content. Different Halwa recipes were analyzed for their organoleptic quality characteristics and economical feasibility. The results showed that good quality instant Halwa mix from unmarketable potatoes, with better sensorial quality could be prepared with economical feasibility.

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Key words : Potato powder, Instant Halwa mix, Sensorial quality

INTRODUCTION

Potato (*Solanum tuberosum* L.) belonging to family Solanaceae is one of the major tuber crops grown in India. Production of potato has made significant progress in recent years. The production of potato reached to 3439100 tonnes in India during the year 2009 (FAOSTAT, 2009). Despite the large production in India, the actual availability of potato is much lower due to wastage during harvesting and post-harvesting operations (Sagar *et al.*, 1996). Moreover, at farm level, it is not always preventable to produce high grade potatoes without the production of lower grade (unmarketable) potatoes. Unmarketable potatoes due to their small size are difficult to handle and so fetch low price to the growers and are considered as waste. Thus, the processing of unmarketable potatoes prevents colossal losses, adds value to the produce and gives better returns to the growers (Anand and Maini, 1979). Unmarketable potatoes available in the market during glut could be utilized more beneficially for the preparation of instant Halwa powder as well as some other instant products. There is urgent need to utilize unmarketable potatoes for the preparation of value added products. The purpose of this

study was to develop and evaluate potato powder as a instant and convenient food ingredient. In present investigation, the efforts have been made to develop potato powder as a convenient ingredient and to standardize the process of instant Halwa mix from this potato powder.

MATERIALS AND METHODS

The present investigation was conducted at the Department of Food Science and Technology, Rajiv Gandhi College of Food Technology, Parbhani.

Materials:

Unmarketable potatoes (below grade D) were procured from Vegetable Market, Parbhani in the month of September 2008. Other ingredients *viz.* sugar, cardamom, fennel, coconut, ghee and cashewnut were obtained from local market of Parbhani. All ingredients were used in powder form except *ghee*. The chemical used during present investigation were of analytical grade. Chemical and processing equipments *viz.*, stainless steel peeler, cabinet drier and mixer grinder, etc. were obtained from Department of Food Science and Technology, Rajiv

Gandhi College of Food Technology, Parbhani.

Physical properties of potato:

Different physical properties of potatoes *viz.*, length, breadth, average weight, average volume, shape, peeling loss and specific gravity were measured. Length and breadth were measured using vernier caliper, average weight was determined gravimetrically. Average volume was determined by water displacement methods. Shape was classified into different groups *viz.*, round, oval, flat and irregular. Specific gravity was determined by weight and water displacement difference technique.

Chemical composition of potato:

Standard methods were used in analysis of chemical properties of potato. Crude protein content was determined by MicroKjeldahl method while moisture and ash content was determined by standard method (AOAC, 1990). Total sugar was estimated by phenol sulphuric acid method (Sadasivam and Manickam, 1996). Crude lipids were determined by using Soxhlet apparatus (AOAC, 1990). The Ascorbic acid content was determined by dye method as detailed by Ranganna (1986).

Preparation of potato powder:

Potatoes were washed to remove the adhering soil particles followed by peeling with the help of stainless steel peeler. Peeled potatoes were sliced of 1-2mm thickness using hand operated stainless steel slicer. Peeled potatoes followed by slicing were directly put into 3% sodium chloride and 0.05% ascorbic acid to prevent enzymatic browning caused by polyphenol oxidase. Further, they were blanched at 80-85°C for 3 min. Slices were also treated 2000 ppm potassium metabisulphite (KMS) for 15 minutes, to prevent non-enzymatic browning. Further, treated slices were dried in mechanical dehydrator at 3 stage dehydration temperature to moisture content of 3-4%. The dried slices were grinded to fine powder using laboratory scale mixer blender. The prepared flour was packed into air tight container till further use.

Standardization of instant potato based Halwa mix:

Prepared potato flour was utilized in preparation of potato based Halwa mix. The recipes for the preparation of ready-to-serve potato based Halwa mix were worked out by frying/roasting potato flour in *ghee* followed by mixing of different ingredients like powdered sugar, cardamom, fennel, coconut and cashewnut in different proportions as summarized in Table 1.

Instant Halwa mixes based on higher sensory score were analysed for various quality attributes. The prepared

Ingredients	Treatments			
	A	B	C	D
Potato flour	45.4	39.6	40.7	41.2
<i>Ghee</i>	9.1	9.9	2.0	---
Sugar	36.3	43.6	48.9	57.6
Cardamom	0.680	0.369	0.610	---
Fennel	0.907	0.594	0.407	0.411
Coconut	6.802	3.96	6.10	---
Cashewnut	0.680	1.584	1.221	0.823

samples were evaluated for qualities on the basis of colour (appearance), texture, taste, aroma and overall acceptability on a 9- point Hedonic scale (Amerine *et al.*, 1965). The sensory evaluation of Instant Halwa Mix was done according to Randomized Complete Block Design (RCBD) as described by Mahony (1985).

Preparation of Halwa from potato based instant halwa mix:

The process of preparation of Halwa from potato based instant Halwa mix is summarized below.

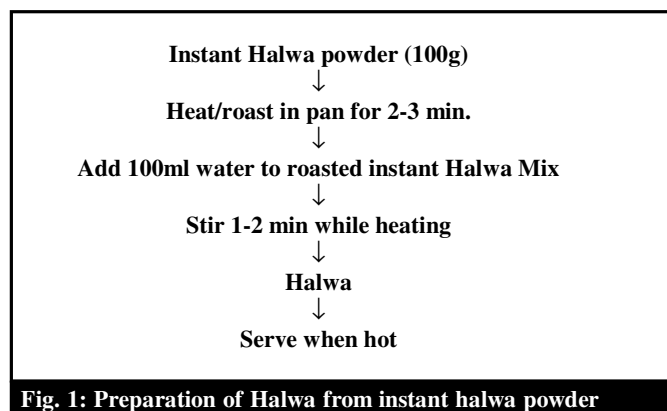


Fig. 1: Preparation of Halwa from instant halwa powder

RESULTS AND DISCUSSION

During the present investigation, sincere efforts were made to utilize unmarketable lower grade potato in preparation of value added product like instant Halwa mix. During the experiment, physical and chemical properties of potatoes were analyzed. The potato pulp was dehydrated, converted to powder and then utilized in preparation of instant Halwa mix. Further, Halwa was prepared for potato based instant Halwa mix and analyzed for its sensorial quality characteristics. The results obtained during the present investigation are summarized as follows:

Physical characteristics:

The physical characteristics of unmarketable potato

Table 2: Physical characteristic of potato

Sr. No.	Morphological character	Parameters
1	Length	3.1 cm
2	Breadth	2.3 cm
3	Tuber weight	20.4 g
4	Specific gravity	1.08
5	Shape	Oval
6	Peeling, trimming losses	21.9 %
7	Flour yield	15.5 %

* Each value is mean of observation in triplicate

Table 3 : Chemical composition of potato (wet weight basis)

Sr. No.	Parameters	Content
1.	Moisture	80.1
2.	Total carbohydrate	15.20
3.	Crude protein	2.17
4.	Crude lipid	0.25
5.	Ash content	0.51
6.	Ascorbic acid (mg/100g)	18.4

* Each value is mean observation of triplicate

Table 4 : Sensory evaluation of instant halwa powder

Sample code	Appearance	Colour	Taste	Flavour	Texture	Overall acceptability
A	6.7	6.7	6.8	7.4	7.1	7.0
B	9.0	9.0	8.7	9.0	9.0	9.0
C	8.4	8.4	7.8	8.7	8.7	8.4
D	7.0	7.0	6.8	7.4	7.5	7.1

tubers are presented in Table 2.

The data depicted in Table 2 with respect to physical properties of unmarketable potato revealed that average length, breadth and tuber weight was very less and incomparable with the good quality potatoes. Such potatoes due to smaller in size are difficult to process in home scale and hence do not get better prices in the market. The data rightly emphasize the need of processing these potatoes on commercial scale, to reduce the wastage of these potatoes. The shape of unmarketable potatoes found to be oval while the marketable potatoes are usually round in shape. The trimming losses seem to be higher. Physical characteristics of unmarketable potatoes clearly justify the need of utilization in bulk as these potatoes are considered not suitable and ignored for culinary preparations.

Chemical composition of unmarketable potatoes:

The data pertaining to chemical composition of unmarketable potatoes are depicted in Table 3.

Chemical composition of potatoes showed that potatoes are very rich source of carbohydrate (15.2 per cent). Interestingly the crude lipid (0.25 per cent) content of potatoes was even less than ash content (0.51% per cent). The crude protein content found to be higher than that of ash and crude lipid content. The values obtained are comparable with the earlier investigations (Gopalan *et al.*, 1989).

Sensory evaluation of instant Halwa Powder:

Several recipes of Instant Halwa Mix containing different quantities of ingredients (Table 1) were used and the best recipe was standardized by a panel of judges.

Data pertaining to standardization recipes of instant Halwa mix based on sensory characteristics (9- point Hedonic scale) of prepared instant potato Halwa have been presented in Table 4.

Data revealed that mean score for colour, texture, aroma, taste and overall acceptability of Halwa prepared from different recipes varied from 7.0 to 9.0, 8.4 and 7.1, respectively, with maximum sensory score for recipe B and minimum for A. Recipe B which was rated superior in overall acceptability.

Conclusion:

Unmarketable potatoes available in the market during glut can be utilized more beneficially for the preparation of Instant Halwa Mix as well as some other instant products. Recipe B which was rated superior in overall acceptability was standardized and contained different ingredients like potato flour (39.6 g), *ghee* (9.9 g), powdered sugar (43.6 g), cardamom (0.369 g), fennel (0.59 g), coconut (4.0 g) and cashewnut (1.58g). On the basis of obtained results, it could be concluded that unmarketable potatoes can be successfully utilized in the preparation of Instant Halwa Mix with better sensorial profile.

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