

# Preparation of candy from ber - A value addition

AJAYKUMAR M. TAKE AND M.G. BHOTMANGE

In order to provide value addition and also to preserve ber fruits for longer period, standardized procedure for the preparation of ber was developed. Mature ber fruits (cv. Umran) were selected and washed to remove the dust particles. Then pricking was done and pricked ber fruits were then plunged in boiling water as well as with sodium metabisulphite for 5-10 minute and then in cold water to stop the process of blanching. Effect of blanching on the nutritional parameters was studied. Destoning was carried out and slices were submerged overnight in sugar syrup of 30<sup>o</sup> Brix and 0.5 per cent citric acid. Then strength of sugar syrup was increased slowly at a constant rate of 10<sup>o</sup> Brix per day till the strength of sugar syrup reaches up to 70<sup>o</sup> Brix. Sensory analysis was carried out to find out the overall acceptability of ber candy. Physical and chemical characteristics of ber fruits were also studied. Results showed that candy treated with sodium metabisulphite scored higher than that of blanched with hot water.

**Key Words :** Ber, Candy, Blanching, NaMS, Citric acid, Sugar syrup, Value addition

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## INTRODUCTION

India is one of the few countries in the world where different types of fruits and vegetables are being produced. It is the second largest producer of fruit in the world after Brazil. Ber (*Zizyphus mauritiana* Lamk.) also known as Jujube, is one of the most ancient fruits of India. Ber belonging to the family Rhamnaceae is popularly called the king of arid zone fruits. Ber has been recognized as a useful edible fruit since antiquity in India. Pareek (2001) summarized the references to ber and other jujubes in scriptural sources and these references covered the period from 1000 BC-400 AD. Such historical evidence attests to the recognition of the fruit and its uses; it does not imply domestication. In India, ber is being cultivated on an estimated area of 22,000 hectares. The yield potential varies from one to two quintals per tree per annum (Yamadagni, 1985).

The ber fruit has high sugar content (sucrose, glucose fructose and starch); it is, therefore, high in carbohydrates, which provide energy. The fruits also contain protein with

many essential amino acids like asparagine, arginine, glutamic acid, aspartic acid, glycine, serine and threonine (Bal, 1981). Major interest has focused on vitamin C content and ber pulp is considered a rich source. Content ranges from 70-165 mg/100g (Bal and Mann, 1978). The FAO and WHO recommendation (FAO, 1974) that the daily intake for an adult man should be 30 mg, illustrates the value of ber pulp in the diet. Pulp contains about 70 IU vitamin A/100 g and the  $\beta$ -carotene content ranges from 75-80mg/100g (Bal *et al.*, 1978). The fruit being easily digestible has a laxative effect; the pulp is sweet and rich in flavour. Ber fruits are within the reach of the poor people, hence rightly known as 'Poor man's apple' (Bal and Uppal, 1992). The post harvest loss of fruits is one of the most pressing problems of the fruit industry especially in the tropical countries like India. In addition to the physical losses in quantity, serious losses do occur in the essential nutrients, notably of vitamins, minerals and fruit quality. Since ber is a seasonal fruit, to make it available throughout the year, development of different products like dehydrated, fermented products will be the best alternative. Hence, the present investigation was carried out to provide value addition and to preserve ber fruit by using sugar in the form of candy.

## METHODOLOGY

Fresh ber fruits (cv. UMRAN), sugar used in the present work were procured from local market. A fruit impregnated with

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cane sugar or glucose syrup, and subsequently drained free of syrup and dried is known as candied fruit.

The process of making candied fruit is practically similar to that for preserves. The only difference is that the fruit is impregnated with syrup having higher percentage of sugar or glucose. The total sugar content of the impregnated fruit is kept at about 75 per cent to prevent fermentation. The ber candy was made from fully mature fruits that are at hard stage. During the preparation of ber candy effect of pretreatments on the constituents of candy was studied for which blanching of fresh ber fruit slices was carried out with hot water and (0.5 %) sodium metabisulphite (NaMS) for 5-10 min. Fresh and fully mature ber fruit (cv. UMRAN) were sorted for over-ripe and bruised fruits. Then fruits were washed with clean water to remove the dust particles present on the upper skin of fruit. Then pricking was done with the help of pointed needle or fork to improve the uptake of sugar. These pricked ber fruits were then plunged in boiling water for 2-10 minute and then in cold water to stop the process of blanching. Destoning was carried out and slices were submerged overnight in sugar syrup of 30<sup>o</sup> Brix and 0.5 per cent citric acid. Then strength of sugar syrup was increased slowly at a constant rate of 10<sup>o</sup> Brix per day and process was

repeated till the strength of sugar syrup reaches up to 70<sup>o</sup> Brix. At this strength of sugar syrup slices were kept for 10-15 days. Then slices were removed and excess sugar syrup was drained out by using wire mesh trays. Finally drying was carried out till the moisture content decreased up to 10-15 per cent. This dried candy was then packed in moisture proof containers and stored at dry conditions. The process flowchart for ber candy preparation is given in Fig. A.

## OBSERVATIONS AND ASSESSMENT

The result of the present study have been discussed and presented under the following heads with figure :

### Physicochemical characteristics of ber (*Ziziphus mauritiana*):

#### Physical properties of ber fruit:

From the data presented in Table 1, it was revealed that the colour of fresh mature ber fruit (cv. UMRAN) was golden yellow while shape of fruit is round to oblate. The average length of fruit was found to be 3.21 cm, whereas the diameter observed was 2.48 cm and shape index recorded was 1.30 which supports the shape of fruit *i.e.* round to oblate. The fruit mean weight (cv. UMRAN) recorded was 30.8 g with a range from 30-34g. The fruit pulp content varied from 84-88 per cent with an average of 85.75 per cent while the waste index which contains peel and seed was 10.27 and 3.98 per cent, respectively.

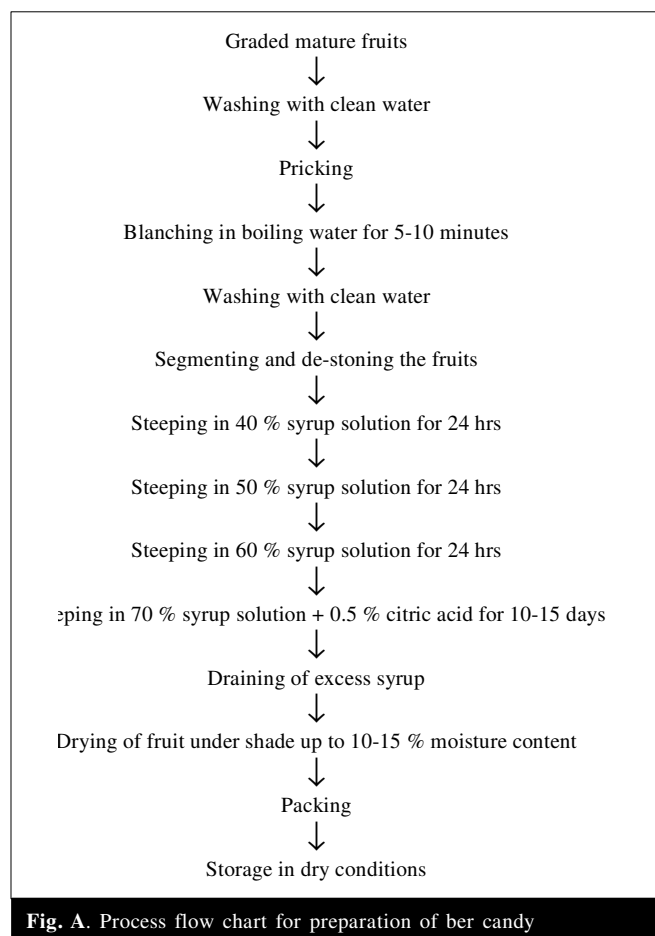
**Table 1.** Physical properties of ber fruit

Parameters	Value
Colour	Golden yellow
Shape	Round to oblate
Weight (g)	30.8±1.72
Length (cm)	3.21±0.11
Diameter (cm)	2.48±0.16
Shape index	1.30±0.10
Pulp yield (%)	85.75±1.19
Peel (%)	10.27±1.12
Seed (%)	3.98±0.33

All values are mean ±SD of ten values

#### Chemical characteristics of ber fruit:

Data in Table 2 represent the chemical characteristics of ber pulp. Pulp contains about 81.19 per cent moisture while nutrients like protein, fat, carbohydrate and minerals were found to be 1.01 per cent, 1.68 per cent, 15.6 per cent, 0.52 per cent, respectively. The results obtained in the present investigation are in good accordance with the results reported by Bal and Mann (1978). As ber fruits are known for their high ascorbic acid content, major interest was focused on the ascorbic acid content of pulp which was recorded 120.63 mg/100 g of pulp which is higher than the results reported by Bal and Mann



**Fig. A.** Process flow chart for preparation of ber candy

**Table 2.** Chemical analysis of ber fruit

Parameters	Value
Moisture (%)	81.19
TSS ( <sup>o</sup> Brix)	17
pH	4.13
Acidity (%)	0.16
Protein (%)	1.01
Fat (%)	1.68
Ash (%)	0.52
Carbohydrate (%)	15.6
Total sugar (%)	8.01
Reducing sugar (%)	3.37
Non-reducing sugar (%)	4.64
Ascorbic acid (mg)	120.63

(1978). This variation may be due to change in variety, location and agro climatic conditions.

*Effect of blanching on constituents of ber candy:*

Blanching is a mild heat pretreatment performed prior to further processing of fruits. Blanching consists of heating the food rapidly to a predetermined temperature, holding for a specified time, then either cooling rapidly or passing immediately to the next processing stage. Blanching causes cell death, physical and metabolic chaos within the cells. The heating effect leads to enzyme destruction as well as damage to the cytoplasmic and other membranes, which become permeable to water and solutes. Blanching of ber slices with sodium metabisulphite shows significant changes in constituents of ber candy majorly with respect to total energy and ascorbic acid content.

It has been observed from Table 3, that when ber candy was treated with sodium metabisulphite there were significant changes in chemical constituents of ber candy. Sodium

**Table 3.** Effect of blanching on constituents of ber candy

Parameters	A (Blanching with hot water)	B (Blanching with NaMS)
Moisture (%)	11.82	10.18
Protein (%)	0.5	0.64
Fat (%)	4.83	4.82
Ash (%)	0.29	0.35
Crude fibre (%)	10.11	12.20
Carbohydrate (%)	82.56	84.01
Total sugar (%)	17.46	18.20
Reducing sugar (%)	7.80	8.13
Non-reducing sugar (%)	9.66	10.07
Ascorbic acid (mg)	132	158
Total energy (Kcal)	375.71	381.98

metabisulphite treated candy contains high amount of ascorbic acid (158 mg), crude fibre (12.20%), protein (0.64%) than hot water treated candy. 100 g of candy treated with sodium metabisulphite yields 381.98 Kcal of energy higher than hot water treated candy. Table 3, clearly indicates that ber candy prepared by blanching with sodium metabisulphite was superior to candy prepared by hot water blanching as blanching causes the removal of gases from fruit tissues, especially intercellular gas which is useful in avoiding oxidation of product which prevents nutrient losses from product. Removal of gases, along with the removal of surface dust, has a further effect in brightening the colour of candy. Ber candy blanched with hot water contains fewer amounts (132 mg) of ascorbic acid than that of sodium metabisulphite treated candy which may be due to leaching and thermal breakdown of ascorbic acid as it is water soluble and thermally liable.

*Organoleptic evaluation of ber candy:*

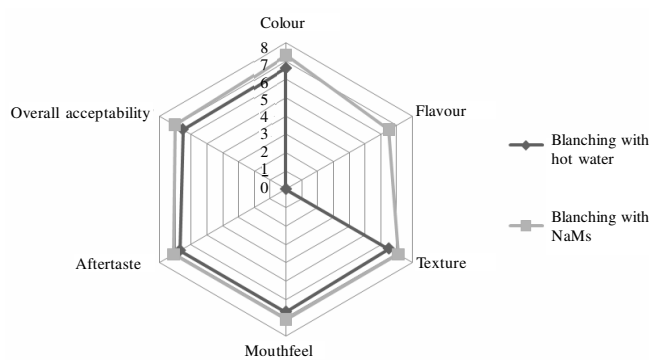
The prepared candy using ber fruit was evaluated by a panel of judges on 9 point hedonic scale. The mean values of score given to each parameter under investigation for organoleptic attributes like colour, texture, flavour, taste, mouth feel, aftertaste, overall acceptability are presented in Table 4.

Table 4 and Fig. 1 show that the score for colour of candy treated with (0.5 %) sodium metabisulphite was recorded higher (7.3) than that of candy blanched with hot water. Scores for other parameters like flavour (6.5), texture (7.1), mouth feel (7.1),

**Table 4.** Sensory evaluation of ber candy

Parameters	A (Blanching with hot water)	B (Blanching with NaMS)
Colour	6.6±0.37	7.3±0.24
Flavour	6.1±0.20	6.5±0.44
Texture	6.5±0.31	7.1±0.37
Mouth feel	6.7±0.24	7.1±0.37
Aftertaste	6.7±0.24	7.1±0.37
Overall acceptability	6.52±0.09	7.02±0.13

All values are mean ±SD of five values



**Fig. 1.** Sensory evaluation of ber candy

aftertaste (7.1) and overall acceptability (7.02) were also found comparatively better as compared to hot water blanching.

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