

# SENSORY AND TEXTURAL EVALUATION OF TOFFEE WITH INCORPORATION OF INDIAN JUJUBE POWDER (*Ziziphus mauritiana*)

Ashish kumar Jatav\*, Devendra kumar Bhatt

Address (es): Mr. Ashish Kumar Jatav,

Department of Food Science and Technology (A Center of Excellence), Bundelkhand University, Kanpur Road, Jhansi- 284128  
Uttar Pradesh, India

## ABSTRACT

Indian jujube powder has a lot of potential to be processed for value addition. Its flavor is acceptable by almost all classes of people. Toffee is one of the most acceptable products largely consumed by children. The confectionary products due to its varied taste and flavor have a wide acceptance in children throughout the world. The different levels of ingredients for preparation of Indian jujube powder toffees showed that all these variables markedly affect texture, taste, flavor, and overall acceptability score and moisture, ash, fat, protein, carbohydrate of the prepared fruit toffees. The Indian jujube powder toffees prepared from mango pulp and jujube powder at different proportion were found almost similar with respect to proximate composition. However, the treatment 20% (A4) had highest scores for all sensory quality attributes except flavor than the rest of the treatments. On the basis of flavor, treatment 20% (A4) was found best. Instead of having high nutritional properties Indian jujube powder is still being used only by unorganized sector and is not being given much emphasis for its commercial utilization in term of value added products. In the basis of all data we can conclude that toffee made with incorporating 20% Indian jujube powder is more acceptable.

**Keywords:** Indian jujube powder, Toffee, mango pulp, texture, sensory.

## INTRODUCTION

Fruit toffees are made from pulpy fruits like Banana, Mango, Indian jujube, Jackfruit, Guava etc. Fruits are grown seasonally and are perishable in nature. Fruit preservation techniques enable the mankind to enjoy fruits even during off-season and fruit toffees one such product. Fruit toffees are highly nutritious products compared to sugar boiled confectionaries. Fruit toffees are made from fruit pulp which is the main ingredient and powder sugar, mango pulp, water, ghee, milk powder, refined corn flour, citric acid, Black salt, and Indian jujube powder are added. Hence, they are tasty and nutritious (Amit Kumar Singh *et al.*, 2014). Toffee is a candy made by caramelizing sugar or molasses (creating inverted sugar) along with butter, and occasionally flour. The mixture is heated until its temperature reaches the hard crack stage of 149 to 154 °C (300 to 310 °F). While being prepared, toffee is sometimes mixed with nuts or raisins. Toffee is a usually manufactured from mango pulp, powder sugar, ghee, water, milk powder, refined corn flour, citric acid, Indian jujube powder, and salt. There are many varieties of different shapes which are generally different priced. During the Canning of Fruits like Mango and Pineapple, the fruit pulp recovered from trimmings, stone, peel etc.

Fruit bars are highly versatile in their usage pattern and can be easily marketed as one of the confectionery. India is second largest producer of fruits and vegetables in the world after China. The fruits and vegetables processing in India is highly decentralized, small scale industries accounting for 33%, organized 25 %, unorganized 42% and large number of units in cottage/house hold and small scale sector, having capacities of up to 250 tones/annum (G. Agarwal and S. Mangaraj, 2005). The cold season also showcases an indigenous fruit, which is not as popular but those who are aware of its existence love it with whole heart-the Indian jujube and it is commonly known as jujube. I would put the figure closer to 33% (still a wild, optimistic, estimate), which means India spends 700 million USD per year on buying toffees unintentionally. That means the average store earns about 60 USD per year, or about Rs. 310 a month, that way (Herjubes *et al.*, 1975).

## MATERIAL AND METHODS

### Collection of Material

Mango pulp, water, Powder sugar, Ghee, Milk powder, Refined corn flour, Citric acid, Black salt, Jujube Powder were procure from an authorized dealer of Jhansi, Uttar Pradesh.

### Preparation of Toffee

Jujube Fruit toffee is a nutritional product, has chewy texture and is a good source of dietary fiber and natural sugar. Ziziphus jujube fruits are very rich in vitamins C and B1 and B2 (Kuliev, A. A., & Guseinova, N. K., 1974). A confection, Jujube fruit toffee is prepared by combining the Mango pulp with water, powder sugar, ghee, milk powder, refined corn flour, Black salt and citric acid. Indian food technologists view the prospect for expanded Jujube fruit processing as highly promising.

**Drying**

In general, the toffee is dried at a room temperature for 20 to 24 hour.

**Packaging**

After drying, the toffee is cut and wrap in a butter paper and then stored in an air tight container.

**Table 1** Details of treatments were as follow

Sample	Amount of jujube powder (%)	Ranking for further study
Sample 501	0%	A1
Sample 502	10%	A2
Sample 503	15%	A3
Sample 504	20%	A4

**Physico-Chemical Analysis of Jujube Fruit Toffee**

Protein content was determined as per (IS: 7219:1973); kjeldhal method, Protein was obtain by using the conversion factor 6.25, moisture was determine by using (I.S.I.,1984), carbohydrate content by different method, ash and fat content were determine to AOAC, 1984 methods.

**Texture Profile Analysis**

Hardness of fruit toffee was measured by stable Micro-system Texture Analyzer (model TAXT2i). A compression plate was used in conjunction with a texture analyzer (Bourne M.C., 1982). Pre-test speed was set to 2 mm/s, a test speed of 2 mm/s, post-test speed of 5 mm/s and distance of 5mm. The absolute peak force was considered as the hardness of the jujube fruit toffee.

**Organoleptic Analysis of Products**

Sensory evaluation offers the opportunity to obtain a complete analysis of the various properties of food as perceived by human sense. Sensory evaluation is an important and best method for evaluating new developed which provide quality measure and production control. The sensory evaluation was done using a score card developed (B. Srilakshami, 2007) following 9 point hedonic scale.

**RESULTS AND DISCUSSION**

The present investigation was envisaged to develop highly nutritious jujube fruit toffee. The toffees were analyzed for physico-chemical characteristics, sensory attributes and textural properties. The results of present investigation are discussed in three sections.

- Effect of jujube powder on quality of fruit toffee.
- Effect of jujube powder on sensory characteristics.
- Effect on textural characteristics of the jujube fruit toffees.

**Texture Analysis-**

The texture of the samples was analyzed and it was found that the force (in g) required was increasing to cut the toffee sample with increasing amount of jujube powder (D.K Bhatt et al, 2015).. Texture analysis was done with the help of Stable Micro System Texture Analyzer TAXT2i. It is above device used to study various mechanical forces applied during the experiment. It used to study many parameters such as hardness, crispiness, sponginess, firmness, etc. by using different kind of probes. The texture analyzer measures the desired force and plots a graphical image which can be easily available to the users for the further analysis. The hardness value is the peak force of the first compression of the product. The cutting probe was used for the evaluation of requirement of force to cut the product. During the test the probe distance was fixed at 5 mm, pre-test speed of 2mm/sec and load cell of 50 kg to complete test. On the basis of it can be concluded that treatment 20% had maximum hardness (2175.27) and minimum in control sample 0% (1120.33). In the present study we observed that all the treatments had greater hardness than control sample that is 0%. All these data were analyzed by one-way ANOVA (Analysis of Variance) and it was found that the hardness was significantly different at 5% level of significance

### Nutritional composition of Prepared Sample

The different levels of ingredients for preparation of fruit toffees showed that all these variables markedly affect texture, taste, flavour, and overall acceptability score and moisture, ash, acidity of the prepared fruit toffees (Devendra Kumar Bhatt and Shweta Verma, 2016).

**Table 2** Proximate composition and Textural properties of Jujube fruit toffee

Sample	Moisture	Ash	Fat	Protein	Carbohydrate	Hardness
A1	10.73±0.15	1.57±0.06	0.30±0.07	0.61±0.18	86.79±0.23	1120.33 ±94.05
A2	10.87±0.15	1.60±0.10	0.39±0.05	0.79±0.08	86.35±0.14	1838.00±79.96
A3	10.97±0.61	1.70±0.10	0.44±0.05	0.88±0.09	86.00±0.46	2020.83±41.09
A4	11.73±0.55	1.83±0.06	0.48±0.05	0.98±0.14	84.64±1.01	2175.27±195.26
Mean	11.08±0.54	1.68±0.13	0.40±0.09	0.82±0.18	85.95±0.97	1.789±433.54
SE±	0.16	0.04	0.02	0.05	0.28	125.15
F Ratio	3.347**	6.458*	5.610*	4.457*	7.888*	47.406*

\*The mean difference is significant at the 0.05 (5%) level. \*\*Non-significant at 5%

**Note-** All value are represented as mean ± S.E.M. (Standard Error Mean), n=3 data were analyzed by one way ANOVA (Analysis of Variance) employing Dennett Multiple Comparisons Test Using SPSS software, Where A1= Control sample, A2= 10% Jujube powder, A3= 15% Jujube powder, A4= 20% Jujube powder.

### Sensory evaluation of prepared Toffee



A laboratory panel consisting of 10 untrained panel evaluated toffee for sensory attributes as color, flavor, texture, taste and overall acceptability along with statistical analysis of toffee made from different amount of jujube powder are presented.

### Statistical Analysis

The product jujube fruit toffees were freshly prepared and sensory evaluation by a panel of judges selected from Institute of Food Technology, Bundelkhand University, Jhansi. The products were judged for the quality such as color, flavor, taste, texture and overall acceptability with the help of 9 point hedonic scale (B. Srilakshmi, 2007). The data obtained from the sensory evaluation was statistically analyzed by using analysis of variance techniques (SPSS) to evaluate the significance at  $p < 0.05$ . Differences were considered significant when  $P < 0.05$ .

**Table 3** Mean Sensory Evaluation values

Treatments	Color	Flavor	Texture	Taste	Overall acceptability
A1	6.65 ±1.38	6.45 ±1.57	6.30 ± 1.77	6.45 ±1.30	6.46 ± 1.16
A2	6.10 ±1.20	5.45 ±1.17	6.95 ±1.12	6.00 ±1.05	6.10 ±.86
A3	7.20 ±1.40	6.05 ± 1.34	6.55 ±1.61	6.40 ± 1.41	6.55 ± 1.29
A4	7.20 ± 1.01	6.75 ±1.09	6.60 ± 1.35	7.05 ±1.34	6.86 ±1.03
Mean	6.79 ±1.29	6.18 ± 1.35	6.60 ± 1.44	6.48 ±1.29	6.49 ±1.09
SE ±	0 .20	0 .21	0.22	0 .20	0.17
F Ratio	1.763**	1.855**	0.327**	1.137**	0 .809**

Note: \*The all mean difference is significant at the 0.05 (5%) level. \*\* Non-significant at 5%.

## CONCLUSION

Indian jujube powder enhances the flavor in the product. On the basis of all data we can conclude that toffee made with incorporation of 20% jujube powder sample are more acceptable. Indian jujube powder prevents different disease (osteoporosis, weight loss, anxiety, cancer etc.) If we include jujube powder in daily life, its prevent many disease. Jujube toffee can also we used nutritious food for low income people including patient those are suffering with different life style disease.

**Acknowledgments:** The present study was supported by the Center of Excellence Uttar Pradesh India, and Bundelkhand University Jhansi, Uttar Pradesh India, to provide necessary research facilities for the successful completion of research work.

## REFERENCES

- [AOAC] official methods of analysis of the association of official analytical chemists (1984). 14<sup>th</sup> edition. Washington. DC: Association of official Analytical chemists.
- Amit Kumar Singh, I. Chakraborty and A. K. Chaurasiya, Baer Preserve Syrup as Booster of Human Health as a Health Drink, An International Quarterly Journal of Life Science, 9(2), 2014, 565-569.
- Bourne M.C., Development in bread making processes, Plant Foods for Human Nutrition. 55, 1982, 33-86.
- Devendra Kumar Bhatt, Piyush Mishra, Shradha kiledar and A.K Jatav, Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT) e-ISSN: 2319-2402,p- ISSN: 2319-2399. Volume 09, Issue 7 Ver. I (July 2015), PP 49-53.
- Devendra Kumar Bhatt and Shweta Verma, IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT) e-ISSN: 2319-2402,p- ISSN: 2319-2399. Volume 10, Issue 3 Ver. I (Mar. 2016), PP 05-14.
- G. Agarwal and S. Mangaraj, Studies on physico-chemical changes in selected fruit during storage, Beverage Food World, 32, 2005, 72-75.
- Herjumbet, L, Meiselman., Bruce, P, Halpern., George, P, Dateo, (1975). Food Sci Lab, U.S Army center, USA, R-76-77.
- I.S.I Handbook of Food Analysis (Part VIII) – 1984 page 12 /Determination of Moisture in Dehydrated Vegetables.
- Kuliev, A. A., &Guseinova, N. K. (1974). The content of vitamin C, B1, B2 and E in some fruits. ReferativnyiZhurnal, 2, 69-73.
- Srilakshmi, B., Sensory Evaluation” Food Science 4th Ed., 2007, Pp 286-297, 246-256.