The Pharma Innovation Journal 2019; 8(9): 64-67

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2019; 8(9): 64-67

www.thepharmajournal.com
Received: 09-07-2019
Accepted: 13-08-2019

Bhople SG
Department of Agricultural Engineering, Maharashtra Institute of Technology, Aurangabad, Maharashtra, India

Chavan RF
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India

Sakhale BK
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India

Correspondence
Chavan RF
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra, India

Studies on standardization of beetroot jam by using date paste and effect on organoleptic properties of jam during storage

Bhople SG, Chavan RF and Sakhale BK

Abstract
The present investigation was carried out to refine the traditional method of preservation of fruits and vegetables by using different proportions of beetroot. Ripened beetroot was taken to extract its pulp and different proportions i.e. 25%, 50% and 75% of date paste were used to standardize the jam. Thereafter, jam samples were packaged in glass bottles and stored at ambient temperature for 3 months. Ratings for taste, texture and overall acceptability of jams were increased up to two months of storage and thereafter followed decreasing trend up to the end of three months. Results pertaining to yeast and mold count of control sample (T_0) and beetroot sample containing 50 per cent date paste (T_2) during three months of storage at ambient conditions revealed that yeast and mold count of all the samples followed a gradual increasing trend throughout the storage period of three months. Initially yeast and mold count was 14×10^1 CFU/g in control sample and 2×10^1 CFU/g in sample containing 50 per cent date paste but it was increased to 19×10^1 CFU/g and 8×10^1 CFU/g respectively in both the samples at the end of storage. Jam prepared by using 50% date paste was rated superior as compared to rest of the treatments. Jam prepared from both the preserved samples after three months were also well acceptable by the panelists.

Keywords: Beetroot, date paste, jam, sensory, storage, ambient temperature

Introduction
Beetroot (*Beta vulgaris* L.) is a member of the Chenopodiaceae family which includes silver beet, sugar beet and fodder beet (Deuter and Grundy, 2004) [5]. They are biennials although they are usually grown as annuals and believed to have originated from Germany (Thompson, 2001). Beetroot produces green tops and a swollen root during its first growing season. It is highly productive and usually free of pests and diseases (Ado, 1999). It is rich in several vitamins, hence is an ideal vegetable for health conscious people (Deuter and Grundy, 2004) [5]. The beetroot is the second most important source of sugar (21.5 % of the world sugar) and is grown in 57 countries. It is a halophytic (as well as Na- salts scavenger) C_3 plant containing up to 20 per cent sugar on fresh weight basis. The storage organ of this plant is usually called the root; of which 90 per cent is actually root derived and the remaining 10 per cent (the crown) is derived from the hypocotyls. A freshly harvested root of sugar-beet contains 75-76 per cent water, 15-20 per cent sugars, 2.6 per cent non- sugars and 4-6 per cent pulp.
Red beets also possess some health benefits. Beets are enriched with nutrients like Mg, P, Na, K and Ca. It also contains ample of Se, Zn and Mn. The flavanoids and carotenoids present in it prevent damage to the cells. The red pigment of beets, betacyanin is effective in prevention of colon cancer. Intake of red beets also reduces high blood pressure. It helps in production of RBC in the blood and removes harmful and toxic substances accumulated in the liver. Leaves of sugarbeet are known to counter bad breath. In Roman times, Hippocrates advocated use of beet leaves for healing of wounds. Sugarbeets have been used to get rid of tumors and to help people with blood diseases and leukemia. It has also been used to treat and cure boils, abscesses and even acne so much so that these have earned the status of "Beet Therapy". Being a good source of carbohydrates, protein, fibre and minerals, sugarbeet tops are used as animal feed, either as fresh or even in ensilaged form. Some of the sugarbeet varieties are grown as fodder beets. Once the juice has been extracted, pressed or dehydrated beet pulp provides an ideal foodstuff for cattle.
Beetroot pulp can also be used to produce industrial pectin or dietary fibre for use with foods enriched with fibre. Processing by-products of sugarbeet, the beet pulp and molasses are also widely used as feed supplements for livestock.

It contributes to fibre in the feed and adds to its palatability. Molasses, a by-product from sugarbeet processing is widely used in the alcohol production (ethanol and butanol), other pharmaceuticals and in baker's yeast. A tonne of molasses yields approximately 300 litres of alcohol. Alcohol derived from sugarbeet is suitable for human consumption (in spirits, perfume, vinegar, pharmaceutical products, etc.) and ideal for use in household products (Cleaning fluids, methylated spirits, etc.) and some other useful chemicals.

Date (*Phoenix dactylifera* L.) has long been one of the most important fruit crops in the arid regions of the Arabian Peninsula, North Africa, and the Middle East. During the past three centuries, dates were also introduced to new production areas in Australia, India, Pakistan, Mexico, southern Africa, South America, and the United States. Dates are a main income source and staple food for local populations in many countries in which they are cultivated, and have played a significant role in the economy, society, and environment of those countries.

Dates produce many products that are useful to humans. The primary product is the date fruit, which can be eaten fresh, dried, or in various processed forms. In North Africa and the Middle East, some dates are harvested and consumed during the Khalal stage, when the fruit are still very astringent with high tannin content (Dowson and Aten, 1962; Glasner *et al*., 2002; Kader, 1992) [6, 9]. However, most dates are harvested during the fully ripened Rutab and Tamar stages, when they are high in sugar and low in moisture and tannin content. Nutritional value of dates is carbohydrates 75 per cent, lipids 0.39 and protein 2.45 per cent. Date fruit are high-energy food sources with 72-88 per cent sugar content at maturity. During the Khalal stage, nearly all (80-85%) of the sugar is sucrose. As ripening progresses, the sucrose is hydrolyzed into reduced sugars such as glucose and fructose. Date fruit are good sources of iron and potassium; a fair source of calcium, chlorine, copper, magnesium, sulfur and a minor source of phosphorus. In addition, dates are a source of 16 amino acids and vitamins A, B_1, and B_2 (Ahmed *et al.*, 1995; Vandercook *et al.*, 1980).

Jam made from different types of fruits is a popular food items among the local population. It is usually prepared from cooked fruit or vegetable, sugars, citric acid and pectin (Broomfield, 1996) [4]. The physicochemical characteristics of fruit or vegetable thereof affect the technological quality of the product as some are more suitable than other for specific characteristics. Processing of jam is therefore, is highly justifiable by different researchers (Abdelazim *et al*, 2011) [1].

As defined by UNE regulation (1974), jams are products formulated from a minimum fruit content of 40 per cent (30% for citrus) and a final soluble solid content of 45° Brix. Moreover, some additives such as citric acid or gelling agents, commonly pectin, can be added. In traditional jam manufacture, all the ingredients are mixed in adequate proportions and the mix is concentrated by applying thermal treatments at normal or reduced pressure to reach the required final soluble content. This process leads to a thickened or gelled consistency, ensures the destruction of fruit enzymes, extracts some of the pectin from the fruit and concentrates the product to a point, where as a result of its acidity and reduced water activity, it becomes self-preserving (May, 1997).

Nevertheless, jams can also be produced from vegetables such as carrots, sweet potatoes and pumpkins. The traditional jam market has been stable during the last few years as a consequence of changes in consumption practices and the presence of alternative or new products on the market. Accordingly, the jam industry needs to improve its competitiveness and develop new products, such as vegetable jams, which may well be a way of achieving this objective (European Commission, 2001) [8].

Materials and Methods

The present investigation based on standardization of beetroot jam by using date paste was carried out in Agricultural Engineering Department, Maharashtra Institute of Technology, affiliated to Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, Maharashtra.

Source of experimental materials

Mature, ripened beetroot vegetables for the present investigation were procured from the local market of Aurangabad area.

Preparation of beetroot jam

Following procedure was followed for the preparation of the product

Beetroots obtained from local market were subjected to sorting and grading followed by thoroughly washing in order to remove dirt, dust and other foreign materials from their surface.

After washing, the beetroots were peeled, cored and cut into four-six equal pieces. The pulp was extracted by heating beetroots to get maximum recovery. Then sugar 40 %, 0.5-0.6 % citric acid, 0.8 % pectin and 0.1 % of sodium benzoate was added to pulp. The pulp was boiled till the TSS become 68.5 ^{0}brix. The process followed for preparation of beetroot jam is shown in below flow chart.

Flow chart

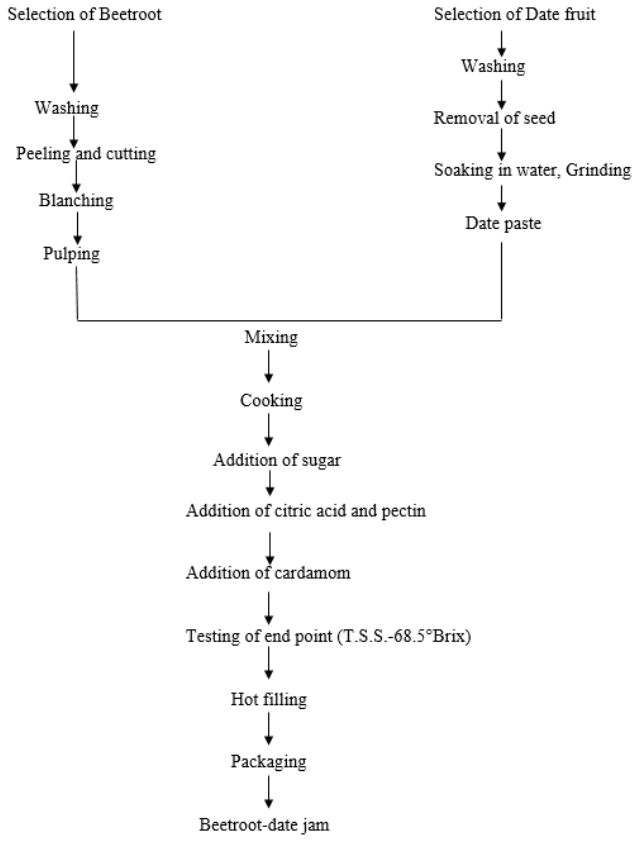

Fig 1: Standardization of beetroot-date jam

Samples of jam were prepared by using 100% beetroot pulp which is T_0, by using 75% beetroot pulp and 25% date paste which is T_1, by using 50% beetroot pulp and 50% date paste which is T_2, by using 25% beetroot pulp and 75% date paste which is T_3 for the standardization of beetroot-date jam.

Table 1: Standardization of Beetroot-date jam

Sr. No.	Sample	Beetroot Pulp (%)	Date paste (%)
1.	T_0	100	00
2.	T_1	75	25
3.	T_2	50	50
4.	T_3	25	75

Organoleptic analysis

The beetroot jam samples were evaluated for their organoleptic attributes namely color, flavor, taste, appearance and overall acceptability by a semi-trained panel comprising of ten panelists drawn from the staff and students of MIT College, Aurangabad. The panelists were asked to record their observations on sensory sheet based on "nine point hedonic rating scale" where 9 and 1 represented like extremely and dislike extremely, respectively.

Storage study of beetroot jam formulated with date paste

Glass bottles of capacity 250 g were employed to store beetroot jam. The packaged product samples were kept at ambient conditions for three months for storage studies. The products were evaluated for the sensory parameters i.e. color, flavor, taste, appearance and overall acceptability.

Microbial analysis

Yeast and mold count

The yeast and mold count was determined according to A.P.H.A. (1992). Potato Dextrose Agar acidified to pH 3.5 with sterile 10 per cent tartaric acid was used and incubation was carried out at 22±2 ^oC for 5 days.

$$\frac{cfu}{gm} = \frac{\text{No. of colonies}}{\text{Volume of sample plated(ml)}} \times \text{Dilution Factor}$$

Results and Discussion

The results of the present study have been discussed as follows under suitable headings:

Sensory evaluation of prepared jams

As per (Table 2), findings of present investigation indicates that ratings for the sensory attributes such as taste and flavor of all the samples were increased gradually throughout the three months of storage period. However, ratings for color, appearance and overall acceptability of all the samples during storage followed decreasing trend. The rating for color varied from 8 to 9 at the beginning of storage and which reduced to 7 at the end of storage. Similar findings were reported by Hussain *et al.* 2010 [10].

Table 2: Sensory Evaluation of beetroot date paste Jams

Sr. No.	Parameter	T_0	T_1	T_2	T_3
1	Colour	8.5	8.5	8.5	7.5
2	Taste	8.2	8.1	8.2	7.8
3	Appearance	8.0	8.1	8.2	7.2
4	Flavour	8.3	8.1	8.3	8.0
5	Overall acceptability	8.4	8.1	8.3	7.1
Mean±SD		6.9±0.17	6.8±0.16	6.9±0.11	6.3±0.34

* Each value is an average of minimum 15 determinations

ANOVA						
Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Between Groups	0.362	4	0.0905	0.51813	0.723754	3.055568
Within Groups	2.62	15	0.174667			
Total	2.982	19				

As per the statistical analysis the one way ANOVA showed significant readings which shows the accuracy and precision of the method of organoleptic analysis used for determination of overall acceptability of the prepared jam.

Colour: It was observed from the results of sensorial evaluation (Table 2), that do not have significant effect of colour characteristics of jam and the control sample found to more or less similar results of treated samples except T_3 sample.

Taste: From (Table 2) and (Fig. 2) it can be concluded that control sample and sample containing 50% date paste (T_2) is having more score for taste as compare to other samples.

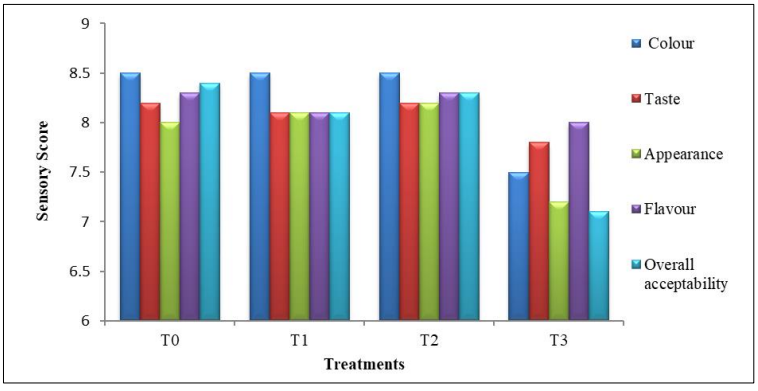

Fig 2: Organoleptic evaluation of beetroot date jam

Appearance: The addition of date paste significantly affected appearance profile. The date paste fibers are found to be suspended in jelly enhancing its appearance profile.

Flavour: The flavour profile of prepared jam up to the concentration of 50%, however further increase in concentration of date paste resulted in decrease in acceptability.

Overall acceptability

The overall acceptability of product is also found to be in correlation with the score of appearance and flavour and the sample T_2 containing 50% of date paste found most superior amongst the treated sample after control sample.

Hence, on the basis of sensorial evaluation of product, it is concluded that date paste at the concentration of 50% is optimum for development of beetroot date paste Jam with superior sensorial quality profile.

Organoleptic quality of beetroot jams during storage

Findings of present investigation indicate that ratings for the sensory attributes such as taste and flavor of all the samples were increased gradually throughout the three months of storage period. However, ratings for color, appearance and overall acceptability of all the samples during storage followed decreasing trend. The rating for color varied from 8 to 9 at the beginning of storage and which reduced to 7 at the end of storage (Dowson *et al.* 1962) [6].

Yeast and mold count

Results pertaining to yeast and mold count of control sample (T_0) and Beetroot sample containing 50 per cent Date Paste (T_2) during three months of storage at ambient conditions are furnished in (Table 3) Findings revealed that yeast and mold count of all the samples followed a gradual increasing trend throughout the storage period of three months.

Table 3: Changes in Yeast and Mold count (CFU/g) of sample T_0 & T_2 during ambient storage

Sr. No	Control Sample (T_0)		Beetroot sample containing 50% Date Paste (T_2)	
	Storage Period (Months)	Yeast and Mold count (CFU/g)	Storage Period (Months)	Yeast and Mold count (CFU/g)
1	0	14×10^1	0	2×10^1
2	1	15×10^1	1	3×10^1
3	2	17×10^1	2	5×10^1
4	3	19×10^1	3	8×10^1

Initially yeast and mold count was 14×10^1 CFU/g in control sample and 2×10^1 CFU/g in sample containing 50 per cent Date Paste but it was increased to 19×10^1 CFU/g and 8×10^1 CFU/g respectively in both the samples at the end of storage. (Ehsan *et al.* 2003) [7].

Conclusion

Based on findings of present investigation pertaining to 'standardization of beetroot jam by using date paste', it may be concluded that beetroot jam prepared can be standardized by using different percentage of date paste. Initially yeast and mold count was 14×10^1 CFU/g in control sample and 2×10^1 CFU/g in sample containing 50 per cent date paste but it was increased to 19×10^1 CFU/g and 8×10^1 CFU/g respectively in both the samples at the end of storage. Control sample and 50% date paste containing jam can be preserved for three months at the ambient conditions. The beetroot jam prepared from 50% date paste superior during three months of storage.

References

1. Abdelazim AM Nour, Khalid SM Khalid, Gammaa AM Osman. Suitability of some Sudanese mango varieties for jam making. Am. J. Sci. Ind. Res. 2011; 2(1):17-23.
2. AOAC. International, Official methods of analysis. Ternds Food Sci. Technology. Association of Official Analytical Chemists, Washington DC, USA. AOAC, 1990, 2004.
3. Barreveld WH. Date palm products. Food and Agriculture Organization of the United Nations, Agricultural Services Bulletin no. 101, Food and Agriculture Organization of the United Nations, Rome, Italy, 1993.
4. Broomfield RW. Manufacture of preserves, flavourings and dried fruits. In: D. Arthery and P. R. Ashurst (eds). Fruit processing. London: Champan and Hall. 1996, 165-196.
5. Deuter P, Grundy T. Beetroot Commercial Production and Processing. Agency for Food and Fibre Sciences. Holland Horticultural Limited Partnership, 2004, 1-4.
6. Dowson VHW, Aten A. Dates: Handling, processing, and packing. FAO Plant Production and Protection Series no. 13. Food and Agriculture Organization Agricultural Development, Food and Agriculture Organization, Rome, Italy, 1962.
7. Ehsan *et al.* Effect of Processing on the Stability of Aspartame and the Quality Attributes of Dietetic Pomegranate Jellies. Bull. Nutr. Instit., Cairo, Egypt. 2003; 14(1):142-158.
8. European Commission. Council Directive 2001/113/EC of 20 December 2001 relating to fruit jams, jellies and marmalades and sweetened chestnut purée intended for human consumption, 2001.
9. Glasner B, Botes A, Zaid A, Emmens J. Date harvesting, packinghouse manage- ment and marketing aspects, p. 177–208. In: A. Zaid (ed.). Date palm cultivation. Food and Agriculture Organization Plant Production and Protection paper no. 156. Food and Agri- culture Organization of the United Nations, Rome, Italy, 2002.
10. Hussain I, Shakir I. Chemical and organoleptic characteristics of beetroot. 2010; 12(1):22-24.