

# Utilization of an Underexploited Fruit FIG (*Ficus Carica*) as a Preserved Product

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**Abstract:** The aim of the process is to make a preserved product jam from fig (*Anjeer*) using apple as the pectin source. Fig fruits consist of high amount of calcium, potassium and iron along with high amount of fiber and low fat. They are rich in vitamin A, B<sub>1</sub>, B<sub>2</sub>. The preparation of fruit preserves today often involves adding commercial or natural pectin as a gelling agent, although sugar or honey may be used, as well. Due to its high nutritional value and the keeping quality it was decided to preserve the fruit by preparing jam. Jams are foods with many textures, flavors, and colors. They all consist of fruits preserved mostly by means of sugar and they are thickened or jellied to some extent. Hence, the fig jam is developed and the quality parameters are assessed. Sensory evaluation, nutritive analysis, and physicochemical properties such as titrable acidity, pH, total soluble solids, and ash values are determined according to the standard methods.

## 1. INTRODUCTION

In order to avoid glut and utilize the surplus during the season, it is necessary to employ methods to extend storage life, for better distribution, to preserve them for utilization in the off-season both in large scale and home scale. Many processes designed to preserve food will involve a number of food preservation methods. It usually involves preventing the growth of bacteria, fungi (such as yeasts), and other micro-organisms (although some methods work by introducing benign bacteria, or fungi to the food), as well as retarding the oxidation of fats that cause rancidity. Food preservation can also include processes that inhibit visual deterioration, such as the enzymatic browning reaction in apples after they are cut, which can occur during food preparation.

The Ficus (*Ficus carica*) is a species of flowering plant in the genus Ficus from the Moraceae, known as the common fig (or just fig), anjeer (Iran, Pakistan), and dumur (Bengali). It is a deciduous tree or large shrub, growing to a height of 6.9–10 meters (23–33 ft), with smooth white bark. Its fragrant leaves are 12–25 centimeters (4.7–9.8 in) long and 10–18 centimeters (3.9–7.1 in) across, and deeply lobed with three or five lobes. The complex inflorescence consists of a hollow fleshy

structure called the syconium, which is lined with numerous unisexual flowers.

Figs are among the richest plant sources of calcium and fiber. According to USDA data for the Mission variety, dried figs are richest in fiber, copper, manganese, magnesium, potassium, calcium, and vitamin K, relative to human needs. They have smaller amounts of many other nutrients. Figs have a laxative effect and contain many antioxidants. They are good source of flavonoids and polyphenols including gallic acid, chogenicic acid, syringic acid, catechin and rutin.

## 2. MATERIALS AND METHODS

### 2.1 Selection of the Method of Preservation:

Preserving fruit by turning it into jam, for example, involves boiling (to reduce the fruit's moisture content and to kill bacteria, yeasts, etc.), sugaring (to prevent their re-growth) and sealing within an airtight jar (to prevent recontamination). Good jam has a soft even consistency without distinct pieces of fruit, a bright color, a good fruit flavor and a semi-jellied texture that is easy to spread but has no free liquid. A great advantage in its preparation is that it can be prepared in a single operation. For the preparation of good quality jam, the fruit should contain adequate amounts of pectin or pectin is added in required amounts.

### 2.2 Pre-Preparation of the Ingredients:

Sorting and grading is essential to get suitable quality of fruit which was done by hand. The fruits were first washed to remove the dirt. Grading of fruit was done based on soundness, firmness, cleanliness, size, maturity, weight, color, shape and freedom from foreign matters, insect damage and mechanical injury. From the graded fig the pulp was extracted manually. It was homogenized in a mixer to obtain fine pulp.

### 2.2.1 Ingredients used are:

- **Fig.:** They should have a mildly sweet fragrance and should not smell sour, which is an indication that they may be spoiled. For the most antioxidants, choose fully ripened figs. For top quality, allow figs to ripen fully on the tree. They must be picked as they ripen or spoilage from the fruit beetle can occur. Figs have a low acid value, so you will need to acidify when canning.



- **Pectin (Apple):** Through apple pectin is produced. Pectin acts as a carbohydrate that causes fruit to gel. Some fruits like apples, grapes and some plums contain enough pectin to form a gel, others require added pectin. You can add pectin to any fruit to ensure a good gel. Pectin may be added either in liquid or powdered form. Low or no sugar pectin can also be used which is extracted from the inner rinds of the citrus fruits and is chemically different from regular pectin.



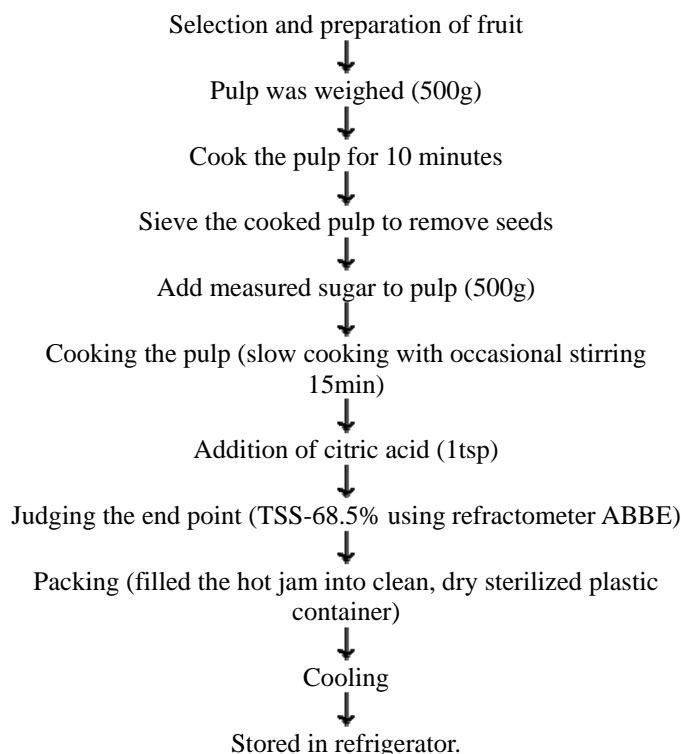
- **Sugar:** Sugar is another essential ingredient in jams. Added sugar preserves jams, helps form a gel and contributes to the flavour. A common cause of failure in making any kind of jam is using less sugar. Sugar must be present in proper proportions with pectin and acid to make a good gel.
- **Citric acid:** It is needed for gel formation and flavour. The amount of acid in fruits also varies with the fruit and degree of ripeness. When using low-acid fruits in recipes without commercial pectin, add 1 tablespoon lemon juice or 1/8 teaspoon citric acid for each cup of fruit.

### 2.2.2 Formulation of different jam samples:

Different jam samples were prepared by varying the percentage (%) composition of fig fruit and apple pulp in that order. T<sub>1</sub> (90-10%), T<sub>2</sub> (80-20%) and T<sub>3</sub> (50-50%).

### 2.3 Preparation of fig fruit jam:

Jams are thick sweet spreads, made by cooking crushed or chopped fruits with sugar. By adding pectin you need not depend up on fruits gelling quality for successful results. Jams are foods with many textures, flavors, and colors. They all consist of fruits preserved mostly by means of sugar and they are thickened or jellied to some extent. Jams made from a mixture of fruits are usually called conserves, especially when they include citrus fruits, nuts, raisins, or coconut. Gelation gives fruit preserves their texture. Gelation depends on pectin, sugar, acid, and water.



### 3. PHYSICOCHEMICAL PROPERTIES OF JAM:

Knowledge of the physico-chemical properties of food is fundamental in analyzing the characteristics of food during its processing. The study of these food properties and their responses to process conditions are necessary because they influence the treatment received during the processing and also because they are good indicators of other properties and qualities of food. In the present investigation certain physico-chemical properties of the developed wood apple jam were analyzed, to ensure the quality of the products. PFA specifies that jam is the product obtained by processing fresh fruits, canned, dried fruit pulp with water, sugar, dextrose, invert or liquid glucose either singly or in combination by boiling to a suitable consistency.

The analysis of jam for the various properties was done using an aqueous solution of the sample. This was prepared by

weighing about 25gm of the sample and dissolving it in 200ml of water. The aqueous solution was kept on a boiling water bath for 1 hour. The solution was cooled and diluted to 250ml with distilled water, filtered and used for analysis.

### 3.1. Titrable Acidity and pH Value:

Acidity value is a measure of stability and shelf life of jam. It is due to the organic acids in fruits and those which are added while making the jam. The setting quality of jam is improved by adequate pH maintenance.

### 3.2. Ash Value:

The ash value is mainly due to potassium and phosphorous and the composition of it. It is the measure of fruits and fruit juice content. A low value indicates deficiency of fruit or excess of sugar

### 3.3. Total Solids and Soluble Solids:

For jam total solids and soluble solids are calculated. The figure for soluble solids help in accessing the fruit content of jam and fruit bar and also helps to prevent the growth of mould and yeast.

### 3.4. Determination of acid insoluble ash:

The ash which is insoluble in dilute hydrochloric acid is called acid insoluble ash. Acid insoluble ash is the measure of sand and other silicon matter present.

### 3.5. Nutrient Analysis of Jam:

Fig fruit is rich in minerals, vitamin A, vitaminB<sub>1</sub> and vitaminB<sub>2</sub>. Storage conditions and length of storage period may alter the nutritive value of fruit. Fruits are important source of ascorbic acid. The ascorbic acid content decreased during storage due to oxidation of ascorbic acid to dehydro ascorbic acid.

## 4. RESULTS AND CONCLUSIONS:

### 4.1 Physicochemical analyses of fig jam:

The analyses of jams were made 1 day after processing. The averages of the duplicate measurements of the analyses of three different samples of jams are shown in table 1. Jams presented low moisture and had soluble solids mean values of 69, 69 and 68.5 °Brix for sample 1(10% apple), sample 2(25% apple), and sample 3(50% apple), respectively. Sugars in jams contribute to high content of soluble solids, an effect that is essential for the physical, chemical and microbiological stability and make gelation of pectin possible. It is known that the acidity and pH of jams should be controlled. The low acidity and low pH contribute to pectin gelation and increase the stability of the formulated jams. However, the pH must not be too low (< 3.0) since it could induce deterioration of sensory quality: excessive acidic flavor, glucose crystallization; granular texture and exudation phenomenon.

**Table 1:**

Parameter	T1 (10% apple)	T2 (20% apple)	T3 (50% apple)
Moisture (%)	15.8	17.22	18
Ash value (%)	0.367	0.382	0.54
Acid insoluble ash (%)	0.1	0.12	0.15
Titration acidity (%)	0.544	0.65	0.78
pH value	4.27	4.10	4
Total soluble solids (°Brix)	69	69	68
Total sugar and Reducing sugar (g/100g)	30.4 20.2	32.3 21.4	36.5 22.9

### 4.2. Sensory Evaluation of fig jam:

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 products developed which provide quality measure and production control.

A scientific discipline used to evoke, measure, analyse and interpret reactions to those characteristics of foods and materials as they are perceived by the senses of sight, smell, taste, touch and hearing. Sensory evaluation was one of the earliest methods of quality control and it is still widely used in industry. However, the level of application depends on the situation. Sensory judgement is expressed by the components like stickiness, firmness and bulkiness. Here, the acceptability of the treatments was evaluated by a panel of 10 members. They assigned scores for appearance, taste, flavour, texture, color, spreadability, after taste. The overall quality score was taken as the combined score of the above attributes.

Sensory evaluation on the basis of 9-point hedonic scale of all the prepared blended jam was done by taste panel. The tasting panel was consisting of 10 members. They were asked to evaluate the colour, flavour, consistency, taste and overall acceptability by a scoring rate, 9 means like extremely, 8 means like very much, 7 means like moderately, 6 means like slightly, 5 means neither like nor dislike, 4 means dislike slightly, 3 means dislike moderately, 2 means dislike very much and 1 means dislike extremely. The different preferences as indicated by scores were evaluated by statistical methods. Mean scores of sensory evaluation are presented in Table 2.

**Table 2:**

Sample	Appearance	Taste	Flavour	Texture	Color	Spreadability	After taste	Overall Acceptability
T1(90-10%)	7.4	7.64	7.25	7.12	7.54	7.23	7.38	7.45
T2(80-20%)	7.6	7.88	7.44	7.35	7.88	7.5	7.88	7.88
T3(50-50%)	7.5	7.88	8.1	6.67	7.77	7.22	8.77	8.0

Sensory evaluation indicated that fig jam with different formulations (i.e.; change in concentration of apple) was acceptable to consumers. The fig jam, however, had the highest mean scores for all attributes being compared. The differences in flavour and spreadability were not statistically significant at the ( $P>0.05$ ) 5% level. The differences in colour, taste and overall acceptability were, however, significant at ( $P < 0.05$ ) 5% level. Some assessors scored fig jam (sample 1) higher for flavor, texture and spreadability. The texture of fig jam (sample 2) had the lowest scores than other parameters or sensory attributes. Sufficient pectin content contributes to the spreadability of the fig jam (sample 2). The color of the product has been improved with the change in concentration of apple.

## 5. CONCLUSION

*Ficus carica* can be used in making jam. The low gel strength of the jam can be improved by the addition of pectin during processing to attain the commercially acceptable gel strength or a combination of fruits rich in pectin (apple) can be used to make up for the deficiency. Optimum gel formation is reported at pH 4.0 and satisfactory gel formation in tropical fruits is achieved at lower pH range. The combination with other fruits could serve to improve the flavor and the color.

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