



# Fruit-Vegetable Preservation Technology and Urban Women: A Study of Patna Town

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**Abstract :** *The present study was undertaken to assess the knowledge and adoption of preservation technology by the urban women of Patna town. It also aimed at finding out the knowledge about the fruit and vegetable preservation and technology and urban women. 50 urban women from the area of Frazer Road and Buddha Colony were selected by incidental sampling technique and questionnaire method was used. India ranks second in the world in the production of fruit and vegetable. It also produces a great variety of valuable horticulture products i.e. 49 million tones of fruit and 86 million*

*tons of vegetable per year. Educational qualifications of the women, 49% are graduate of which 13% are still they are unaware of Preservation Technologies. Most of the respondents (49%) were graduate very few respondent are post graduate. 21% of respondent belonged to the age group of 20-30 yrs 40% of the respondent belonged to the age group of 30-40 yrs, and 22% of the respondent belonged to 40-50 yrs of the age and 12% from 50-60yrs of age group. 22% are only matriculate and 16% only literate. The rate of women who make pickles at home is 52%. According to them pickle are very easily available in market all of them are house wife that's why they don't have enough time to prepare pickle at home. 12% of respondent answered that they know about the government agencies regarding food preservation technology & 88% of them were unaware of it.*

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## Introduction:

India ranks second in the world in the production of fruit and vegetable. It also produces a great variety of valuable horticulture products i.e. 49 million tones of fruit and 86 million tons of vegetable per year. These fruits and vegetables are nature's gift to man and play an important role in the diet of human beings. They not only provide protective nutrients, but are also an important source of roughage, since vegetables are low in calories due to presence of water and fiber. They are good for those who are obese.

Fruits and Vegetable are edible, and more or less juicy product of a tree or plant. Usually they are available with a wide range of flavor, colors and textures (Shakuntala, 2001).

As far as preservation is concerned, it is very useful to preserve fruits and vegetables. As we know that food preservation is the process of treating and handling food to stop Food spoilage, loss of quality, edibility or nutritional value and thus allow for longer food storage. Preservation usually involves preventing the growth of bacteria, yeasts, fungi and other micro-organism, as well as retarding the oxidation of fats which cause rancidity. Fruits and vegetables preservation can also include processes which inhibit visual deterioration, such as the enzymatic browning reaction in apples after they are cut.

Bihar has achieved significant levels of production in mango, guava, litchi, pineapple, brinjal, cauliflower, bhindi, and cabbage in India. Despite the state's leading role in food production, investment in irrigation and other agriculture facilities has been inadequate in the past.

- Bihar accounts for 71% of India 's annual litchi production.
- Maize accounts for 1.5 million MT (or 10 % of country production).

- Sugarcane produces 13.00 million MT.
- Litchi production is 0.28 million MT (Bihar contributes 85% of national production).
- Makhana level areas are 0.003 million MT (Bihar contributes 85% of national product).
- Mango is 1.4 million MT (13% of all India).
- Vegetable production is 8.60 million MT (9% of all India).
- Honey production is 1300MT (13% of all India).
- Aromatic rice 0.015 million MT.
- Milk Production (present): 4.06 million MT. COMPFED has established 5023 cooperative societies with 2.54 Lakh membership-highest among the eastern states.
- Fishery production levels are 0.27 million Lakh MT (Wikipedia).

Food preservation has been defined "as the science which deals with the process of prevention of decay or spoilage of food thus allowing it to be stored in a fit condition for future use" it has also been describe as the state in which any food may be retained over a period of time without (1) being containment by pathogenic organisms or chemicals (2) losing optimum qualities of color, texture, flavor and nutritive value. As far as preservation is concerned, it is very useful to preserve the fruits and vegetable. As we know that food preservation is the process of treating and handling food to stop down Food spoilage, loss of quality, edibility or nutritional value and thus allow for longer food storage. Preservation usually involves preventing the growth of bacteria, yeasts, fungi and other micro-organism, as well as retarding the oxidation of fats which cause rancidity. Fruits and vegetables preservation can also include processes which inhibit visual deterioration, such as the enzymatic browning

reaction in apples after they are cut (Mudambi, 2006).

In short, food preservation usually refers to the process of treating and handling food to stop or slow down spoilage in order to allow for a longer shelf life.

In 1810 Nicholas Appert, wrote "The Art of Preserving Animal and Vegetables for Many years", which is the first work on modern canning. In honour of his discovery canning is still known as 'Appertizing'.

Louis Pasteur in 1860, by his experiment on heat treatment he prove that micro-organisms are the real cause of spoilage and that by destroying these, foods can be preserved in suitable containers . he introduce the word 'Pasteurization', which means heat treatment of at a sufficiently high temperature to kill maximum, though not all, of the micro-organism, such as bacteria, moulds and yeast present in food , water and air and by preventing their access to the food inside the container by sealing it hermetically.

For instance spin-processing is possible for fruit pulp like mango pulp , tomato pulp, fruit purees, concentrate, syrups, canned fruits, juices and ready-to serve beverages.

Pattabhiraman, Sastry and their colleagues, at CFTRI (1969) have made a study of the method of preparation of odor concentrates of mango and guava and identified some of the odorous components. Such work is necessary in case of other indigenous fruits like custard apple, jackfruit, etc.

Recently, in connection with a systematic investigation on the concentration of the fruit juices, Siddappa and Bhatia studied the factors responsible for bitterness and gelation in orange juice concentrate.

Many processes designed to preserve food will involve a number of food preservation methods. Preserving fruit by turning it into jam, for example, involves boiling, sugaring and sealing in an airtight jar. There are many traditional methods or technology of fruit and vegetable preservation. These are:

**Freezing** - Most vegetables can last 8-12 weeks in the freezer.

**Canning** - Canning is a great method for preserving fruits and vegetables with high water content, like tomatoes, mushrooms, beans and peaches.

**Drying** - Drying fruits, vegetables and herbs is also a very easy process and can be done without any special equipment or speeded up by using the oven or a dehydrator. Dried fruits, seeds jerky, leather and even popcorn can be done by these methods.

**Pickling** - Vegetables and fruits can be preserved in this manner, including peppers, cauliflower, apples and pears. Relishes are also prepared by pickling.

Preservation of food helps in:

1. Increasing the shelf-life of food thus increasing the supply.
2. Making the seasonal food available throughout the year.
3. Adding variety to the diet.
4. Saving time by reducing preparation time and energy.

Preservation increase availability of food, thus improving the health of the people. Availability of seasonal foods throughout the year also helps in stabilizing price of such foods.

**Types of Preservation :**

**(a) Canning – Fruits** : Fruits are high-acidic foods, so they can be safely processed in a boiling

water canner. The heat destroys yeasts and molds that may be present in the food and forces oxygen from the product and jars. The result is a tight, vacuum seal as the jar cools, which prevents re-contamination of the product by yeasts and molds.

**(b) Canning – Vegetables and fruits :** Vegetables and meats are low acid foods ( $\text{pH} > 4.6$ ), and they must be canned in a pressure canner. The high heat is sufficient to kill yeasts, molds, bacteria, and also destroy the spores of bacteria such as *Clostridium botulinum*. In addition, the heat results in removal of oxygen from the product and jar. This result in a tight, vacuum seal as the jar cools.

**(c) Pickling :** When foods are pickled, the acidity of the food is increased. This is done by adding acid in the form of vinegar or by allowing fermentation to occur resulting in the natural production of acid in the product. There are two types of vinegar used in pickling. Apple cider vinegar and distilled white vinegar. Apple cider vinegar has a fruity flavor and can be used to pickle fruits. Distilled white vinegar is used for light colored products and products where a fruity flavor is undesirable. The natural acid that is produced is lactic acid and that preserves the product. The acid level allows the products to be safely canned in a boiling water canner. The heat results in the removal of oxygen from the product and the jar. These result in a tight, vacuum seal as the jar cools.

**(d) Jellied Fruit Products :** Jellied fruit products rely on acid in the fruit to limit microbial growth. In addition, sugar and or pectin are added to bind up water in a product making it unavailable for microbes to grow. Yeasts and molds are destroyed by heating in a boiling water canner which also forces oxygen out of the product and jar. The jars form a tight, vacuum seal when cooled.

**(e) Freezing :** Freezing lowers the temperature of foods to a level that halts microbial growth. Water in the product freezes and then becomes unavailable for microbes to grow. What you must remember is that freezing does not sterilize the food. When frozen foods are thawed, precautions must be taken to ensure their safety.

**(f) Drying :** Drying food removes water from it and prevents it from being available for microorganisms to grow.

Preservation increase availability of food, thus improving the nutrition of the people. Availability of seasonal foods throughout the year also helps in stabilizing price of such foods.

#### **Principles of Preservation :**

##### **(1) Preservation or delay of microbiological decomposition (Preservation techniques).**

- (a) By keeping undesirable microorganisms from the food (asepsis).
- (b) By removal of microorganism from the food, such as by filtration.
- (c) By hindering the growth and activity of microorganism, such as by employing low temperature, drying anaerobic conditions, or chemicals preservatives.
- (d) By killing the microorganism present in the food, such as by heating, irradiation or mechanical means.

##### **(2) Preservation or delay of self –decomposition of the food (Chemical spoilage).**

- (a) By destruction or inactivation of food enzymes, such as by blanching.
- (b) By preservation or delay of purely chemical reaction, such as prevention of oxidation by an oxidant, etc.

- (c) Prevention of damage to the food from insects, animals, mechanical means, etc. (packaging).

**Preservation Methods :**

• **Thermal Processing**

- Destroy microorganisms and enzymes
- Yeast, mold, enzyme – easily destroyed at boiling temperature (100°C)
- Bacteria – sometimes heat resistant
- Pasteurization – food is heated in a closed system, cooked fast and placed in a sealed container
- Ex : milk

• **Removal of heat (Cold Processing)**

- Reduces the rate of growth of microorganisms.
- Converts large percentage of water content of food to ice, making it unavailable for microorganisms.
- Prevents breakdown of cells caused by enzymes.

• **Control Of Water Content(Drying)**

- One of the oldest methods of food preservation.
- Reduction of moisture content thus preventing microbial growth.
- Exposure to air/artificial heat.
- Dried foods are lightweight and easier to store.

• **Radiation**

- Foods are subjected to gamma rays.
- Still being researched to ensure safety of treated product.

• **Pickling**

- Generally applies to food that is preserved in brine or vinegar.
- Essential Ingredients:

- Fruits and vegetables (firm, flesh, free of blemishes).
- Vinegar (renders a characteristic flavor, preserves by inhibiting growth of microorganisms).
- Sugar (acts as a preservative, adds sweetness).
- Spices (gives flavor).
- Other preservatives (alum/Tawas-crispness).

• **Fermentation**

- Not all microorganisms are harmful to food.
- Some organisms are able to produce acid which can stop the growth of harmful microorganisms.
- Fermentation – oxidation of carbohydrates, resulting in the production of acid and alcohol.

• **Canning**

- Packing food in tightly sealed tin cans or canning jars and heated at high temperature.
- Heating destroys harmful microorganisms.
- Sealing prevents the growth of aerobic organisms.

• **Smoke**

- Usually combined with salting and drying.
- Used to preserve fish and meat.
- Gives the food good appearance, flavor and odor.

**Purpose of the Study :**

Food processing industry has a wide scope not only in the national but also international market. Bihar is considered rich in fruit and vegetable production. The state government has taken a number of steps to increase the food

processing industry in the domestic as well as global market. This field carries a wide scope in self employment sector which has not yet been explored. Therefore this study is designed to find out about the extent to which the urban women of Patna have ventured in this field.

### **Significance of the Study :**

Self employment is a very good means of upliftment of women from a very small and unequipped stage.

It has been seen in the other state, the resources are commercially utilized not only for entrepreneur but also by common people in the self employment sector.

However this is not the scenario in Bihar. Patna being the commercial hub of Bihar, the self employment sector is yet to tap the potential of the food processing industry, especially women who are considered well equipped with the techniques and methods of food processing. Food processing is not enterprising enough to take this field to a commercial level. Therefore, food processing is related only to the domestic levels.

### **Objectives :**

- To assess the nutritional benefits of preserved food items.
- To study extent of adoption of fruit and vegetable preservation technology by urban women in Patna.
- To identify problems experienced by urban women of Patna in the adoption of preservation technologies.
- To find out the scope of self employment among urban women of Patna in this field.

### **Hypotheses :**

- Preservation provides nutritional benefits to the food items.

- Preservation of food items requires high degree of skill and training.
- Urban women are well trained in adopting various food preservation technologies.
- Urban women are utilizing this field as a source of self employment.

### **Review of Literature :**

In 1810 Nicholas Appert, found that "The Art of Preserving Animal and Vegetables for Many years", which is the first work on modern canning .In honor of its discovery, canning is still known as 'Appertizing'.

Louis Pasteur in 1860 , by his experiment on heat treatment proved that micro-organisms are the real cause of spoilage and that by destroying these, foods can be preserved in suitable containers. He introduced the word 'Pasteurization', which means heat treatment of at a sufficiently high temperature to kill the maximum, though not all, of the micro-organism, such as bacteria, moulds and yeast present in food, water and air and by preventing their access to the food inside the container by sealing it hermetically.

For instance spin-processing is possible for fruit pulp like mango pulp , tomato pulp, fruit purees, concentrate, syrups, canned fruits, juices and ready-to-serve beverages.

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Recently, in connection with a systematic investigation on the concentration of the fruit juices, Siddappa and Bhatia studied the factors responsible for bitterness and gelatin in orange juice concentrate.

**Methodology :**

**Area of Study :** Areas of Frazer Road and Buddha Colony of Patna town.

**Sample and Sampling :** Incidental sampling technique was adopted for the study.

**Sample Size :** The sample size of the respondent was 50 women between the age group 20-60.

**Research Tool**

**Interview Schedule :** Interview schedule will be prepared for the women .With the help of this in-depth interview schedule, data will be collected.

**Data Analysis :** After the collection of data it will be analyzed with the frequency distribution method. Further the total number of frequencies will be expressed in percentage.

**Results and Discussion :**

**Table- 1 : General information of the respondents**

S. No.	Information				
1.	Age	(20-30)yrs 21%	(30-40) yrs 40%	(40-50)yrs 27%	(50-60)yrs 12%
2.	Education	Literate 16%	Matriculation 22%	Graduation 49%	P.G. 13%
3.	Family structure	Nuclear 72%	Joint 28%	-	-
4.	Marital status	Married 79%	Unmarried 5%	Widow 16%	Divorcee 0%
5.	Income	30,000-40,000 63%	40,000-50,000 30%	50,000-above 7%	

Findings of the study a majority of the respondents (40%) were from 30-40 years of age, belonged to upper caste (54%), had nuclear family (60%) and agriculture as their main occupation (90%). They were mainly from medium socio-economic status (56%).

Educational qualifications of the women who are graduate are 49% but still they are unaware of Preservation Technologies. Most of the respondents (49%) were graduate very few respondent are post graduate (13%).

**Table – 2 : Shows that pickle was prepared by a majority of the respondents**

S. No	Pickle Making	%
1.	Yes	52%
2.	No	13%
3.	Rare	21%
4.	Sometimes	14%

Table – 2 shows that the rate of women who make pickles at home is 52%. Acc to them pickle is very easily available in market all of them are house wife and that’s why they don’t have enough time to prepare pickle at home. Besides that they prepare pickle for household purpose and not for business purpose.

**Table – 3 : Adoption of Various Preserved Items**

S. No.	Preserved Items	Yes (in %)	No (in %)	Sometimes (in %)
1.	Pickle			
	Amla	10	33	57
	Mango	84	11	5
	Lemon	82	6	12
2.	Chili	15	20	65
	Squash			
	Lemon	12	33	55
	Litchi	3	17	81
3.	Orange	12	33	55
	Mango	1	2	97
	Murabba			
	Awla	2	7	91
4.	Bathua	2	7	91
	Sauce			
5.	Tomato	18	41	41
	Chili	18	41	41
5.	Chutney			
	Tomato	3	4	93
	Mango	2	Nil	98
	Amla	4	Nil	96

In table-3 the mango pickle was prepared by 84% of the respondents.

People are not seen interested (12%) in making squash.

**Table – 4 : Any idea of Govt. agencies regarding food preservation**

S.No	Idea	%
1.	Yes	12
2.	No	88

12% of respondent answered that they know about the government agencies regarding food preservation technology & 88% of them were unaware of it.

According to the data, maximum number of women prepare pickle while murabba and chutney and other items which are prepared by the least number of respondents. Preparation of murabba and chutney are both time consuming and expensive, hence women don't prefer to prepare them. Pickles, specially mango and amla is preferred by women because it is, cost effective and is liked in the household.

Since good quality sauce is easily available in the market women don't waste their time in its preparation. Moreover women are not trained to prepare such items. Hence, they don't feel confident to prepare them.

- Fruits and vegetables were available only during short seasons.
- Inadequate and time consuming food preservation methods.
- Lack of facilities for rapid transport of food from long distances.
- Contamination of food supplies.

Large proportion of agricultural produce is wastage due to improper storage and warehousing, lack of transportation and food processing facilities. There is a significant shift in consumer food preference towards processed food products. Urban women can add value with proper management and marketing initiatives. The processed food market opens a great potential for employment for urban women.

#### **Conclusion :**

It was concluded from the study that the respondent are not aware of the changing trends of a modern consumer.

The urban women of Patna lag behind in the field due to poor knowledge with respect to the latest technology, equipment and method use in the sector.

Although food processing industry is considered a wide scope in national as well as global market.

They also lack awareness regarding the assistance provided by govt. organization.

Also due to lack of marketing facility in the city trained and skilled women don't want to explore this venture.

#### **Suggestion :**

Government should plan in order to encourage women entrepreneur in self employment sector. In the food processing industry government should take the following steps :

- Provide financial assistance specially designed for women entrepreneur.
- Organize training programs in the field of food processing.
- Create marketing opportunities by organizing fairs and exhibition at local , national and global level.
- Provide knowledge regarding the latest technology in food processing industry through workshops and seminars.
- Suggestion for women already working in this field.
- They should try and avail the facilities (financial as well as others) provided by govt. and non-govt. sectors.
- They should learn to adopt the latest technologies in the field of food processing industry.



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