



9

FOOD PRESERVATION

You are now familiar with perishability of food and importance of selection as well as storage of food to prevent its spoilage. Do you know how you can actually prevent food from getting spoilt? Yes, by preserving it. You must have seen it at your homes-potato wafers being dried, raw mango being cut and dried, tomato sauce, *chutneys*, *dal wadi* and *papads* being made.

Preserved food not only adds variety to our meals but also helps in utilising excess produce at harvest time. Let us learn more about food preservation in this lesson.



OBJECTIVES

After reading this lesson, you will be able to:

- define the term 'food preservation' and state its need;
- explain the basic principles of food preservation;
- list and describe household methods of food preservation;
- describe recipes for preservation of simple food items at home.

9.1 MEANING AND NEED FOR PRESERVATION

Food preservation is to treat food to keep it in good condition for a long time. Why do we do that?

Let us take a simple example of boiling milk. Why do we boil milk? So that we can use it for a longer period. You know that boiling delays milk from getting sour. You can say you have processed milk and preserved it, even if it is for a short duration.



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Food preservation is a form of processing of food to prevent it from spoilage and making it possible to store in a fit condition for future use.

It may be as simple as boiling of milk or complicated like pickling of mango or lemon. By preserving foods, we are also increasing their shelf life. You already know what shelf life of food means. Yes, it means the time period for which a food can remain fit for human consumption at optimum temperature.



Activity 9.1: There are a lot of preserved foods available in the market. List five of them and state approximate shelf life of each. Also, state if there are any instructions about keeping each. Can you state one reason for doing so?

Activity Table

Food item	Shelf life	Keeping instructions on label	Reason (Remark)
1.			
2.			
3.			
4.			
5.			

9.1.1 Need for preservation

- To increase the shelf life of foods.
- To prepare new products like jams, papads, pickles, etc. Such products are enjoyed by everyone and all the year round.
- Processing reduces the bulk of fruits and vegetables. The storage and transportation becomes easier, e.g., 1 kg of carrots would take more space than 1 kg of carrot *murraba*.
- Helps in utilizing the food stuffs when available in excess.

9.2 PRINCIPLES OF FOOD PRESERVATION

You have learnt earlier that by boiling milk we are preserving it for a longer time. But, what are you actually doing by boiling? You are killing the micro-organisms by raising the temperature of milk. Micro-organisms cannot survive at very high temperature. This is one of the principles of food preservation. Let us now learn about the principles of food preservation:

1. By killing the micro-organisms.



2. By preventing or delaying the action of micro-organisms.
3. By stopping the action of enzymes.

1. By killing the micro-organisms

You already know that boiling of milk kills micro-organisms. Sometimes, heat is applied for a shorter duration to kill only undesirable micro-organisms, that is those which can spoil the food stuff. It is done while pasteurizing milk. The cooking that you do at home also keeps food free from micro-organisms. In canning, (sealing in tins) food is heated to high temperature to prevent growth of micro-organisms in food.

2. Preventing or delaying the action of micro-organisms

You all know that a peeled apple spoils faster than one with intact skin. Do you know why? This is because the apple has its skin as a protective covering which prevents the entry of micro-organisms. Similarly, the shell of nuts and eggs, skin of fruits and vegetables serve as a protective coating and delays the action of micro-organisms.

Food packed in polythene bags and aluminium foils are also protected against micro-organisms. You have read earlier that micro-organisms need air and water to grow. But if these are removed, you can prevent the action of micro-organisms and ensure that food does not get spoilt.

Lowering temperature or freezing a food also helps in delaying the action of micro-organisms and thus in food preservation. You must have come across frozen foods. Frozen food can be kept for a longer time than fresh food. This is because micro-organisms cannot act at low temperatures. Thus, when you are putting food in the refrigerator or freezer, you are preventing the micro-organism from growing. Lastly, certain chemicals like sodium benzoate and potassium metabisulphite also help in preventing the growth of micro-organisms. These chemicals are called 'preservatives'.

Thus you have learnt that the action of micro-organisms can be delayed or prevented in many ways:

- by providing a protective covering
- by raising the temperature
- by lowering the temperature
- by adding chemicals

3. By stopping the action of enzymes

Enzymes also cause food spoilage. They are naturally present in food. Take the example of fruits. Keep a raw banana for a few days and observe what

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happens to it. Yes, the banana will turn ripe, become yellow and then start decaying and browning. All this happens due to presence of enzymes. What will happen if the action of enzymes is stopped? The foodstuff will be prevented from spoiling.

Enzyme action can be prevented by giving a mild heat treatment. Before canning or freezing, vegetables are dipped in hot water or exposed to steam for a few minutes. This is known as *blanching*. When you heat milk, you are not only killing micro-organisms present in it but also stopping the action of enzymes. This extends its shelf life.



INTEXT QUESTION 9.1

1. Which of the following will not help to arrest the action of micro-organisms on tomatoes :
 - (a) put them in boiling water
 - (b) put them in a freezer
 - (c) leave them on the shelf.

2. List four ways of delaying action of micro-organisms on apples.

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3. Define preservation and shelf life.

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9.3 HOUSEHOLD METHODS OF FOOD PRESERVATION

Some of the practical methods which can be used for preserving food at home are:

- (i) Dehydration (Drying)
- (ii) Pickling with salt, spices and/or oil
- (iii) Making jams, jellies, *murabbas*



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- (iv) Bottling of squashes and juices
- (v) Freezing

i) Dehydration (Drying)

Preservation of foods by drying is an age old method. Drying is observed in cereal grains, legumes and nuts. All these dry on the plant itself.

Dehydration usually implies the use of controlled conditions of heating, with the forced circulation of air.

Dried foods are preserved because the available moisture level is so low that micro-organisms cannot grow and enzyme activity is controlled. Due to their reduction in weight, dried foods are more easily transported and stored.

You can make various types of *papads*, *amchur*, potato/banana and tapioca chips, *badis*, etc., by sun-drying at home. Vegetables can also be sundried by first blanching and then drying. You can sun-dry beans, peas, potatoes, cauliflower, ladies finger, garlic, onion and all leafy vegetables. Fruits like apricots, bananas, dates, grapes, peaches, pears, apples, etc. can also be sun-dried. The process is simple.

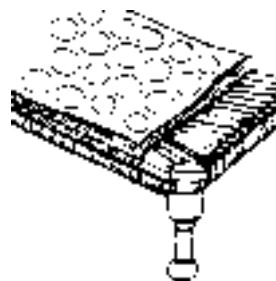


Fig. 9.1: Dehydration

Green leafy vegetables like *methi*, *pudina*, *palak* are washed thoroughly, plucked, spread on a clean cloth and sun dried. They are covered with a muslin cloth to prevent contamination by dust. After drying, they are stored in clean, dry, air-tight containers.

POTATO CHIPS

Ingredients

- Potatoes
- Salt
- Polythene bags
- Water
- Potassium metabisulphite (KMS)
- Trays or big plates or large polythene sheets
- Muslin cloth

Method

Wash potatoes, peel and cut into circular pieces of 2-3 mm thickness. Dip the pieces in boiling water for 3-4 minutes. Take out and dip the potato chips in cold water containing little salt and potassium metabisulphite for 10 min-



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utes. For 1 liter of water, add 20 grams of salt and 3 grains of potassium metabisulphite. This is done to prevent blackening of the vegetables.

Strain and arrange the potato slices on a tray or polythene sheet. Cover with muslin cloth and place in the sun for several days till completely dry. Store in air-tight containers or pack in polythene bags.

Note : Raw banana, tapioca can also be dehydrated similarly.

ii) Pickling with salts, spices and/or oil

There will rarely be any house in India where pickles are not eaten. Recall the pickles that you ate this season.

Do you know how salt, spices and oil help in preserving the pickles? We know that every foodstuff has some amount of water in it, which helps micro-organisms to grow. When salt and spices are added, they draw out the water from the foodstuff, thus micro-organisms cannot grow. Moreover, they improve the flavour of the food being preserved. Spices such as mustard, pepper and *hing* (asafoetida) are used in pickling.

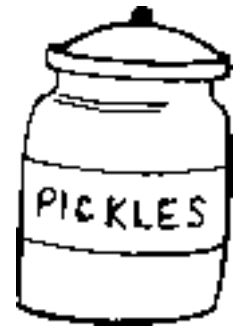
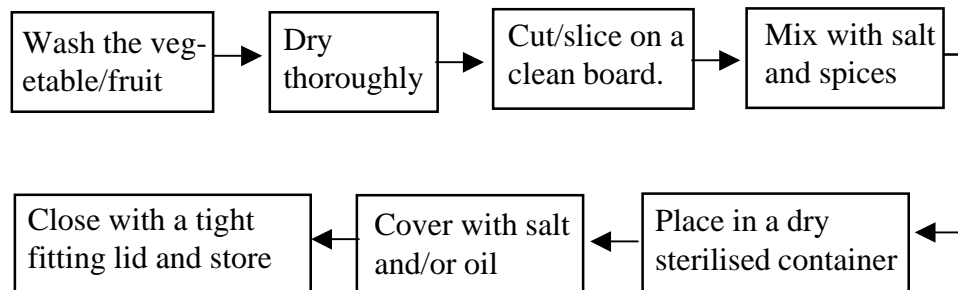


Fig. 9.2: Pickling

You must have observed that the pickle is usually covered with a layer of oil. Why? This is because, the layer of oil prevents the foodstuff from coming in contact with the air, thus preventing the entry of micro-organisms, which can spoil the pickle.

Foodstuffs that can be pickled are lemon, mango, amla, carrot, ginger, cauliflower red/green chilli, etc. You can surely add many more to this list.

The process of preparing a pickle is simple.



Here is a recipe for sweet lemon pickle. You can prepare other pickles in the same way as explained above.



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SWEET LEMON PICKLE

Ingredients	Quantity
Lemon	1 kg
Salt	150 g
Black salt	100 g
Cloves (powdered)	2 No.
Ajwain	40 g
Hing	1 g
Black pepper powder	40 g
Sugar	200 g

Method

Select round, fully mature and juicy lemons. Wash well and dry. Cut each lemon into 8 pieces. Put in a clean jar. Add all the spices and sugar. Shake well. Keep the pickle in sun for 10-12 days, shaking it occasionally.

(iii) Making jam, jellies and murabbas

You can make jam by boiling the fleshy part (pulp) of the fruit with sufficient quantity of sugar to a thick mixture. You can make jams with apple, mango, papaya, pineapple, raw mango, etc.

Jellies are prepared by boiling the fruit with or without water and straining it. Then the strained and clear juice extract containing pectin (helps to set the jelly) and acid is mixed with sugar and the mixture is boiled. It is boiled to a stage at which it will set to a clear jelly-like substance. A well made jelly is transparent, well set and has the original flavour of the fruit. Guava, pineapple and orange can be easily converted into jelly.



Fig. 9.3

Murabbas are made by boiling the fruit in sugar solution, till they become soft. Murabbas are popular for eating with chapatis, puris, etc.

Let us now learn how to make a mixed fruit jam and amla murabba.

MIXED FRUIT JAM

Ingredients	Quantity
Mixed fruit pulp	500 g
Sugar	500 g
Citric acid	4 g (1 teaspoon)
Water	100 ml
Fruit essence	few flops
Red colour	1/2 teaspoon.

AMLA MURABBA

Ingredients	Quantity
Ingredients	
Amla	1 kg
Sugar	1.5 kg



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Procedure	Procedure
<p>1. Wash the fruits, peel them and cut them into small pieces. You can use banana, apple, sapota (cheeku), mango, etc.</p> <p>2. Convert fruit pieces into pulp by mashing them manually or in a mixer. Boil 3. the apple peels and seeds in 100 ml of water. Strain it and add the water to fruit pulp (This will extract pectin from peel. Pectin is a substance which helps in setting the jam). 4. Boil fruit pulp for about 15 minutes. Add sugar. Continue boiling with constant stirring. 5. After about 30 minutes, when the mass starts thickening, add citric acid dissolved in small amount of water. 6. Continue boiling till the pulp falls from the spoon in the form of a flake or sheet. When you put a small amount of this into a plate of cold water, it will settle in one place. This shows the end point or the point at which the jam is ready. 7. Remove the jam from fire and add essence and colour. 8. Fill hot jam into clean, sterilized bottles and cool the bottles. While filling hot jam, place the bottles over a wooden board. 9. If you want to keep the jam for a long time, pour a layer of melted paraffin wax over it and cover the bottles tightly. This wax can be removed at the time of use.</p>	<p>1. Prick amla with fork and steam cook for 5 minutes</p> <p>2. Add 50% of sugar (750 gm) to amla and mix well on the first day.</p> <p>3. On the second day see that the sugar dissolves, if not remove amla from the syrup and heat till the sugar dissolves. Cool the syrup and add amla and left over sugar (750 gm).</p> <p>4. Repeat on the third day. Add all the left over sugar.</p> <p>5. Amla murraba is ready for use after 15 days.</p>

(iv) Bottling of squashes

A glass of cold lemon squash is always welcome in summers. Lemon squash or any other squash can be easily prepared at home. For preparing squash, fruit juice is mixed with sugar syrup. The quantity of sugar depends on the quantity of fruit juice. Squashes should be stored in bottles with a narrow mouth and tight fitting lid. You can prepare squashes with lemon, orange, mango, grapes, pineapple, etc.

Let us now learn how squashes are made.

General procedure for making squash

1. Extract the fruit juice and filter it through a sieve.
2. Make a syrup with sugar and water.
3. Add citric acid to the syrup and remove from flame when a white layer forms at the top.



4. Cool the syrup and filter it.
5. Mix with the juice extracted, add colour and essence.
6. Add potassium metabisulphite (KMS) or sodium benzoate. Mix and put in sterilized bottles immediately leaving some head space. (space between top of the liquid and the bottle cap).

Note :

- (1) To extract juice from grapes cook for 5-10 min and pass through the strainer.
- (2) To extract juice from pineapple, cut into pieces (without removing the skin) grate and squeeze with muslin cloth.

Ingredients	Fruit Juice				
	Lemon	Orange	Lichi	Mango	Pineapple
Fruit juice (kg)	1	1	1	1	1
Sugar (kg)	1½	1½	1½	1	1½
Water (kg)	¾	¾	¾	1	¾
Citric acid (gm)	—	25	25	30	25
Colour	—	1 tsp	—	—	1 tsp
Essence	—	1 tsp	—	—	1 tsp
KMS (tsp - tea spoon)	½ tsp	½ tsp	½ tsp	½ tsp	½ tsp

(KMS - Potassium metabisulphite.)

Sterilization of bottles: For preserving any product, it is essential that bottles should be properly sterilized. For this, fill a big vessel with water in which bottles can be dipped. Bottles should be left in boiling water for 20 minutes. Put a layer of cloth at the bottom. Place bottles over it. After sterilization, keep the bottles well covered so that they do not get contaminated again.

(v) Freezing

Freezing fruits and vegetables in season can be of great benefit as they can be available when they are not in season. For example, freezing of peas in winter when they are cheap and of good quality, can be of great use in summer when they are very expensive. Let us learn how freezing of peas is done.

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FREEZING OF PEAS

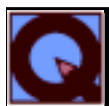
Select fresh, tender peas and shell them. Take sufficient water to completely immerse the peas. Add 10 gms of salt for every 1 litre of water and boil. Add peas to the boiling water and leave for 2 minutes. Drain and cool immediately. Pack in small polythene bags, remove air by pressing and seal the bags. This is done so that no micro-organisms remain in the packet. Place the packets in the freezer.

You can also freeze cauliflower, beans, carrots, capsicum, ladies finger, green chana, corn, spinach, methi, etc. in the same way. A temperature of 18°C is recommended for storage of frozen foods. The period during which the food can be stored successfully varies with food and storage temperature.



Activity 9.2 : Visit a market, find out the preservatives used in the following products:

S.No	Product	Preservative used
1.	Orange squash	
2.	Mango pickle	
3.	Guava jelly	
4.	Tomato sauce	
5.	Apple Jam	

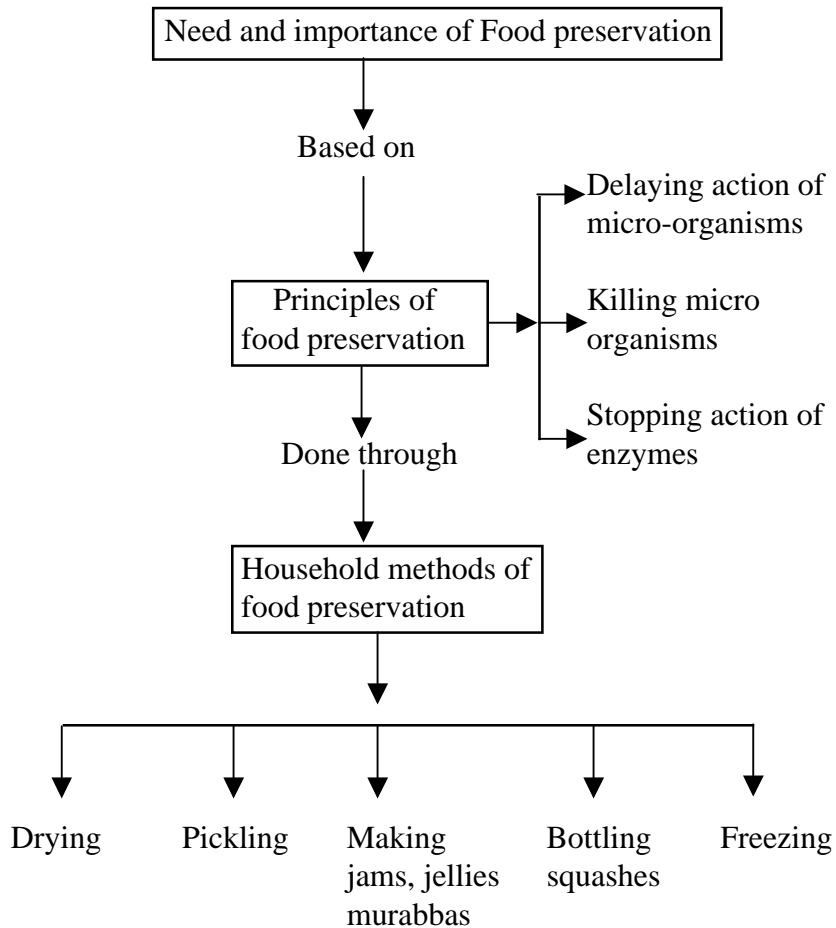


INTEXT QUESTIONS 9.2

1. The common preservative used in making squashes is:
 - (a) KS
 - (b) KSM
 - (c) KMS
2. Oil in pickles
 - (a) delays the action of micro-organisms.
 - (b) kills the micro-organisms.
 - (c) stops the action of micro-organisms.
 - (d) stops the action of enzymes.
3. Freezing preserves food because it
 - (a) delays the action of micro-organisms.
 - (b) kills the micro-organisms.
 - (c) stops the action of micro-organisms.
 - (d) stops the action of enzymes.
4. Write the steps for preparation of mango pickle.
5. Write the steps of freezing *methi* leaves.



WHAT HAVE YOU LEARNT



Notes



TERMINAL EXERCISE

1. What is food preservation?
2. Give four reasons why we should preserve food.
3. Suggest the best method to preserve the following foods and give one reason for each selection:
 - (a) Orange juice
 - (b) Raw mango
 - (c) Apple
 - (d) Potato
 - (e) Carrots



Notes

**ANSWERS TO INTEXT QUESTION**

- 9.1** 1. (c)
2. (a) Do not remove the peel
(b) Pack apples in polythene/aluminium foil.
(c) Keep in the refrigerator
(d) Make jam
3. Refer to text

- 9.2** 1. (c) 2.(c) 3. (c)
4. Wash mangoes; wipe with clean cloth; cut into pieces; mix in salt and spices; place in clean bottles; cover with oil; close with tight fitting lid.
5. Wash methi well; pluck the leaves and tender stems; pack in small polythene packets and seal; place in the freezer.

ANSWERS TO TERMINAL EXERCISE

1. Refer text
2. (a) To increase their shelf life
(b) To prepare new products
(c) To reduce the bulk of fruits and vegetables
(d) To prevent spoilage and wastage of food
3. (a) as squash
(b) as pickle
(c) as jam or jelly
(d) as wafers
(e) as pickle

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