

Block

2

FOOD CHOICE, PREPARATION AND PRESERVATION

UNIT 6

Let Us Choose the Right Food **55**

UNIT 7

How Healthy are Our Meal Patterns? **63**

UNIT 8

Let Us Ensure Taste and Nutrient Retention **68**

UNIT 9

Let Us Make Food Safe to Eat **82**

UNIT 10

Let Us Preserve Food **88**

BLOCK 2 FOOD CHOICE, PREPARATION AND PRESERVATION

Block 2 consists of five units. It is intended to provide the learner with a comprehensive knowledge of the combination of different foods to improve its nutritional value, different methods of cooking to retain the nutrients and make the meals attractive. The learner after going through this block will also learn about the different methods of food preservation and personal hygiene to prevent food spoilage.

In *Unit 6* we study more about suitable combinations of different foods taking into consideration their nutritive value, their seasonal natures, their local availability and their cost. The intention is to lead you to select available foods wisely and combine them in a manner that provides preparations which are not only nutritious but also fresh and of low cost.

In *Unit 7* we take a look at the variety of foods commonly consumed in our country and the meal patterns prevalent among vegetarians and non-vegetarians. The meal patterns of the high and low income groups of families are also studied in the rural and urban contexts. In this unit, we take stock of the status of meal patterns prevalent in India among different sections of the population in order to let you realise that the majority of our population do not consume healthy meals and that we need to pay more attention to our daily meals.

In *Unit 8* we try to help you to learn more about the many methods of food preparation and of cooking, so that you can handle foods in a skilled manner and have such food preparations for yourself and the family which are not only nourishing but also have variety, attractiveness and a pleasing flavour.

In *Unit 9* the emphasis is on the ways and means of prevention of infection, infestation and spoilage of food. This unit will make you aware of the principles of food and personal hygiene.

In *Unit 10* we will study about the scientific methods of food preservation and storage. Such methods of preservation not only help us to maintain the quality of food but also prevent the wastage of certain foods which are available in plenty only in certain seasons of the year and are scarce in others.

UNIT 6 LET US CHOOSE THE RIGHT FOOD

The inclusion of food-stuffs rich in several nutrients as well as suitable combinations of different foods enhance the nutritional value of our meals tremendously. It is not only important to eat nutritious food but it is equally important to choose the right foods. The use of seasonal, locally available and inexpensive quality foods must be encouraged.

Structure

- 6.0 Objectives
- 6.1 Introduction
- 6.2 Socio-Cultural Beliefs and Practices
- 6.3 Seasonal Foods
- 6.4 Locally Available Foods
- 6.5 Inexpensive Quality Foods
- 6.6 Food-stuff Rich in More Than One Nutrient
- 6.7 Combination of Foods
- 6.8 Let Us Sum Up
- 6.9 Glossary
- 6.10 Answers to Check Your Progress Exercises

6.0 OBJECTIVES

After studying this unit, you will be able to:

- select and include the right foods in your meals;
- list the benefits of eating seasonal, locally available and inexpensive quality foods;
- list foods which are rich in more than one nutrient; and
- use foods in various combinations.

6.1 INTRODUCTION

You know that food is necessary for life. If we do not eat adequate food, our body will not function properly and we will become prone to diseases. You have also read that we must eat a mixed diet, that is a combination of all types of food. In Unit 5 you have studied the different food groups and the foods included in each group. In order to remain healthy, it is essential to consume foods from each group. The concept of food groups helps us decide which food-stuff to include in our diet. This helps to have variety in our diet and also take into account non-availability of certain foods. For example, in winter it may not be possible to eat mangoes as a source of vitamin A.

However, a suitable alternative would be carrots. Therefore, it is not only necessary to know the types of food to eat but also to choose the right food. Besides the nutrient content, let us now think of other factors which would help us choose the right food.

6.2 SOCIO-CULTURAL BELIEFS AND PRACTICES

Certain customs and beliefs have an important influence on food consumption. We must consider these while choosing our food. It is no use trying to convince a vegetarian to eat chicken or to try and force a person who dislikes eggs to eat them. Therefore, religious beliefs, social customs and individual likes and dislikes all influence our choice of food. You will need to examine your choice in the light of what you learn in this course. You may find that some of your choices are beneficial, but others may need to be altered if these affect our food intake adversely. Certain socio-cultural factors may not always have a good effect on our food intake. Therefore, we must discourage harmful beliefs like the restriction of certain foods during pregnancy and lactation. Nowadays, certain foods like ready-to-eat snacks, and fast foods, which are very easily available have become popular. These may be tasty but the nutritional value of some of these is questionable and therefore not beneficial to our body.

Practical Activity 1

List three beliefs or fads which you think have a bad influence on your diet.

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Practical Activity 2

List five foods which are very popular but of poor nutritional value.

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6.3 SEASONAL FOODS

We must keep in mind a number of factors while choosing from a wide range of foodstuffs. The use of seasonal foods must be encouraged. Seasonal foods are those foods which are available in plenty only during a particular period, as they are grown in that season. At the peak of a season, each vegetable and

fruit has the highest nutrient content and the best flavour. Vegetables which have been stored in cold storage or fruits which have been preserved with the use of preservatives and by canning, lose their flavour to a certain extent. During the process of preservation some loss of nutrients also occurs. Vegetables like peas, carrots, cauliflowers are cheaper in winter than in summer. Mangoes, which are available in summer are less expensive than winter fruits which may also be available in the hot, summer months. Thus, you can get high quality at a low price, when you buy seasonal foods. In Table 6.1, a list of fruits and vegetables available in different seasons is presented.

Table 6.1: Seasonal Fruits and Vegetables

Season	Vegetables	Fruits
Summer	Bhindi	Mangoes
	Beans	Pineapples
	Tinda	Pears
	Cucumber	Melon
	Lauki	Watermelon
	Capsicum	
Winter	Beetroot	Apples
	Peas	Lemons
	Cauliflower	Grapes
	Carrots	Mausambi
	Radish	Oranges
	Methi	Guava
	Spinach	
	Cabbage	
	Bathua	

Practical Activity 3

Conduct a market survey and list the price of five seasonal and five non-seasonal vegetables. Compare the costs. List the price of any two vegetables and two fruits in season and offseason. Compare the costs.

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6.4 LOCALLY AVAILABLE FOODS

All of us either buy foods from the local market or grow them in our kitchen-gardens or fields. In other words, we eat those foods which are grown around the place we live in. It is impractical to get foods to eat from a place situated far away. Besides this, the cost of transportation, storage, etc., also increases the price of these foods. As mentioned earlier, the food loses some flavour as well as nutrients if it is stored. Thus, if you include locally available foods in your diet you are ensuring better nutrition at a lower cost. Foods available in a particular area are also more popular in that place and may not be acceptable to people living in a different part of the country e.g., ragi, a cereal, grown and eaten in South India is not readily acceptable in the North. Maize flour, wheat and dalia are cereals more common in North India while the staple cereal in the South and the East is rice. Similarly, fish and sea-foods are popular in the coastal areas of our country. The consumption of milk and milk products is high in Punjab and other Northern States due to its easy availability.

6.5 INEXPENSIVE QUALITY FOODS

A very wrong notion that exists in our mind is that food which is expensive is of better nutritional value as well. On the contrary we find that foods which are cheap are often very rich in their nutritional value. Most of us believe that almonds are very good for health; but the cheaper groundnuts are equally nutritious. Iron is better absorbed from animal sources as compared to vegetable sources. Egg and flesh foods are good sources of iron. These foods however, are costly and may not be within the reach of all of us. Cereals and pulses can be sprouted or germinated (Unit 8) to increase their nutrient content. Vitamin C and certain B complex vitamins are increased by this process. Similarly, fermentation increases the quality and quantity of nutrients. Thus, high quality and quantity foods are not expensive if you know how to choose them.

6.6 FOOD-STUFF RICH IN MORE THAN ONE NUTRIENT

All foods contain more than one nutrient. The amount of nutrients present, however, may vary from food to food. We call certain foods 'nutritious' because they contain several nutrients in significant amounts. You have already read about the nutrient content of various foods in Units 3 and 4. The Table 6.2 lists the nutrients present in different foods:

Table 6.2 Nutrients in Edible Portions of Common Foods (Per 100 gm)

Let Us Choose
the Right Food

		Whole Wheat flour	Raw milled rice	Bengal gram Dhal	Soya bean	Ground-nut	Buffalo Milk	Cows Milk	Butter	Ghee (Buffalo)	Hydro-genated oils (Vanas-pati)	Cooking oils
Nutrients:												
Net calories (Energy)	Kcal	320	356	329	381	520	107	72.89	729	900	900	900
Protein	gm	10.57	7.94	21.55	35.55	23.65	3.68	3.2	0	0	0	0.
Carbohydrate	gm	64.17	78.2	46.72	12.79	17.27	8.39	4.94	0	0	0	0
Fat	gm	1.53	0.5	5.31	19.82	39.63	6.5	4.4	81.0	100.0	100.0	100.0
Calcium	mg	30.94	7.49	46.32	239	54	121	118	0	0	0	0
Iron	mg	4.10	0.65	6.08	8.29	3.44	0.16	0.15	0	0	0	0
Vitamin A (Retinol)	mcg	7	0	32	106.	9	48	53	960	270	750	0
Vitamin B ₁ (Thiamine)	mg	0.42	0.05	0.35	0.59	0.57	0.05	0.03	0	0	0	0
Vitamin B ₂ (Riboflavin)	mg	0.15	0.05	0.15	0.24	0.12	0.13	0.11	0	0	0	0
Niacin	mg	2.37	1.69	1.87	2.72	11.35	0.07	0.08	0	0	0	0
Vitamin C	mg	0	0	0	0	0	2.37	2.01	0	0	0	0

		Sugar	Cane Jaggery	Potato	Spinach	Apple	Banana	Almond	Egg (Hen)	Goat meat	Fish (Rohu)	Rice Flakes Chirwa)
Nutrients:												
Net calories (Energy)	Kcal	82	354	69.78	24.37	62	111	609	168	118	102	353
Protein	gm	0.1	1.85	1.54	2.04	0.29	1.25	18.41	13.3	21.4	19.71	7.44
Carbohydrate	gm	13.11	84.87	17.89	2.05	13.11	24.95	3.04	0	0	2.34	76.75
Fat	gm	0	0.16	0.23	0.64	0.64	0.32	58.49	13.3	3.6	1.4	1.44
Calcium	gm	18	107	9.52	82.29	13.68	6.77	228	50	6.18	39.37	9.19
Iron	mg	0.15	4.63	0.57	2.95	0.26	0.40	4.59	1.63	1.48	1.04	4.46
Vitamin A (Retinol)	mcg	0	42	6	1395	0	20	0	510	0	0	—
Vitamin B ₁ (Thiamine)	mcg	0	0.04	0.16	0.16	0.03	0.01	0.15	0.14	0.07	0.05	0.12
Vitamin B ₂ [Riboflavin]	mg	0	0.01	0.01	0.10	0.01	0.04	0.26	0.08	0.17	0.04	0.04
Niacin	mg	0	0.02	1.36	0.33	0.25	0.48	3.71	0.14	5.14	2.33	1.60
Vitamin C	mg	0	0	26.11	30.28	3.57	8.06	0.74	0	0	22	--

Source: Indian Food Composition Tables, NIN (2017), ICMR, Hyderabad

As shown in the Table 6.2, cereals, besides providing energy are also a good source of protein and B complex vitamins. Milk is sometimes called a 'complete food' since it contains almost all nutrients except iron and vitamin C. Animal foods like egg, meat, fish and poultry also provide several nutrients like protein vitamin A, B complex and minerals. Fruits and vegetables are good sources of minerals and vitamins, while sugar and the fats mainly provide energy. Thus, by including in our diet foods rich in several nutrients we can enhance the nutritional value of our diet substantially.

Check Your Progress Exercise 1

- 1) Do the following foods provide more than one nutrient? Give your answer as Yes or No.
 - a) Milk
 - b) Sugar
 - c) Rice
 - d) Bengal gram
 - e) Ghee
 - f) Spinach

6.7 COMBINATION OF FOODS

You have read earlier that the combination of certain foods in our diet increases their nutritional value. Cereals and pulses, if eaten separately are not as nutritious as when eaten together. A combination of cereals and pulses improves the quality of protein in the meal which is not difficult to get. Dosas, idlis, khichri, missi roti, etc., are all examples of cereal-pulse combinations which we eat frequently.

A combination of cereals with vegetables is also nutritious. The addition of vegetables increases the content of vitamins and minerals in the meal. Sarson ka saag and Makki ki roti, vegetable stuffed parathas, tomato sandwiches are commonly eaten vegetable- cereal combinations.

You know that all foods are good sources of certain nutrients. Therefore, in order to eat a wholesome meal it will be advisable to include several foods in the meal. Cereals and fats will mainly give energy, pulses and meat mainly protein, and vegetables and fruits, minerals and vitamins.

Check Your Progress Exercise 2

- 1) Given below are the names of five commonly eaten foods. State whether they are combination foods or not: Say 'yes' or 'no' against each food.
 - a) Egg custard
 - b) Dal stuffed parathas.....
 - c) Besan laddoo
 - d) Chapati

- e) Vegetable pulao
- f) Curd

Practical Activity 3

Plan and prepare one dish each

- 1) Using seasonal vegetables or fruits.
- 2) Using low cost nutritious foods.
- 3) Using food which has more than one nutrient.
- 4) Using a combination of cereals, pulses and vegetables.

6.8 LET US SUM UP

Let's choose the right food

- Seasonal foods
- Locally available foods
- Inexpensive, quality foods
- Foodstuffs rich in more than one nutrient
- Combination of foods

It is important to eat food, but it is equally important to choose the right food. We must encourage the use of seasonal as well as locally available foods since they are cheaper, more nutritious and easily available. Food/stuffs which are rich in more than one nutrient should be included in our daily diet. Low cost foods may also be very nutritious and one need not spend money on costly, prestige foods. The nutritional value of our diet may be improved by combining certain foods together.

6.9 GLOSSARY

Canning	: Preserving in sealed metal containers
Fast foods	: Foods which are partially prepared and fast to cook
Fermentation	: Process that is caused by addition of yeast to wheat or rice flour
Germination	: Sprouting of seeds
Makki ki Roti	: Roti made of maize flour
Missi ki Roti	: Roti made with Bengal gram flour and wheat flour
Preservative	: (Quality, course of action, etc.) tending to preserve; (substance) for preserving perishable food-stuffs
Sarson Ka Saag	: A preparation of mustard leaves eaten commonly with maize flour roti.

6.10 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress Exercise 1

1) a) Yes b)No c) Yes d)Yes e) Yes f) Yes

Check Your Progress Exercise 2

1) a) Yes b)Yes c) Yes d)No e) Yes f) No



UNIT 7 HOW HEALTHY ARE OUR MEAL PATTERNS?

Since India has a vast population spread over different states, there is great diversity in the food habits and food consumption patterns. A large section of the population is vegetarian, while a minority consume flesh foods. In this unit, we will discuss the adequacy of the various meal patterns.

Structure

- 7.0 Objectives
- 7.1 Introduction
- 7.2 Foods Commonly Consumed in Our Country
- 7.3 Our Meal Patterns — Vegetarian and Non-vegetarian
- 7.4 Nutritional Adequacy of Our Diets
- 7.5 Let Us Sum Up
- 7.6 Glossary
- 7.7 Answers to Check Your Progress Exercises

7.0 OBJECTIVES

After studying this unit, you will be able to:

- list the variety of foods selected and consumed in India; and
- discuss the nutritional adequacy of vegetarian and non-vegetarian diets.

7.1 INTRODUCTION

India, as you are probably aware, has an economy based mainly on agriculture. Though there has been a considerable increase in the production of food grains over the past several-decades, the concomitant increase in population has offset the balance. The nutritional status of the population is a reflection of their food consumption patterns. Thus, before making any attempt to improve the nutritional status of our people, it is essential to know how healthy our meal patterns are.

7.2 FOODS COMMONLY CONSUMED IN OUR COUNTRY

It is a well-known fact that cereals or millets form the main food item (staple food) in Indian diets. The commonly consumed ones are wheat, rice, jowar, bajra, ragi, maize and barley. People living in the North, North-Western and Central regions of India mainly eat wheat and millets while those residing in the South and the North-East consume mainly rice. Another common food item consumed in our households is pulses. The common pulses are bengal gram, red gram, black gram, green gram and lentil.

Depending on the region, a wide variety of green leafy vegetables, roots and tubers, other vegetables and fruits are available. Therefore, seasonal variations and availability affect the consumption of these foods.

In India, there is a sizeable population of milch cattle, and thus milk is an important food-stuff consumed in the country. A very large proportion of this milk is also converted into various products for consumption like curds, buttermilk, butter, ghee, khoa, malai and chenna (cheese). Animal foods consumed in India are eggs, meat and poultry and a large variety of fish. Since, India is also one of the largest producers of oil-seeds such as groundnuts, sesame, mustard, coconut, etc., they are included in our diets in a number of ways. A variety of spices and condiments are an essential part of an Indian diet. These include chillies, pepper, cardamom, cloves, cumin seeds and mustard.

Practical Activity 1

List the foods which commonly form part of the diet in your region as per the three basic food groups.

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7.3 OUR MEAL PATTERNS—VEGETARIAN AND NON-VEGETARIAN

The dietary pattern followed in India is mainly a vegetarian one. Such a dietary pattern consists of inclusion of food-stuffs like cereals, pulses, milk and its products, fruits and vegetables. This pattern has evolved over a period of time based on the philosophy of non-violence practised by Mahavira Buddha and King Ashoka. Religion and cultural sentiment forbid many people from eating foods of animal origin requiring slaughter of animals. This is the reason why some vegetarians do not hesitate to include eggs in their diet.

Only a small percentage (about 20%) of the population in India is non-vegetarian. This means, they include foods like meat, fish, poultry, etc., besides the above mentioned foods in their daily diets. However, the staple food in the Indian non-vegetarian pattern still remains a cereal. Meat, fish or poultry preparation is served merely as an adjunct. Even among the non-vegetarians, inclusion of animal foods in the diet is not generally a daily feature. This is due to the low purchasing power as well as conscious choice with respect to one's diet. Besides, religion forbids the consumption of flesh foods on certain days, occasions and festivals. It is also due to religious beliefs that Hindus do not consume beef, as the cow is considered a sacred animal.

Whether the dietary patterns are vegetarian or non-vegetarian, a wide difference exists between the dietary patterns of the poor and the affluent classes. The diets of the poor population in our country are predominantly made up of cereals with very little intake of other foods that are rich in proteins, vitamins and minerals like pulses, seasonal vegetables and fruits.

Differences in dietary patterns also exist between the rural and urban populations. Since the rural people are engaged mainly in agricultural activities, they have a better intake of seasonal foods. As cattle rearing is also a common occupation with them, milk and its products form a part of their diet. On the other hand the poor urban population which constitutes mainly of the industrial labour force tend to consume inadequate diet. The high prices prevailing in the cities combined with poor knowledge of food value on the part of the workers are the reasons for this state of affairs. With improvement in the economic status of the urban population there is a tendency to spend more money on clothes and entertainment than on food. Even when more money is to be spent on food, the tendency is to spend more on refined and prestigious foods rather than on protective foods. For example, people show a preference for sugar instead of jaggery, milled rice in place of parboiled rice and more of confectionary items. While cost of the diet is on the incline its nutritive value is on the decline.

7.4 NUTRITIONAL ADEQUACY OF OUR DIETS

After having a basic idea about the types of food — vegetarian and non-vegetarian — consumed by the people of our country, let us now look into the nutritional adequacy of our day-to-day diets. Most people think that the vegetarian dietary pattern is nutritionally inadequate. This image is being revised in the light of recent research. Various studies have been made to compare the nutritional adequacy of vegetarian and non-vegetarian diets. These studies have shown that pure vegetarians can be well nourished if the diet includes foods from all the basic food groups (as discussed in Unit 5), thus providing sufficient energy and other essential nutrients. It has also been observed in these studies that the work performance and, endurance in vegetarians is superior to that of the meat eaters. The Sherpas from the Himalayan regions have demonstrated the adequacy of a non-flesh diet to prepare young men to endure the most severe stress on the human body like extreme altitudes and unbearable low temperatures. In addition, a well-balanced vegetarian diet has nutritional benefits such as a trim body and a tendency towards lower serum cholesterol. The traditional non-vegetarian pattern of diets as followed in India are distinctly different from the Western non-vegetarian pattern. As discussed earlier in this unit, the staple food preparation in the Indian nonvegetarian pattern is a cereal preparation while in the Western pattern it is generally a flesh food preparation. Hence, the Western non-vegetarian dietaries have an excess of protein and fats which are associated with degenerative diseases of heart, kidney and colon. Those who follow the traditional Indian non-vegetarian pattern do not normally have the kinds of problems like obesity and heart diseases associated with the Western non-vegetarian dietary patterns.

The Indian dietary pattern whether vegetarian or non-vegetarian also has roughage in fairly good amounts. This is one of the major reasons for the low incidence of cancer of the colon in India. We can, therefore, say that the Indian dietary pattern whether vegetarian or non-vegetarian is a healthier one compared to the Western dietary pattern.

One aspects however which needs to be noted in todays context is that with globalisation and increased purchasing power eating out has become fashionable (among Indians) leading to an increased consumption of fast food which is high in calories and lacks the essential nutrients. The easy availability of the fast food and its frequent consumption has lead to the problem of obesity among Indian adults and children. If this trend continues then the situation may become more worse as obesity is a risk factor for several problems like diabetes, cancer, heart diseases etc.

However, the nutritional inadequacy of the diets of the poorer population in our country, which is of great concern. As mentioned earlier, their diets mainly consist of cereals and there is a lack of foods which are rich in proteins, vitamins and minerals. Poor purchasing power and large families are the main reasons for the diets being nutritionally inadequate. Lack of education is also a major contributory factor.

Malnutrition and undernutrition are, therefore, widely prevalent among the low income groups of the population. Deficiency diseases like protein energy malnutrition, anaemia and vitamin A deficiency have therefore become the major nutritional problems of our country. The diets of these people can be improved by using suitable combinations of foods, and by promoting methods that can be easily practised at home, like sprouting and fermentation. This improves the nutritional content of the diet without increasing the cost.

Check Your Progress Exercise 1

- 1) Discuss the nutritional adequacy of the vegetarian and the non-vegetarian dietary patterns in 10 lines.

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Practical Activity 2

Conduct a survey among families in your neighbourhood to find out the prevalence of vegetarian and non-vegetarian meal patterns in your locality. Select a poor family, middle income family, and a high income family and list the types of foods consumed among each of these families. Compare and study the difference.

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7.5 LET US SUM UP

A variety of cereals, pulses, fruits and vegetables and also flesh foods like meat, fish, egg and poultry are available in India. Cereals are the staple food supplemented by pulses, milk and its products, seasonal fruits and vegetables. The diets of nonvegetarians, include cereals and pulses besides the flesh foods. If sufficient food from all the basic food groups is consumed, the vegetarian diets will not only be nutritionally adequate but also suitable for highly active individuals like athletes, runners, bicyclists, labourers, etc. It is not surprising, therefore, that more and more people are now adopting a vegetarian diet pattern.

The majority of the Indian population being poor, their dietary patterns are nutritionally inadequate. Their diets consist predominantly of cereals with negligible amounts of other foods. This is the reason for widespread malnutrition in India especially among women and growing children. Therefore, there is a strong need to educate the people on the importance of eating a mixed diet consisting of a variety of foods whether vegetarian or non-vegetarian.

7.6 GLOSSARY

Cancer	: A serious disease in which cells in a part of a person's body increase in number rapidly in an uncontrolled way producing abnormal growth.
Meal pattern	: Pattern of food consumption.
Milch cattle	: Milk producing cattle
Obesity	: A condition of excessive body weight above the normal
Staple food	: Food used in maximum quantity as the main item in the diet

7.7 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress Exercise 1

1) As commonly believed the vegetarian dietary pattern is not normally nutritionally inadequate. If foods from each of the basic food groups are included in adequate amounts in the vegetarian diet, it is nutritionally adequate. In fact, vegetarian diets have been shown to improve work performance and endurance.

Non-vegetarian diets are equally nutritious, but if the meat foods are included in plenty there are chances of having excess proteins and fats in the diet which in turn increase the chances of causing heart and kidney disorders. However, in India the non-vegetarian diets have cereals as the staple food while those in Western countries have more of flesh foods. Therefore, the non-vegetarian Indian diets do not necessarily have excess proteins and fats like those of the West.

UNIT 8 LET US ENSURE TASTE AND NUTRIENT RETENTION

Most of the food items that we consume daily have to be cooked to make them easily digestible, attractive and tasty. However, during the cooking of food, some of the important nutrients are destroyed. In this unit, you will learn to retain the nutrients in the food you cook, while ensuring its taste as well. This will be shown to you by the various methods of preparing food.

Structure

- 8.0 Objectives
- 8.1 Introduction
- 8.2 Preparing Foods for Cooking
- 8.3 Cooking Methods
 - 8.3.1 Moist Heat Methods
 - 8.3.2 Dry Heat Methods
 - 8.3.3 Other Methods of Cooking Foods
- 8.4 Effects of Pre-cooking Methods on Quality of Food
 - 8.4.1 Peeling
 - 8.4.2 Cutting, Chopping, Slicing
 - 8.4.3 Pounding
 - 8.4.4 Grinding
 - 8.4.5 Soaking
 - 8.4.6 Sprouting
 - 8.4.7 Fermentation
 - 8.4.8 Mixing
- 8.5 Effect of Cooking Methods on Food
- 8.6 Let Us Sum Up
- 8.7 Glossary
- 8.8 Answers to Check Your Progress Exercises

8.0 OBJECTIVES

After studying this unit, you will be able to:

- identify the methods of food preparation and cooking which are suitable for different foods;
- describe the methods of preparing and cooking different kinds of foods;
- compare different cooking methods with regard to the effects they have on the nutrients in foods; and

- list the qualities of cooked foods which make them tasty and nourishing.

8.1 INTRODUCTION

In Units 1 and 2, you have learnt what food is, why we eat it and how important it is for our health and well-being. You have also read that food provides us with the essential nutrients required by our body. Most of the foods like cereals, pulses, vegetables, meat, etc., have to be cooked before eating. Cooking makes them tasty, colourful, attractive and easily digestible. However, if proper care is not taken during cooking, certain nutrients may be destroyed even though food may be tasty, colourful and attractive to eat. It is, therefore, important to take care that the nutrients do not get destroyed while cooking the food. Only then would they be of nutritional benefit to us. In this unit we are going to see what are the methods of preparing, cooking and combining foods so that they are nutritious and attractive, as well as tasty.

**FOOD IS PREPARED & COOKED TO MAKE IT NUTRITIOUS,
ATTRACTIVE & TASTY**

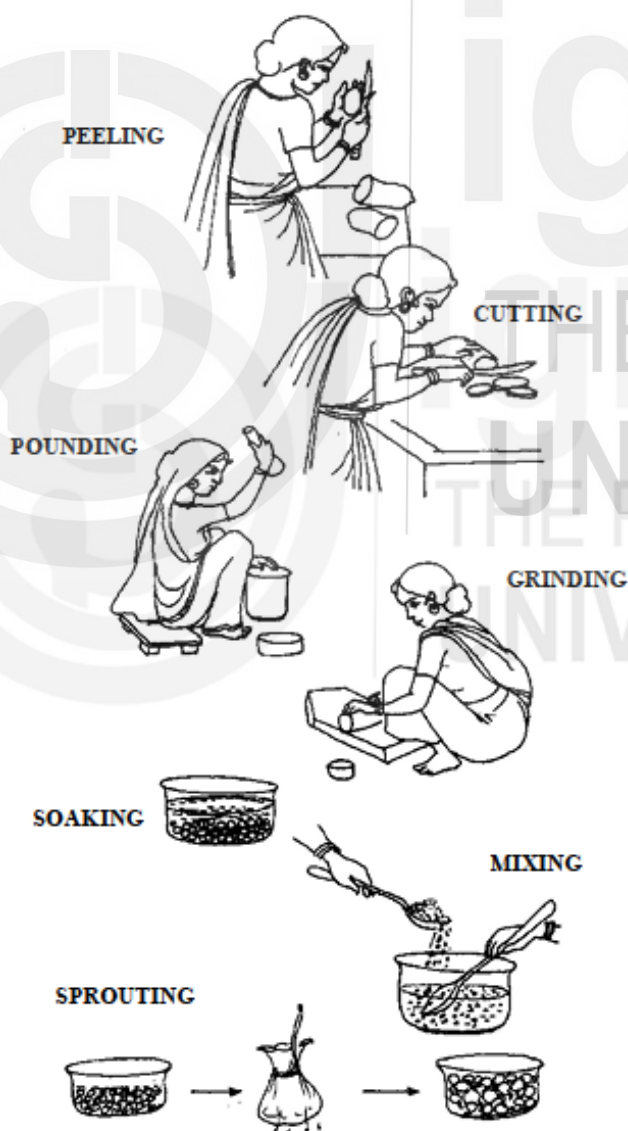


Fig. 8.1: Food preparation Methods

8.2 PREPARING FOODS FOR COOKING

In India, different kinds of foods are available in different parts of the country depending on the climate and the seasons. Just as eating habits of people differ in different regions, methods of preparing foods for cooking also differ. While all methods may be used to some extent everywhere, some methods are used more often than others. Common among them are peeling, cutting, chopping, slicing, grating, pounding, grinding, soaking, sprouting, fermenting, mixing and so on. Let's try to study the methods listed above and see how they can be used for various foods.

- i) **Cleaning** : Cleaning includes washing/removal of undesirable components. Washing with water removes the dirt and pesticide remnants from the surface of fruits and vegetables. Cleaning also includes discarding the dried, yellow, withered leaves, spoilt and soggy portions from the fruits and vegetables, insects, debris and gravel from cereals and pulses.
- ii) **Peeling**: Fresh fruits and vegetables all have a firm outer skin or peel which protects the inside portions. When this skin is removed (either before cooking or eating the fruit or vegetable) it is known as peeling. Peeling is especially necessary when the skin is blemished or dirty, too tough to digest or spoils the taste when cooked with the vegetable. Most fruits and vegetables e.g., ghia, tinda, kathal are peeled before cooking while some can be cooked with their skins on, like potatoes, brinjals, tomatoes, etc.
- iii) **Cutting**: Most of the fruits and vegetables are cut before use. Cutting increases the surface area of the food, exposes it to the air or heat source in cooking and helps to cook it evenly and faster. Cutting in different shapes and sizes helps to create variety in the form of the cooked food.
- iv) **Pounding**: This is basically crushing a food to flatten it to reduce its thickness for easier cooking. Examples are pounding of rice in a mortar or beating down of meat pieces to flatten them for frying, etc. Pounding foods like meat, helps to make them tender and easy to cook.
- v) **Grinding**: This is a method of reducing foods to a very fine form. Dry foods such as spices, cereals and grains are ground to a powder. Most foods are ground to a paste like chutneys or dhal pastes for making vadas, etc.
- vi) **Soaking**: Most whole pulses and legumes are soaked for a few hours to soften them for quicker cooking.
- vii) **Sprouting**: This is another word for germinating. This method is used for whole pulses, legumes and grains. After preliminary soaking, they are loosely covered by a damp cloth and allowed to germinate. The sprouted product is used in salads, chaat, etc.
- viii) **Mixing**: This is a simple method of food preparation in which different ingredients are prepared in a fine form and blended together. For example, fruit and milk in a milk shake, curd and water in lassi, dhal and rice in khichdi, spices in garam masala and so on. The above methods

used separately or in combination, can help to produce a lot of variety in shape, form, texture, flavour and sometimes even colour by mixing different foods creatively before and during, cooking.

- ix) **Fermenting:** This is a process by which food grain or cereal flours are mixed together with pulse pastes and allowed to become sour. In North India, the word 'Khameer' is used. Some examples of fermentation are seen in the preparation of doughs for bread, bhatura or mixtures for idli, dosa, dhokla, etc. Curd is also prepared by fermentation. The products of fermentation are soft, spongy and sour.

Practical Activity 1

- a) List the foods that are available in your area in (a) summer (b) rainy season (c) winter.

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- b) Take one of your favourite foods in each season and cut them into different shapes and sizes.
c) Cook the prepared food.
d) See which form you like to eat. May be you like more than one form for the sake of variety in your meals.

Practical Activity 2

- a) Select one food from each food group (as learnt in the previous unit).
b) Prepare each food using different methods that you have just learnt.
c) Try to combine the prepared foods together on a plate and see which are the most colourful combinations.
d) Share your experiences with your friends
e) Find out how other people prepare their foods. Try to learn one new method every week.

8.3 COOKING METHODS

Just as there are many ways of preparing foods, there are also many ways of cooking them. Cooking usually requires heat which is applied in one of the following two ways:

Moist Heat Method: The process of transferring heat from a source to a food through the medium of water is called 'moist heating'.

Dry Heat Method: The process of transferring heat directly from a source to a food is known as ‘dry heat method’. In addition to moist and dry heat methods foods are also prepared by sauteing and frying as depicted in Table 8.1.

Table 8.1 List of cooking methods which fall into the two groups mentioned above

MOIST HEAT	DRY HEAT	OTHER METHODS
i) Boiling	i) Roasting	i) Sauteing
ii) Simmering	ii) Grilling	ii) Frying
iii) Blanching	iii) Toasting	
iv) Steaming	iv) Baking	
v) Pressure cooking		
vi) Poaching		
vii) Stewing		

8.3.1 Moist Heat Methods

- i) **Boiling:** Cooking foods in water which is bubbling constantly over the food in a pan. We use this method for cooking potatoes and other vegetables, eggs, rice, etc. The temperature of the water is 100°C when it boils.

Practical Activity 3

- a) Take four medium-sized potatoes in a pan.
- b) Add enough water to cover the potatoes.
- c) Place the pan on the fire and allow the water (liquid) to boil.
- d) Note the time when the water starts bubbling over the potatoes.
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- e) Let the potatoes boil till they are tender.
- f) Test this with a knife. If the knife goes smoothly into the potato, it is cooked.
- g) Note the time again. See how long it has taken to cook potatoes by boiling.

- ii) **Simmering:** When foods are cooked in water or liquid which is not bubbling vigorously as in boiling, the method of cooking is called 'simmering'. The body of the water or liquid shows very tiny bubbles coming to the surface and breaking. This method takes longer to cook food than boiling. By this method, the food retains its shape better and nutrient losses are less.

Practical Activity 4

Repeat activity 3, but this time cook potatoes by simmering, using the same pan and amount of water. Make sure that potatoes of the same size are cooked to the same tenderness as in the activity above. Note how much longer potatoes take to cook by simmering.

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iii) **Blanching:** In this method of cooking, the food is usually dipped in boiling water for five seconds to two minutes, depending on the texture of the food. The purpose of this method is to remove peels of fruits, vegetables, nuts, etc. easily without changing their texture too much. For soft juicy fruits and vegetables, the blanching can also be done by pouring boiling water on the food and then leaving it immersed in the water for some time before peeling. Whichever method is used, the hot food is then dipped in cold water. This makes the peel shrink and then it can be removed easily keeping the fruits or vegetables intact. This method is generally used for tomatoes.

Practical Activity 5

- a) Take a firm ripe tomato.
- b) With a sharp pointed knife, remove the stem portion and at the rounded end mark a cross.
- c) Boil water in a pan.
- d) Dip the tomato in boiling water and count three.
- e) Take the tomato out and immerse it in cold water. You will find the skin of the tomato curling back where you had marked a cross.
- f) Pull back the skin and see how easily it will peel off, leaving the tomato hard enough to be sliced.
- g) Try the method on other fruits as well.

iv) **Steaming:** This method requires food to be placed in a vessel in which steam can enter and cook the food. The steam is generated by boiling water in a pan and another pan is placed in water. The second pan contains the food to be cooked. The food does not come in direct contact with the water in the outer pan. The steam is produced by the boiling water, and this rises to come into contact with the food.

Practical Activity 6

Repeat the previous activity and steam potatoes without putting them in the water. Note the time required to cook them to the same degree of tenderness. Compare.

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- v) **Pressure Cooking:** This is a method of cooking food by steam—under pressure. It is a quicker method than pan steaming. This is because more heat gets generated if steam is not allowed to escape and pressure develops in the pan. The 'pressure cooker' has been made (on this principle).
- vi) **Poaching:** This method involves cooking in a small amount of liquid at a temperature just below the boiling point (simmering). Foods generally poached are eggs, fish, fruits, etc.
- vii) **Stewing:** This is a gentle method of cooking in a pan with a tight fitting lid, using small quantities of liquid to only half cover the food. The food above the liquid surface is cooked by steam and the other half in the liquid is cooked at simmering temperature (98°C). It is a slow method of cooking and is usually used for cooking meat, dhals, etc.

8.3.2 Dry Heat Methods

As mentioned earlier in 8.3 dry heat methods involve the application of direct heat to the food to be cooked. Fat may be used for cooking such food. However, water or moisture is not used in these methods.

- i) **Roasting:** In this method food is brought into direct contact with the heat source. The food is periodically coated with fat and turned over the fire from time to time to cook it evenly. Roasting can be done on live coals, under a grill, in the tandoor or any other oven. You must have eaten 'tandoori chicken' or 'fish tikka' and 'kababs'. These are all cooked by roasting.
- ii) **Grilling:** The food is placed on a metal grill direct over the source of heat. This method is usually used for tender cuts of meat, poultry or fish, and when foods need to be browned or made crisp on the surface. When bread is browned under a grill or on live coals, the method is called toasting.
- iii) **Baking:** Baking requires an oven or 'tandoor' or any equipment in which hot air circulates around the food placed in it. The action of dry heat is combined with the steam generated from the food during cooking. Baked foods are generally crisp and brown on top but soft and spongy inside, e.g., biscuits, cookies and cakes.

8.3.3 Other Methods of Cooking Foods

- i) **Sauteing:** This method involves cooking food in just enough fat or oil to coat the base of the pan in which the cooking is done. The food is tossed occasionally or turned over to enable the pieces to come into contact with the oil or fat and get evenly cooked. The pan is usually covered with a lid to let the steam given off by the food help to cook it faster and evenly. Usually vegetables, small pieces of meat and pulses are cooked by this method. After sauteing, liquids may be added if gravy is required. This method of cooking helps to keep pieces separated in the cooked dish.
- ii) **Frying:** Frying is cooking food by immersing it fully or partly in hot fat or oil till it is of golden brown colour and has a crisp feel. When

completely immersed, the method is known as 'deep frying' as in making samosa, purees, etc. When the food is partly immersed it is called 'shallow frying' as for 'potato tikki' or 'besan pura\ etc. In India, foods are generally fried in a "Kadaai", using a perforated ladle.

Quite often a single method of cooking is not used for cooking food. A combination of methods may be used. Let's do the following activity and see what kind of cooking methods are usually combined for food preparations at home.

Practical Activity 7

- 1) Observe food being cooked in your home. Write down the methods used to cook:
 - a) Potato-bhaji.....
 - b) Dhal
 - c) Chapathi.....
 - d) Halwa
- 2) Select two dishes that you like best and describe the cooking methods used in their preparation.
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8.4 EFFECT OF PRECOOKING METHODS ON QUALITY OF FOOD

You already know the methods of preparing foods for cooking. Now we will examine how these methods affect food texture, taste, flavour and nutrients.

8.4.1 Peeling

Most of the vitamins and flavour compounds in fruits and vegetables are water soluble. These also lie near the peel or skin. In peeling food the moisture comes to the surface and some of these elements are lost. This is why peeled foods lose their flavour quickly, and dry up and shrivel or shrink easily. The foods also become tender to handle and enzymes and micro-organisms can act more easily to spoil the food. The air comes into contact with the food and oxidative changes take place. These changes affect the colour, texture and nutritive quality of food. Vitamins C and B are the nutrients easily destroyed. Carbohydrates, protein and minerals are not affected.

To retain freshness, taste, flavour, and the nutritive value of food remember to:

- 1) **PEEL ONLY IF IT IS A MUST**
- 2) **PEEL JUST BEFORE COOKING**
- 3) **PEEL AS THINLY AS POSSIBLE**
- 4) **WASH FOOD WELL AND DRAIN BEFORE PEELING**
- 5) **NEVER WASH AFTER PEELING**

8.4.2 Cutting, Chopping, Slicing

Cutting foods in any form or size exposes more surface area of the food to air, microorganisms and enzyme action. The finer the cutting, the greater are the nutrient losses. Cutting with an iron knife enhances the iron content but makes cut foods brown easily.

- 1) Cut after washing or straight after peeling.
- 2) Cut into medium sized pieces and not very small ones.
- 3) Don't expose cut foods to air for long.
- 4) Don't leave the food too long after cooking.
- 5) Use stainless steel knives, choppers or slicers to maintain natural colour.
- 6) Cut with a sharp knife to get even edges & good shapes.

Practical Activity 8

- a) Take some potatoes. Wash, and peel with a stainless steel knife or peeler.
- b) Leave it aside for 20-30 minutes.
- c) Peel another potato and cut it into chunks and leave it aside for some time.
- d) Chop another peeled potato into fine pieces or thin slices and leave it aside for some time.
- e) Repeat activity 8 but use an iron knife.
- f) Compare the intensity of browning in the different samples of potato and record your observations.

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8.4.3 Pounding

With pounding, food gets beaten out of its original shape. But the product gets tender especially in the case of meat. It loses some of its moisture and thereby some surface vitamins. Proteins and minerals are not affected. The

complex carbohydrates like cellulosic fibres get broken down mechanically and help in quicker cooking and digestion. In cereals, some outer layers of the grains may be destroyed along with the loss of B- vitamins.

FOOD SHOULD BE WASHED, DRIED AND THEN POUNDED

8.4.4 Grinding

When water is used in grinding a food, losses of flavour and nutrients take place. Textural and colour changes also occur. In some foods, however, flavour gets enhanced if dry grinding is done after roasting, as in freshly ground coffee, or spices like cumin (jeera) or dhals as in sambhar powder. Find out from your mother or friends why they grind some foods. They will probably tell you, that the flavour improves by doing so. Foods are generally ground for mixing with other foods, or ingredients, in order to give them a better flavour and also for obtaining different textures.

8.4.5 Soaking

When food is soaked in water and the water is discarded, water soluble nutrients get leached out. The food absorbs water and becomes soft and can then be more easily cooked and digested. The flavours, however, are lost only if the soaking is prolonged and the water discarded.

Remember:

- 1) TO SOAK IN A SMALL AMOUNT OF WATER TO COVER THE FOOD.**
- 2) NOT TO SOAK TOO LONG.**
- 3) NOT TO THROW AWAY SOAKING LIQUID.**

8.4.6 Sprouting

Although there are some losses in soaking, these losses are counteracted by sprouting. When a pulse or grain sprouts or germinates, vitamin C and B complex vitamins are enhanced. Soaking is an important method of providing these vitamins in the diet especially when fresh green vegetables are not in season. The other advantages of sprouting are the improved colour, soft texture and fresh flavour. The toxic substances in foods also get removed by inactivation and taste is thus improved.

8.4.7 Fermentation

In this method, the food acquires a sour taste and a soft, spongy texture. The types of foods mixed together determine the nutritional quality of the fermented product. Usually the method helps to improve digestibility of proteins and enhances the amount of B complex vitamins.

8.4.8 Mixing

The type of foods mixed together will determine the quality characteristics of the mixture. In order to mix, all foods must be in a fine form. The texture and flavour of a mixture will depend on the nature of the components of the

mixture and whether they are ground, grated or chopped before mixing. Some mixtures are consumed immediately after mixing as for instance 'lassi'. The nutritive value will depend on the amount of curd or cream, sugar or salt in the mixture. Again, in a cereal-pulse mixture the nutrients of each of the foods will determine the nutrients of the mixed food.

Practical Activity 9

Make a list of foods which are mixed together and eaten as such or cooked together and eaten.

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Check Your Progress Exercise 1

1) What is the effect of cutting, chopping, slicing and soaking on the nutrient content of food?

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2) What are the advantages of sprouting and fermentation?

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8.5 EFFECTS OF COOKING METHODS ON FOOD

Moist methods of cooking lead to greater losses of nutrients than dry methods. Some nutrients, however, are stable to heat compared to others. Hence nutrient quality of the food depends on the duration time and temperature of cooking. Foods which contain plenty of moisture in them like green leafy vegetables, courgettes (tori), gourd, etc., lose more through leaching than low moisture, hard textured foods. Losses are greater if salt is added to the cooking water and the water discarded.

Some of the natural colour of foods also gets leached out or decomposed in the presence of acids used during cooking. Green vegetables improve their colour if cooked uncovered for the first five minutes because the volatile acids escape. Quick cooking of greens is, therefore, recommended for retention of nutrients. Taste, flavour and texture are also better with dry methods of cooking, because the high temperatures used in such methods

make the outer surface crisp and store the flavour, moisture and nutrients. The texture is crisp on the outside and tender inside. People generally think fried foods are not so nourishing. This is not true. If they are cooked at the right temperature and for short time, they are excellent in their qualities.

FRIED FOODS ARE DIFFICULT TO DIGEST ONLY WHEN YOU ARE SICK.

Moist methods are good for the retention of nutrients, if simmering temperatures are used in cooking and the liquids are used up for making curries, dhals, soups, etc. then, the nutrients do not get wasted. For high protein foods like meat, fish and poultry, hot dry methods are preferable.

A combination of dry and moist methods are often used in India for making items such as bhajis and curries.

Check Your Progress Exercise 2

1) Which method of cooking, moist heat or dry leads to a greater loss of nutrients?

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2) How can you improve nutrient retention in the moist heat method?

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Practical Activity 10

1) List the methods of cooking used for the following foods in your home:

- a) Rice
- b) Wheat/Jowar/Bajra/Maize/Ragi.....
- c) Dhal
- d) Milk
- e) Green leafy vegetables.....
- f) Other vegetables.....

2) Observe and record the changes in volume, texture and colour in the preparation mentioned in 1.

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8.6 LET US SUM UP

Most foods require some kind of preparation and cooking before they are consumed. This is because:

- i) Most foods cannot be eaten as such in a raw state, and require to be washed, prepared and cooked for consumption and easy digestion.
- ii) Heat treatment during cooking renders the food safe for consumption.
- iii) Some methods like sprouting and fermentation help to enhance the nutritive quality of foods.
- iv) Combining different methods and cooking creatively enhance interest and variety in meals.

Moist methods of cooking lead to greater nutrient losses, as do high temperatures and long periods of cooking; addition of acidic and alkaline materials during cooking affects the texture of the foods. Acids give firmer texture while alkalis break down the cellulose of plants and make food mushy. The methods and ingredients chosen should be governed by the texture, colour and taste desired. For retention of taste and nutrients, the following guidelines are helpful:

- 1) Wash foods well and cook with peels intact wherever possible.
- 2) Try to peel thin.
- 3) Wash before cutting, not after.
- 4) Prepare foods just before cooking.
- 5) Do not discard soaking or cooking liquids. Cook quickly and at lowest possible temperature.
- 6) Select seasonal foods for the best colour, flavour and nutrients.
- 7) Choose the right cooking methods for the food being cooked.
- 8) For maintaining natural colours of foods, especially brinjals, potatoes, apples, bananas, etc., use a stainless steel knife and cover these foods with a damp cloth or immerse them in salt water or syrup before cooking.

8.7 GLOSSARY

- Sieving** : Process of passing food through a mesh with holes to separate impurities and dirt.
- Chopping** : Cutting to divide into very fine pieces.
- Drying** : Removal of water or moisture from foods.

8.8 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Let Us Ensure Taste
and Nutrient
Retention

Check Your Progress Exercise 1

- 1) **Cutting, chopping, slicing:** Cutting foods in any form or size exposes more surface area of the food to air micro-organisms and enzyme action. This results in nutrient losses. The finer the cutting, the greater are the losses.

Soaking: When food is soaked in water and the water is discarded, water soluble nutrients are lost.

- 2) Advantages of sprouting and fermentation
- Vitamin C and B complex are enhanced.
 - There is an improvement in colour, texture and flavour.
 - The toxic substances in foods are removed by inactivation and taste is improved.

Advantages of fermentation. This method helps to improve digestibility of proteins and enhances the content of vitamin B complex.

Check Your Progress Exercise 2

- Moist heat method.
- Nutrient retention can be improved if simmering temperatures are used for cooking and liquids are not discarded but used for making curries, dhals, soups, etc.

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UNIT 9 LET US MAKE FOOD SAFE TO EAT

In this unit, you are going to learn the general rules of personal and food hygiene. These rules, if observed, would result in the prevention and control of contagion.

Structure

9.0 Objectives

9.1 Introduction

9.2 Food Safety

9.3 Food and Personal Hygiene

9.4 Preventing Spread of Diseases

9.4.1 Preventing Spread of Disease through Food

9.4.2 Preventing Spread of Disease through Water

9.4.3 Preventing Spread of Disease through Utensils

9.4.4 Preventing Spread of Disease through Food Handling

9.5 Let Us Sum Up

9.6 Glossary

9.7 Answers to Check Your Progress Exercises

9.0 OBJECTIVES

After studying this unit, you will be able to :

- observe general rules of personal and food hygiene while handling and cooking food;
- describe how food can act as an agent of transmitting infection; and
- enumerate steps that you would take to prevent the spreading of contagion through food.

9.1 INTRODUCTION

In Block 1 you learnt about the various functions of food, food consumption and basic food groups. You have also learnt in earlier units of Block 2 how to choose the right kind of food and prepare it using a variety of methods to ensure retention of texture taste and nutrients. Are you, however, aware that you have to do a number of additional things before you really consume the food? You go to the market, select and buy proper food, and perhaps store it for some time before you cook and eat it. At each stage the chances of food getting contaminated is very high. Therefore, if you wish to derive the maximum benefit from the money spent on food, you must take precautions in handling, cooking and serving of food so that it is safe to eat. In this unit,

we shall learn about what steps we can take to ensure that the food we eat is safe and free from infections.

9.2 FOOD SAFETY

Food Safety in recent times has become an important health issue in response to the increasing problem of food borne illness both in the developing and developed countries. It is concerned with acute and chronic hazards that make food injurious to health of the consumers. Food Safety can be defined as an assurance that food will not cause harm to the consumer when it is prepared / or eaten according to its intended use.

Do you know that the year 2008-09 had been declared as “Food Safety and Quality Year”?

9.3 FOOD AND PERSONAL HYGIENE

Food Hygiene refers to all conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain. Food hygiene is an important factor which influences the effect that the food has on the body. This is because food is a potential medium through which contagious diseases can be transmitted. Hygiene in food preparation thus becomes very important to prevent any contagion from being spread through food. To observe high standards of food safety and hygiene, you must take the following precautions to maintain personal hygiene.

- 1) Wash your hands with soap and water and wipe them with a clean cloth before working with food.
- 2) Keep your nails short and clean.
- 3) If you have any cuts or wounds on hands or fingers, cover these with dressing before handling food.
- 4) If you have any septic cuts or other infections, you should not handle food.
- 5) Do not touch hair, nose or any other part of your body while working with food.
- 6) You must avoid sneezing and coughing over the food.
- 7) Do not lick fingers in between for tasting food and if you use a spoon for tasting do not return it to the food without washing.
- 8) You must keep the whole place clean, including the utensils and dishes in which you prepare and serve the food.
- 9) To keep the food free of flies and dust, you must keep the cooked and cut foods covered and use waste bins with lids.
- 10) While serving food, you must not touch the food surface with your hands.

If you observe the points given above in handling and preparation of food, you would have food which is safe and free from possible harmful bacteria.

Practical Activity 1

- a) Recall how many of the above mentioned good habits you observed while preparing food yesterday? List these.

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- b) Observe any one of your friends preparing food and note down her/his good and undesirable habits.

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9.4 PREVENTING SPREAD OF DISEASES

You have just learnt about the general practices that you must follow in order to make food safe and prevent nutrient loss (Unit 8). Now let us see what specific diseases can be caused by eating contaminated food, and what you can do to prevent the spread of these diseases through food, water, cooking and serving utensils, and food handling.

9.4.1 Preventing Spread of Disease through Food

Diseases like enteritis, typhoid, paratyphoid, dysentery and cholera are caused by micro-organisms which spread through food and water. Tuberculosis may also spread through milk or other food. A specific type of micro-organism present in an- acid type of canned food can sometimes result in a deadly disease like botulism, and various moulds present in the canned food can lead to food poisoning.

Milk is a very good medium for the growth of micro-organisms and may become a vehicle for the transmission of diseases like diphtheria, typhoid, paratyphoid, cholera, dysentery and scarlet fever. Fortunately, our practice of boiling milk destroys all the disease carrying micro-organisms and makes it safe to drink.

It is important for you to realise that parasites like hookworm, etc., spread through fruits, vegetables, greens and other foods which grow close to the soil, because this soil often gets contaminated with the excreta of humans and animals. To ensure that these fruits and vegetables get freed from these micro-organisms you must wash them very thoroughly in clean water and if possible soak these in a solution of potassium permanganate or ordinary salt solution.

9.4.2 Preventing Spread of Disease through Water

Water is also a major source of contagion. Water is collected from many different sources and if the source is not a protected one, it may have a very high potential for spreading many diseases. If your supply of water is from an unprotected source, you must boil and/or filter the water before drinking it.

9.4.3 Preventing Spread of Disease through Utensils

Often you would have observed the utensils being cleaned with soil. If the soil used is collected from places which are trodden over by men and animals, this soil becomes a major source of infection. If the economic conditions do not permit the use of soaps and detergents then ash should be used. Ash is sterile and safe for cleaning utensils. Have you noticed that many times, only one napkin is used for cleaning the cooking platform and wiping the utensils? This is one of the major sources of infection through utensils. Pathogenic organisms may spread from diseased persons to others if the utensils used by them are not cleaned properly. Therefore, such utensils should be thoroughly cleaned and sun dried.

9.4.4 Preventing Spread of Disease through Food Handling

To protect yourself from infection and disease, take care to eat only at those places which are clean and tidy in the cooking and serving areas and where the foods are kept covered, and thus, protected from flies other insects. When you eat out, select only those foods which require minimum handling by food handlers and that are prepared and served preferably in disposable dishes. Avoid eating food at way side eateries.

REMEMBER INFECTIONS FROM FOOD CAN BE SPREAD THROUGH:

- **FRUITS AND VEGETABLES GROWING CLOSE TO SOIL**
- **MILK AND WATER**
- **CONTAMINATED UTENSILS**
- **COOKS AND FOOD HANDLERS**

Check Your Progress Exercise 1

1) List three ways in which contagion spreads.

- a)
- b)
- c)

2) How can you make water safe to drink?

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- 3) List three diseases for which milk could serve as carrier.

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Practical Exercises 2

- 1) Observe and record the practices related to food hygiene adopted for the following in your home:

- a) Food preparation

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- b) Food service

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- c) Storage of food and water

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- d) Storage of leftovers

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- a) Disposal of food waste

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- 2) Identify the right practices from the above. Identify the wrong practices and suggest modifications to correct them.

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9.5 LET US SUM UP

Food is an ideal medium through which infections can be transmitted. This can happen directly through the contaminated fruits, vegetables, milk and water or indirectly through contaminated cooking and serving utensils and cooks and food handlers.

To make our food safe and free from infections we must be hygienic in

handling food and its preparation. We must ensure personal cleanliness, cleanliness of surroundings in which the food is prepared and served, and also wash the foods thoroughly before use. We must also take care to keep the flies and insects away from food as these contribute significantly to the spreading of contagious diseases.

9.6 GLOSSARY

- Food handler** : A person engaged in either purchase, preparation or serving of food.
- Hygiene** : Principles of maintaining health; practice of these, e.g. by cleanliness.
- Micro-organisms** : The organisms which are very small and not visible to the naked eye.
- Parasites** : Animal or plant living in or on another and drawing its nutrients directly from it.
- Pathogenic organisms** : Harmful micro-organisms which cause diseases in the body.

9.7 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress Exercise 1

- 1) The three ways in which contagion spreads.
 - a) Through food and water.
 - b) Through contaminated utensils.
 - c) Through cooks and food handlers.
- 2) Collect water from a protected source. If the supply of water is from an unprotected source one must boil or filter the water before drinking it.
- 3) Diptheria, typhoid and cholera.

UNIT 10 LET US PRESERVE FOOD

Preserving foods when they are in plenty is a good practice since we can prevent wastage and we can consume them when they are not in Season. In this unit, we discuss various methods of preserving and storing perishable, semi-perishable and non-perishable foods.

Structure

10.0 Objectives

10.1 Introduction

10.2 Definition of Food Preservation

10.2.1 Need to Preserve Food

10.3 Food Spoilage

10.3.1 Causes of Food Spoilage

10.4 Methods of Preserving Perishable and Semi-perishable Foods

10.5 Methods of Storing Non-perishable Foods

10.6 Let Us Sum Up

10.7 Glossary

10.8 Answers to Check Your Progress Exercises

10.0 OBJECTIVES

After studying this unit, you will be able to :

- define the meaning of food preservation;
- list common causes of food spoilage;
- classify the foods on the basis of their perishability;
- describe common methods of food preservation; and
- list the different foods and match them with the methods by which they can be preserved/stored.

10.1 INTRODUCTION

We preserve and store foods when they are produced and available in plenty so that we can use them when they are not in season, are less easily available and therefore expensive. You must have noticed that there is hardly any food that does not spoil over a period of time. Delay in the use of fresh foods alters the freshness, taste and nutritive value of these foods. Thus, they become less desirable and ultimately unfit for consumption. Depending upon the perishability, the foods can be divided into three categories:

- i) Non-perishable foods do not spoil easily and can be stored under proper conditions for several months e.g. whole cereals, pulses, oilseeds, etc.

- ii) Semi-perishable foods can be kept for about a week to a month's time e.g. flours, roasted oilseeds, biscuits, potatoes, onions, etc.
- iii) Perishable foods cannot be kept for more than a day or two without affecting their quality e.g. milk and milk products, eggs, meat, fish, vegetables, etc.

10.2 DEFINITION OF FOOD PRESERVATION

Food preservation is a process by which certain food like fruits and vegetables are prevented from spoilage for a long period of time. The colour, texture, taste and nutritive value of foods is also preserved.

10.2.1 Need to Preserve Foods

We preserve food for the following reasons:

- Processed food add variety to the meals. We enjoy eating pickles with our meals.
- Food produced in excess can be preserved and used later in the year when it is expensive and not available. Tomatoes can be processed into sauce when they are cheap and available in plenty.
- Processed foods can be transported to areas where food is not grown or available.
- Processed foods make transportation and storage of foods easy as they reduce the bulk and occupy less space.
- Processed foods are an asset during times like war famine, floods where people need to be fed in large numbers.

10.3 FOOD SPOILAGE

Food spoilage is the deterioration in the colour, flavour, odour or consistency of a food product due to agents which make it unacceptable for human consumption.

10.3.1 Causes of Food Spoilage

The three main causes of food spoilage are:

- i) Micro-organisms
 - ii) Enzyme action
 - iii) Insect and rodent damage.
- i) Micro-organisms cause moulding, fermentation and putrefaction in food. These micro-organisms are usually found on the skin or outer layer of food and they penetrate inside the food only when the outer covering has been broken.
 - ii) Enzymes are found in all fresh foods e.g. they are found in fruits and vegetables. They are very important for the ripening of fruits and vegetables. However, if this action of enzymes continues even after the

fruits/vegetables have become fully ripe, it brings about decomposition or undesirable changes in food. You must have observed the darkening of a cut surface, development of soft spots and offensive flavours in fruits and vegetables. These initial symptoms are caused by enzymes. Microorganisms can grow on such damaged vegetable tissues causing fermentation.

- iii) You know that rodents, worms, weevils, bugs, fruit flies and moths damage food. They not only eat away food but spoil it by their excreta. You must have observed the cuts and bruises caused by these worms and insects on food which serve as pathways by which micro-organisms reach the interior of the food.

FOOD IS SPOILED BY:

- **MICROBIAL GROWTH**
- **ENZYME ACTION**
- **INSECTS AND RODENT DAMAGE**

Therefore, if we have to prevent the damage to food due to any of the above causes, we have to use specific methods of handling and processing of food.

An effective method of preservation is the one that slows down or prevents the action of agents of spoilage without damaging the food or adding harmful substances to it. This is done by controlling the temperature, humidity and sunlight, and also by prevention of damage by insects and rodents.

METHODS OF FOOD PRESERVATION AIM AT DESTROYING THE AGENTS OF FOOD SPOILAGE OR SLOWING DOWN THEIR ACTIVITY.

Check Your Progress Exercise 1

- 1) Depending on their perishability categorise the following foods:

Category

- a) Milk
 - b) Bread
 - c) Wheat
 - d) Wheat flour
 - e) Potatoes
- 2) List the major causes of food spoilage
- 3) Methods of food preservation eitherthe micro-organisms or their growth.

10.4 METHODS OF PRESERVING PERISHABLE AND SEMI-PERISHABLE FOODS

The aim of food preservation whether it means keeping the food for a day or two in the refrigerator or for a year or so in cans or a freezer is to ensure: i) safety from pathogenic organisms or toxicity through chemicals, and ii) maintenance of optimum quality of colour, texture, flavour and nutritive value.

We commonly use the following methods for preserving foods:

1. **Cold Storage:** You must have sometimes eaten mangoes and ladies finger in December-January and cauliflower in June. Though expensive in off season, these are available due to cold storage facilities. Foods can be kept for long periods of time in commercial cold storage rooms at proper humidity and very low temperature. Fruits and vegetables in cold storage are kept just above the point at which they freeze (31°- 35°F), while butter and meat may be kept at much lower temperatures.
2. **Freezing:** A large variety of foods can be preserved by freezing. When the foods are frozen, the bacteria are unable to grow and the enzyme action is retarded or inactivated by blanching, prior to freezing. Before you decide to preserve foods by freezing:
 - i) Select the foods with quality and maturity.
 - ii) Blanch vegetables to inactivate enzymes.
 - iii) Cool and pack foods in polythene bags, or moisture-proof wrapping foils, waxed paper or cellophane, etc.
 - iv) Make small packs so that the entire package can be frozen quickly.

You must store these foods at temperatures below 0°F. In order to retain the flavour, texture and nutritive value, you must, however, ensure prompt use of frozen foods upon thawing. If you allow the food to stand for some time after thawing, microorganisms will multiply and may spoil the food. After thawing, never refreeze the food as the spoilage of soft tissues may have set in.

3. **Refrigeration:** This is the most commonly used method of preserving food in a household. You can store meat, fish, and poultry in the refrigerator for several days, while milk, curd and cheese can be stored for 2-3 days.

You can also store vegetables and fruits for several days in the refrigerator without altering their texture, colour, flavour and nutritive value. In order to ensure their crispness, these must be stored in polythene bags.

You must remember to cover all foods and to place milk and other animal products in the coldest part of the refrigerator.

Check Your Progress Exercise 2

- i) What is the aim of food preservation?

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- ii) List at least two food items each that can be preserved by cold storage, freezing and refrigeration.

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4. **Heat Treatment-Boiling, Sterilisation, Pasteurisation and Canning:**

The micro-organisms are killed or inactivated by heat. The more intense the heat treatment the more effective the destruction of organisms. In canning, foods are sterilised in a few minutes or even seconds by the application of high temperature processing.

You may have read the word ‘pasteurised’ on butter and milk packs. Did you understand what it meant?

Pasteurisation: This is a heat application process by which most of the microorganisms in milk or butter are killed. Food is subjected to high temperature for a short time and then cooled immediately. This helps to increase the duration over which the quality of milk and butter can be maintained. Since all micro-organisms are not killed, you must store these under conditions which are unfavourable to their growth. You must have observed that curries and pulses, when kept outside for a few hours are boiled vigorously to prevent spoilage. These are preserved by boiling and most micro-organisms are killed at boiling temperature.

5. **Dehydration:** This is the process by which water is removed to increase the shelf life of the food. The principle of dehydration is that micro-organisms are unable to grow in the absence of moisture. A few foods have very little moisture e.g. grains and pulses. Yet it is necessary to dry these to less than 12% moisture in order to prevent spoilage. Foods preserved by this method include immature legumes, vegetables and fruits such as raw mangoes, figs, raisins, apricots, amla, green leafy vegetables like methi potatoes, carrots, turnips, cauliflowers, etc. Certain foods like roots and tubers, papads, fish, peas, bitter gourd, etc., are processed i.e., either boiled in water or salted before they are dehydrated through conventional methods of sun-drying. Spray drying is a mechanical method of drying milk to form a fine powder which can be reconstituted with water to make fluid milk whenever required. You must have observed that dehydrated foods are markedly reduced in weight and therefore can be conveniently stored and transported.

Practical Activity 1

1) List various foods that can be preserved by

a) Sterilisation and canning

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b) Pasteurisation

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c) Boiling

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2) List three foods which you can preserve by dehydration.

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6. **Chemical Preservation:** We have all eaten pickles, jams, jellies and fruit preserves. How often do we think why the vegetables and fruits used in making the pickles, jellies, fruit preserves, etc., do not go bad whereas fresh fruits or vegetables would perish within a few days? The effect of preservation is that various methods used in preserving foods in the form of pickles, jams, etc., inactivate the micro-organisms by making the water unavailable for the growth of these micro-organisms. This could be done by:

- i) Use of salt and sugar.
- ii) Use of acid.
- iii) Use of oil and wax.
- iv) Use of chemical preservatives.

- i) **Use of Salt and Sugar:** Vegetables and fruits are often preserved by this method. This method involves either submerging of fruits or vegetables like amla, mangoes, potatoes, etc., in brine (salt solution) or adding or rubbing salt onto those vegetables in high concentrations. The presence of salt in high concentrations reduces the availability of water to micro-organisms for their growth, thus preserving the foods.

Similarly, submerging of cut and blanched fruits in sugar syrup as is done in fruit preserves, restricts the microbial growth, thus preserving fruits over an extended period.

- ii) **Use of Acid:** A strong acidic medium is not conducive for the survival of microorganisms. Hence we use vinegar or lemon juice effectively in preservation of vegetables, ketchup and tomato sauce, etc.
- iii) **Use of Oil and Wax:** Oil and wax have a unique property of forming a protective layer which shuts out moisture and oxygen in the air from coming in contact with the food they coat. This property of oil and wax is used for coating fruits such as lemons, apples, apricots, etc., to keep them fresh for a longer time. You would have observed that in many parts of India, it is a common practice to rub castor oil on grains and pulses so as to coat these with a thin layer of oil. This is done to enhance their keeping quality. Similarly, when oil is used in pickles, a top layer of oil is formed which prevent moisture or micro-organisms in the air from coming in contact with food.
- iv) **Use of Chemical Preservatives:** Chemical preservatives include calcium propionate, potassium meta-bisulphite, sodium benzoate, benzoic acid, sulphur dioxide, etc. These must be used with great caution as they could be toxic if not used in proper concentrations. The chemical preservatives are used in the preservation of grains to prevent spoilage.
- v) **Radiation:** Radiation like gamma rays and ultraviolet rays have some use in the preservation of bread and cake products and packaging of bacon, meat and cheese in western countries. These radiations are, however, mainly used to kill/ reduce micro-organisms in the air in the storage or processing room.

YOU CAN PRESERVE FOODS BY:

- **COLD STORAGE, FREEZING, REFRIGERATION**
- **HEAT TREATMENT**
- **DEHYDRATION**
- **CHEMICAL PRESERVATION**
- **IRRADIATION**

Check Your Progress Exercise 3

- 1) List two foods that can be preserved by using
- a) Salt and Sugar
- b) Acid

- c) Oil and Wax
- d) Chemicals

2) a) Which radiations are commonly used for preserving foods?

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b) Which foods can be preserved by radiation?

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10.5 METHODS OF STORING NON-PERISHABLE FOODS

You are aware that rodents and insects often attack foods such as cereals, pulses, flours, etc. They eat up the food and their excreta gets mixed up with the food, making it unfit for consumption.

However, non-perishable foods are easy to preserve and store for long durations. If you do not give due attention to the proper storage, these foods deteriorate in quality and can get contaminated, resulting in a considerable wastage of food.

You must bear in mind and act on the following points for the storage of non-perishable foods:

- i) Clean and thoroughly dry the pulses and grains.
- ii) Store in clean, dry and air tight containers.
- iii) Add indigenous substances like neem leaves, turmeric or coat the pulses and grains with oil to protect these from micro-organisms and insects.
- iv) Ensure that the room in which you store these foods is well ventilated and free from leakages, cracks and crevices in the wall to avoid seepage of water and have a cemented floor.
- v) To prevent rodent attack, you may use baits and traps.
- vi) Check the stored grains and pulses periodically. If you find these infested you must remove the stock, clean it up and sun dry before re-storing it.
- vii) Take care not to mix up old stock with the fresh one.

INSECTS AND RODENTS SPOIL FOODS LIKE PULSES, GRAINS AND FLOURS.

CLEAN AND SUN DRY THE GRAINS AND PULSES AND STORE THESE IN PROPERLY VENTILATED, MOISTURE AND INSECT-FREE STORE ROOMS.

Practical Activity 2

a) List four non-perishable foods.

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b) How should you store the following in your home:

i) Wheat and rice.

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ii) Flour.

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Practical Activity 3

1) List the foods that were preserved last year in your home.

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2) Indicate the methods of preservation you used.

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10.6 LET US SUM UP

Depending on their degree of perishability, foods can be categorised as non-perishable, semi-perishable and perishable foods. Main causes of food spoilage are microbial growth or action of micro-organisms, enzyme action and damage by insects and rodents.

Preservation of food aims at destroying the agents of food spoilage or slowing down their activity. Preservation helps in storing the foods when the availability of foods is in plenty so as to use these at a time when they are less easily available and are expensive.

We commonly use methods like cold storage, freezing, refrigeration, boiling, sterilisation, pasteurisation, canning, dehydration, chemical preservation and dry storage for preserving and storing a variety of foods.

10.7 GLOSSARY

Blanch : Preheating in boiling water

Enzymes : An organic catalyst

Humidity : Moisture

Irradiation : Exposure to gamma rays or ultraviolet rays

Indigenous	: Local
Maturity	: Ripening
Micro-organisms	: Organisms not visible to naked eye
Pathogenic	: Disease causing
Putrefaction	: Becoming rotten
Relative Humidity	: Percentage of moisture present in air
Thawing	: Becoming less cold
Toxicity	: Harmful effects

10.8 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress Exercise 1

- 1)
 - a) perishable
 - b) semi-perishable
 - c) non-perishable
 - d) semi-perishable
 - e) semi-perishable.
- 2) Micro-organisms, enzymes, insect and rodent damage.
- 3) Methods of food preservation either destroy the micro-organisms or slow down their activity.

Check Your Progress Exercise 2

- 1) The aim of food preservation is to ensure
 - a) safety from pathogenic organisms or toxicity.
 - b) maintenance of optimum quality of colour, texture, flavour and nutritive value.
- 2) Cold storage — Mangoes, Cauliflower.
Freezing—Peas, Carrots.
Refrigeration—Meat, Milk.

Check Your Progress Exercise 3

- 1)
 - a) Mangoes, Amla
 - b) vegetables, tomato sauce
 - c) lemons, apples
 - d) cereals, vegetables.
- 2)
 - a) Gamma rays and ultraviolet rays
 - b) Breads, cake, packaged food.



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