
UNIT 10 FOOD

Structure

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10.1 INTRODUCTION

In previous two blocks of the course, we have discussed various dimensions of science pedagogy including methods and approaches as well as assessment techniques. Block three and four will help you to deal with variety of content proposed in science curriculum and refresh your ideas about some basic concepts of sciences. Present Unit will deal with the concepts related to the theme “food” prescribed for classes VI to X. In this unit, we will discuss about components of food as well as types of nutrition among plants and animals. Unit will also deal with role of various microorganisms in nutrition. Those techniques and processes will be discussed which are being using for getting higher yields of crops. Unit will end with discussion on various aspects of animal husbandry including cattle and poultry farming, fish production, etc. The entire discussion will be central to teaching-learning process, which could be adopted by you while dealing with certain kind of content.

10.2 OBJECTIVES

After going through the unit, you will be able to:

- explain various components of food to learners,
- enable learners to explore various types of nutrition in animals and plants,
- help learners in understanding the role of microorganisms,
- make learners aware about various measures being taken for getting higher yields, and
- sensitize learners various types of animal husbandry practices in India.

10.3 COMPONENTS OF FOOD

Learners are well aware of the food we eat is made up of items like pulses, grains, sugar, oil, etc. We eat food to get energy for our day to day work as well as for growth and strength in body. They may ask a question about specific components in food items that give us energy. Let us try to answer this question.

Every food item and its ingredients contain some component which is needed by our body. These specific components are known as **nutrients**. Learners may have a rough idea about various nutrients like protein, carbohydrate, fat etc. Here is an example of a classroom discussion.

Science teacher Ms. Shweta enquired learners about their previous knowledge related to components of food. She initiated a discussion with an incident from her childhood. She told learners that her mother used to ask her to drink milk daily. Her mother had told her that milk is a good source of Calcium. She asked learners to narrate such incidents from their daily lives. Manoj told that his grandmother always asks his mother to give *daal* for lunch and dinner. Grandmother says that *daal* is a good source of protein. Rubina shared her experience that her father always emphasizes the need to eat fruits everyday as they are a good source of vitamins. This discussion generated a lot of curiosity amongst most of the learners in the class and they started asking more about all these components. This activity led to Ms. Shweta writing on the board, drawing columns and it soon evolved into a game.

After discussion, she told the class that **various food items are sources of components which are essential for our body. These components are known as nutrients. Some of the important nutrients are carbohydrates, proteins, fats, vitamins and minerals.**

- You can organise a talk by a nutrition expert or a doctor from your community, highlighting the importance of various nutrients for our body.
- Learners may be asked to collect pictures of different food items and prepare a pictorial chart of food items and their components.

You will find that few items contain more than one nutrient. Learners may ask the question whether all food items have all types of nutrients.

Activity 1

Bring some food items in the class and demonstrate the presence of Carbohydrates, Proteins and Fats in them by using simple testing methods as suggested in NCERT Science Text book of class VI. Ask children to observe your demonstration and prepare a checklist for each food item to tick which component is present in that item.

After performing this activity, discuss the importance of these components for our body. The basic needs of our body can be divided as follows:

Energy Needs: You have to explain to children that the first need of our body fulfilled by food is the need for energy. Energy is required to perform daily work by different organs of the body. **Carbohydrates** and **Fats** are the major energy giving components of the food.

There are various food items that are rich sources of Carbohydrate, e.g. Wheat, Rice, other grains, Potato, Sugar, etc. Fat is also a source of energy. It is mainly present in edible oils, ghee, butter, milk, meat etc.

Growth and Repair of the body: Proteins and Minerals like Calcium, Phosphorus, Potassium, Iron etc., are needed for growth and for repair of our body. These are found in Milk, Banana, Brinjal, Egg, etc.

Protection against diseases: There are some components of food known as Vitamins which are essential for protecting our body against diseases. These are needed for the growth of our body and to maintain good health. Vitamin C is an important vitamin and is found in citrus fruits like orange and amla.

Along with these, **Fibre** is also important for our body. Fibre helps in the digestion process. How can we provide an opportunity to children to explore and identify various sources of components of food in the classroom? Following activities can also be used for this.

- A pictorial quiz can be planned, in which children are asked to link the sources with the components or sources with the benefit.
- You can use it as group activity too. Three different groups may be assigned different projects of collecting and representing components of food and their sources on chart paper. Their pictorial charts can be displayed on bulletin board of the class.

When you will discuss various components and their importance for body, children may ask you about the required amount to eat them and in which proportion. If it is not the case you can initiate a discussion on how much of these they eat in a day. This will help you to move further on the issue of balance diet.

Balanced Diet

At elementary level, children are aware of what they eat and how much they eat but many of them prefer to eat their favourite food which may not have much nutritional value or may have little nutrients but may not be balanced. If you ask the children what they eat, you will receive a variety of responses. Give them an activity.

Ask children to write on a piece of paper what they eat daily for breakfast, lunch and dinner. They should be further asked to analyse their daily food into ingredients and into nutrients in following manner, e.g.		
Breakfast	Daliya with milk	Protein Calcium Carbohydrate
Lunch	Aluparatha/ idli/chapatti/rice	Fat Carbohydrate
Dinner	Daal, vegetable, rice, tomato and chapatti	Protein Carbohydrate Vitamin C
This list may vary with different children depending on the region but this exercise will help you to proceed further. You can ask children to reflect on whether all necessary nutrients are there in their daily diet. Ask them about their opinion on what should be their regular diet for being healthy and energetic. You can start your discussion on what constitutes Balanced Diet.		

A diet which contains proper balance of food items to meet our daily needs for growth, energy and activities may be considered as **Balanced Diet**. You should tell children that a balanced diet is really important because it gives the body all of the essential vitamins and minerals that it needs to perform its daily functions. Balanced diet consists of the five major food groups which are the **proteins, carbohydrates, vitamins, fats and minerals**. The food groups should be taken in portions in a meal so as to attain a balanced diet.

Salts, vegetables and fruits for **fibre** should also be provided in the right proportions.

Let us play a game with children to make them aware about balanced diet.

Make some paper slips with pictures and names of various food items like grains, vegetables, fruits, animal products like egg, fish, meat, milk, etc., put all of them into a bowl and form groups of three to four children.

Ask every group to come one by one and pick up a slip of items, which they want to have at breakfast, lunch and dinner.

Repeat the same activity with all groups and ask them to present their meal plan one by one to whole class.

After presentation of each group, other children should be asked to reflect on selection of food items of the group and advise them on how to make their meal balanced.

Children should to be made aware that all people do not need to have identical balanced diet. The composition of balanced diet also varies with age and the nature of work. One misconception about balanced diet is that it is always expensive. This misconception needs to be corrected.

10.4 NUTRITION

10.4.1 Nutrition in Plants

In the previous sections, we have discussed that food is essential for all of us. Food provides material for the energy required for absorption and translocation of nutrients, for the growth of the body, synthesis of cell materials, movement and locomotion, and excretion of waste products, etc. All living beings including plants need food for growth, life and work. Nutrition refers to the mode of taking food by an organism and its utilization by the body. Living organisms are categorized as **Autotrophs** and **heterotrophs** by the way they obtain food. Green plants and some bacteria need only inorganic compounds for preparation of food. They are called autotrophs. Organisms including all animals, fungi, and most bacteria, that take food from other organisms are called heterotrophs. Let us discuss these two further.

Autotrophic and heterotrophic nutrition

We all know that most of the plants make their own food. The organisms that made their food by themselves from simple substances are called **autotrophs** and such nutrition is known as **autotrophic** nutrition. Thus plants are referred to as autotrophs. Autotrophic organisms make their own food by a process called **photosynthesis**. We will discuss in detail about photosynthesis in the next

sub section. Animals and some other organisms like fungi use plants or other organism as their food are known as **heterotrophs** and such nutrition is called **heterotrophic** nutrition. Apart from autotrophic nutrition, there are some other modes of nutrition in plants too. Let us take a look at the following table.

Table 10.1: Some forms of Nutrition in Plants

Saprophytic	Saprotrophs are decomposers and liberate energy for their own use by breaking down complex organic matter from the dead bodies of other organisms. These are mostly fungi or bacteria. These saprotrophs recycle materials from dead organisms to living ones.
Parasitic	Parasites are organisms that live in or on other living organisms (called the host) generally receiving shelter and deriving nutrients from it. The parasites may or may not cause harm to the host plant. e.g. <i>Cuscuta</i> (Amarbel)
Insectivorous	Insectivorous plants are autotrophic but obtain organic matter and animal nitrogen from insects, however they are not bigger than the size of a grasshopper, e.g. Pitcher plants, Drosera, Dionea or Venus fly trap, etc.
Chemoautotrophs	Chemoautotrophs are bacteria using CO ₂ as a carbon source and energy derived from the oxidation of inorganic materials such as iron, sulphur, ammonia and nitrite. They use chemical reactions to obtain energy from inorganic compounds. These bacteria are particularly important in nitrogen fixation, nitrification and denitrification.

Children should be aware of the different varieties of nutrition in plants. Let us discuss what can be done to transact this content in the classroom.

Ask children about their food— what they eat and what the sources of their food are and give them a task to categorize their food into plant or animal products. You can ask them about the animals— what is their food? Where does it come from? You will find that most children will answer that animals either eat other animals or plants. Thus, you can conclude that animals depend upon other animals or/and plants for their food.

You can make use of the following grid.

Animal product as food Item	Source	Food of animal
Milk	Cow, Buffalo, Goat	Grass, leaves
Ghee	Cow, Buffalo	Grass, leaves
Meat	Hen, goat etc.	Grains, grass, soft small leaves
Fish	Fish	Small fishes, planktons
Egg	Hen	Grains

You can further ask children about the source of food of plants. Where does the food of plants come from? Most of them may not be able to respond as quickly as is in case of animals. We have studied earlier in this section that most of the plants make their own food and are known as autotrophs.

Activity 2

- Ask children to observe a few plants at their home. Some plants can be kept in the dark for 8-10 days. Children should compare the plants kept in the dark with the plants exposed to sunlight and note down the differences.
- A field trip can be arranged to a green house near your school where vegetables are being produced. Ask children to observe and prepare a write up based on following points:
 - Type of vegetables/plants grown there
 - Measures adopted to regulate light, temperature, water and carbon dioxide
 - Difficulties in their growth as highlighted by the owner/caretaker of that place.

Check Your Progress

Note: a) Space is given below to write your answer.

b) Compare your answer with the one given at the end of this Unit.

- 1) How will you describe the Autotrophic and heterotrophic nutrition in the classroom? Suggest an activity.

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10.4.2 Nutrition in Animals

In the previous sections, we have discussed that plants are a major source of food for animals and Sun is the ultimate source of energy. We have also discussed that nutrition refers to the mode of taking food by an organism and its utilization by it. Animals and human beings are categorised as **heterotrophs** as they are dependent on plant or other animals for their food. Nutrition is required by all animals ranging from a cellular amoeba to a big elephant and a whale but the process of acquiring nutrition differs in each one of them.

Let us have a look on various nutrition patterns in different animals.

Animal	Food	Organ of feeding
Amoeba	Microscopic food particles	Pseudopodia
Hydra	Planktons	Ciliya
Starfish	Soft small animals	Stomach come out to capture
Snake	Small animals like frog, rats	Mouth
Wall lizard	Insects	Tongue and mouth
Pigeon	Insects, grains	Beak
Goat	Grass, grains	Mouth
Lion	Rabbit, deer etc.	Mouth with strong jaws

Nutrition in amoeba and other animals

We all know that animals are of various types and have different body structures and feeding habits. Let us take examples of some animals and what they eat.

A similar table can be developed for organs of digestion in animals. You will find that lower order animals have different organs for digestion like vacuoles in amoeba, teeth insert digestive enzymes in snakes or a single tube in insects and a fully developed digestive system of mouth, esophagus, stomach, small and large intestine etc.

Let us discuss the human digestive system in detail in the following section.

Human Digestive System

We have seen a model of human digestive system in our school days and have also drawn the human digestive system several times.

The human digestive system is one of the complex organ systems which start from the mouth cavity and ends at the rectum. The whole system is developed around a central canal well attached with other organs. In human digestive system along with food canal, organs like **teeth, tongue, salivary glands, pancreas** and **liver** play their important role. At elementary level, our focus should be on familiarization of children with these organs and their role in digestion.

We can use a model of digestive system to demonstrate the functions of various organs of the digestive system. If a model is not available, a chart showing different parts of the digestive system can be used. Let us recall different parts of the digestive system and their functions in a nutshell. It will help us to plan the teaching learning process.

Table 10.2: Parts of the Digestive System and their functions

Organ/ compartment	Position	Role in Digestion
Mouth and Buccal Cavity (teeth, tongue)	First opening of the system	Ingestion: process of intake of food Cutting, biting, piercing and tearing of food by teeth Mixing of saliva with small pieces of food by tongue
Oesophagus	Along the neck	By means of a series of contractions, process called peristalsis ; the esophagus delivers food to the stomach.
Stomach	Thick walled bag between the oesophagus and the small intestine	Works as a mixer and a grinder. Secretes mucus, hydrochloric acid (HCL) and digestive juices. Mucous protects the lining of the stomach. HCL kills bacteria and makes the medium acidic. Digestive juices break down the proteins into simple substances.
Small Intestine	Three segments, the duodenum, jejunum,	Receives secretions from the liver and the pancreas. Complete digestion process takes place here.

Organ/ compartment	Position	Role in Digestion
	and ileum (7.5 meters long)	Digested food is absorbed by the blood vessels by the process called absorption . Absorbed substances are transported to various body parts through blood to build complex substances like proteins. This process is called assimilation .
Large Intestine	About 1.5 meter long a wider tube below the small intestine	It absorbs water and salts from the undigested food material.
Rectum and Anus	Last part of the alimentary canal	Converts undigested waste into semi solid faeces which passes through anus. This process is called egestion .
Other organs: Liver	Attached to the small intestine and placed in upper part of the abdomen	Secretes bile juice. Bile is stored in gall bladder and helps in the digestion of fat.
Pancreas	A large leaf shaped gland below the stomach	Pancreatic juice acts on the Carbohydrates, Fats and Proteins
Salivary Glands	Small glands in the buccal cavity.	Secretes saliva which breaks starch into sugar.

Apart from a working model of digestive system, you can use Videos available in the form of animation, which will help children to understand the digestive system. Many such animations are available on YouTube. Many multimedia CD/ DVD are also available, which will help you to engage children in explaining different parts of the digestion process. You are advised to plan your lesson around such materials and make the experience enjoyable for children.

Check Your Progress

Note: a) Space is given below to write your answer.

b) Compare your answer with the one given at the end of this Unit.

- 2) Discuss how the process of digestion takes place in small intestine in brief. And also discuss the activity which will be used to demonstrate this in classroom.

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10.5 HOW TO GET HIGHER YIELDS

We all know that demand of food is increasing day by day in our country. Contrary to it, land for production is decreasing in order to fulfill developmental needs of the country. It has emerged as a challenge to our agriculture scientists to cope up the situation. Learners at secondary level should be made aware of many such issues. One day Ms. Alisha, a science teacher at Kendriya Vidyalaya saw an info-graph on production of pulses in our country and brought it in the class to initiate the topic.

She showed this info-graph published in Times of India in the class. She divided the class into 2 groups. One group was asked to raise questions and other group to find out the answer.

Group 1 asked following questions:

- Why is there a need to boost pulse production?
- Is boost required in only pulse production or other crops also?
- What are the ways to get higher yields?
- Do all of us eat pulses?
- What are other alternatives?
- What kind of food habits do people have in our country?



Fig. 10.1 Source: time of india.indiatimes

Many such questions make the classroom active and learners started questions and finding answers. They were discussing, arguing and answering. Watching this, Alisha was very happy and decided to extend the discussion further. She asked learners to collect more information about food habits, crop production, demand of food items in the country, etc.

Next day, she found learners have come with many details. Articles published in magazines, newspapers. (the purpose of this activity was to motivate learners to explore resources in their surroundings which can facilitate her in developing understanding about ways and means for getting higher yields). One such infographic brought by a learner was on food habits of Indians.

This has helped her to develop an understanding in the class that when we talk about getting higher yields, we have to think in both directions, i.e. vegetarian and non-vegetarian.

You will find in the textbook of class IX, three aspects have been discussed in this regards, i.e. crop variety improvement, crop production improvement, and crop protection management.

When we talk about crop variety improvement, we are taking about identifying those crops which are disease resistant, requires less fertilizer, give good production.

You have to introduce the concepts like **hybridization** i.e. crossing between genetically dissimilar plants. Hybridization may be of three types:

Intervarietal Hybridization:

Hybridization between two or more varieties of same crop.

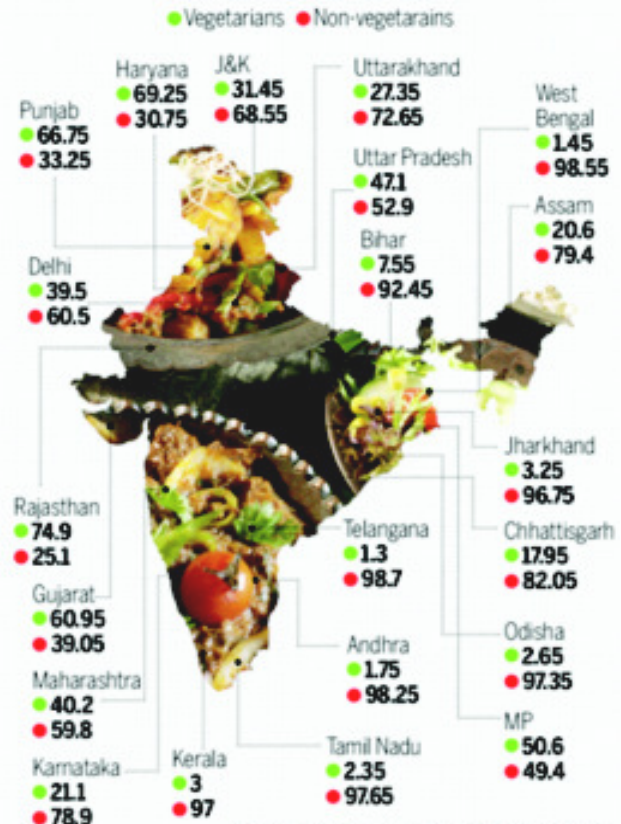
Interspecific Hybridization: Hybridization between two different species of same genus.

Intergeneric Hybridization: Hybridization between two different genera.

Now a days you must have come across various debates on genetically improved crops, in which a specific gene is being introduced to develop desired characteristics. These are known as **Genetically Modified Crops or GM crops**. Debates on Bt Cotton and BtBrinjal are very common.

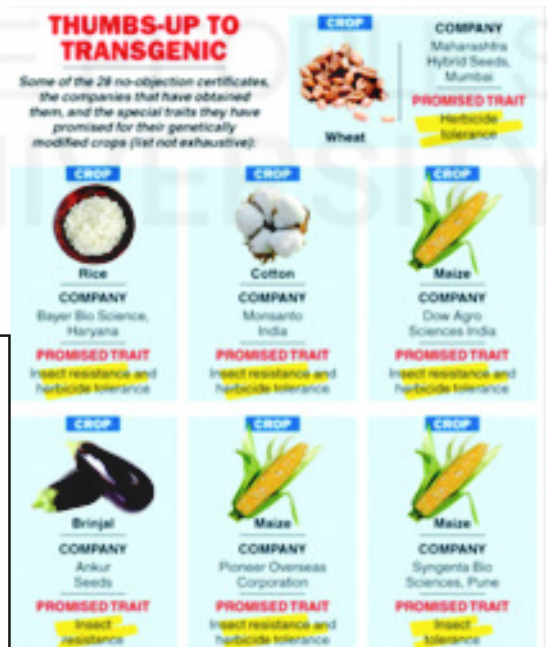
Rahman, a science teacher gave following activity in his class.

Rahman asked his learners to explore and enlist the crops, which are genetically modified and are being used worldwide. He also asked them to enlist the kind of benefit is promised in every crop in the list. Few learners came with charts and whole class prepared the following list:



Source: Sample Registration System Baseline Survey

Fig. 10.2



Source: timesofindia.indiatimes.co

Fig. 10.3

Crop	Tolerance
Maize	Insect and herbicide
Soyabean	Insect and herbicide
Cotton	Insect and herbicide
Papaya	Insect
Tomato	Increased lycopene
Brinjal	Insect
Wheat	herbicide
Rice	Insect and herbicide

Source: The Telegraph, 27/12/2013

This activity facilitated Rahman to continue discussion on various factors responsible for crop variety improvement. Learners also debated on pros and cons of GM Crops.

Activity 3

- Organize a debate on benefits and reservations on using Genetically Modified (GM) Crops in India. Prepare a report and discuss it with learners in your class.
- You can organize a talk of an agricultural scientist or social worker working for agricultural issues. This will help learners to understand the concept and issue more effectively.

Another important dimension is crop production management. We are going to discuss its one important part i.e. nutrient management in next sub-section.

10.5.1 Nutrient Management

Learners may have an idea about various nutrients required for plants. If you ask, many of them will tell you about various fertilizers like UREA, DEP,



Lakshmi's Story: Building a Business with Dirt and Worms I Bill & Melinda Gates Foundation

Fig. 10.4

POTASH, which their parents are using in their agricultural fields. Nowadays, organic matters are also being used to improve the productivity of soil. You have to give them an opportunity to understand the difference between **organic supplements i.e. Manure** and **Chemical supplements i.e. Fertilizers**.

Baidehi, a science teacher in Andhra Pradesh used a video to start her class, which is a success story of a village woman Lakshmi who used vermin-compost technique. This video is available at <https://www.youtube.com/watch?v=KNIVA9F8huE>.

This story helped Baidehi to initiate the discussion on vermin-compost, which is a kind of manure. Generally, manure is of two types:

Compost and Vermi-Compost

Green Manure

You have to provide opportunity to your learners to see both kind of manures and discuss their benefits.

You can use examples of using remains of one crop before going for another in traditional Indian fields such as use of leaves and dead parts of plants in developing manure, etc.

You can organize a visit of professional manure development facility (if available in your vicinity) or use video films to give learners a feel how it works.

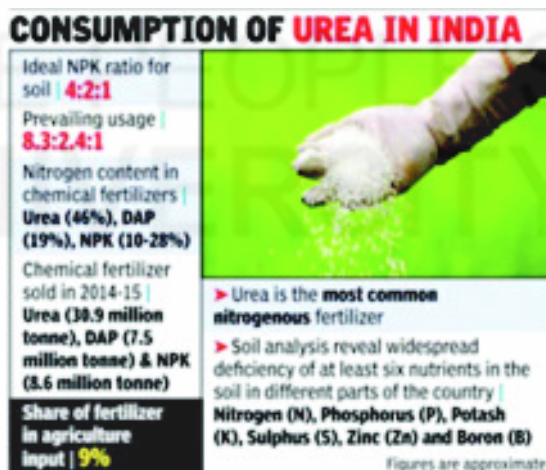
As far as fertilizers are concerned, you can use tables, charts, graphs, info-graphs, sample of various fertilizers to explain the concept. Also, encourage your learners to debate on benefits of using fertilizers and also consequences of over use of fertilizers.

Activity 4

Invite a farmer parent to your class. Discuss with him various crops he grow and type of fertilizer he used. Ask learners to prepare a chart based on information given by the farmer.

After it, learners should be asked to calculate the ratio of fertilizers used by the farmer and prescribed by scientists.

You can also use some news paper articles/info-graphs also for this purpose.



Source: timesofindia.indiatimes.com

Fig. 10.5

10.5.2 Irrigation

Crop production improvement has another important dimension of irrigation. In India, learners will tell you various means of irrigation including rain, canals, wells, *rahat*, ponds, tube-wells, etc. Nowadays many fresh initiatives are being promoted for ensuring water for irrigation as well as use of every drop of water. Slogans like **more crops more crop** are being discussed.

You have to discuss modern means of irrigation in your class and also provide an opportunity to feel traditional means of irrigation so that learners can compare themselves, which one is more effective and why.



Fig. 10.6: Irrigation Systems in India

Activity 5

Give a project work to learners of your class, in which they will explore various means of irrigation being used in India. You can divide the class into few groups and each group should be given a different project like:

- 1) Traditional means of irrigation in India
- 2) Modern means of irrigation in India
- 3) Means of irrigation using ground water
- 4) Means of irrigation using rain water
- 5) Government initiatives to promote Modern means of irrigation, etc.

After completion of the project, each group will be asked to give a seminar presentation followed by discussion in the class.

10.5.3 Crop Patterns

Ask learners to give examples of various crops being cultivated at their living place and write their responses on board.

There will be a variety of responses and the variety may be more in case the children in the class are from different geographical areas. In planes of north India, major crop patterns may be wheat, rice, sugarcane, maize, mustard, mango, etc., while in the hilly regions it will be apple, tea, maize, pulses like rajma, etc. for children from the Southern States and coastal regions of India, rice, sugarcane or coconut, etc. are the important crops. This shows that India has a variety of cropping patterns due to varied geographical and climatic conditions.

Activity 6

- Children should be involved in activities like developing small projects on crop patterns in different regions in India.
- An exercise to enhance their understanding about various crops in different regions in India can be organised with the help of the map of India.
- Children can be asked to collect information from the parents and the local farmers in their neighbourhood about specific climatic needs of various crops and prepare a report on it.

Apart from this, crops are classified into groups based on their growing seasons, duration of crop or economic importance. Let us have a look at all these classifications in the following chart.

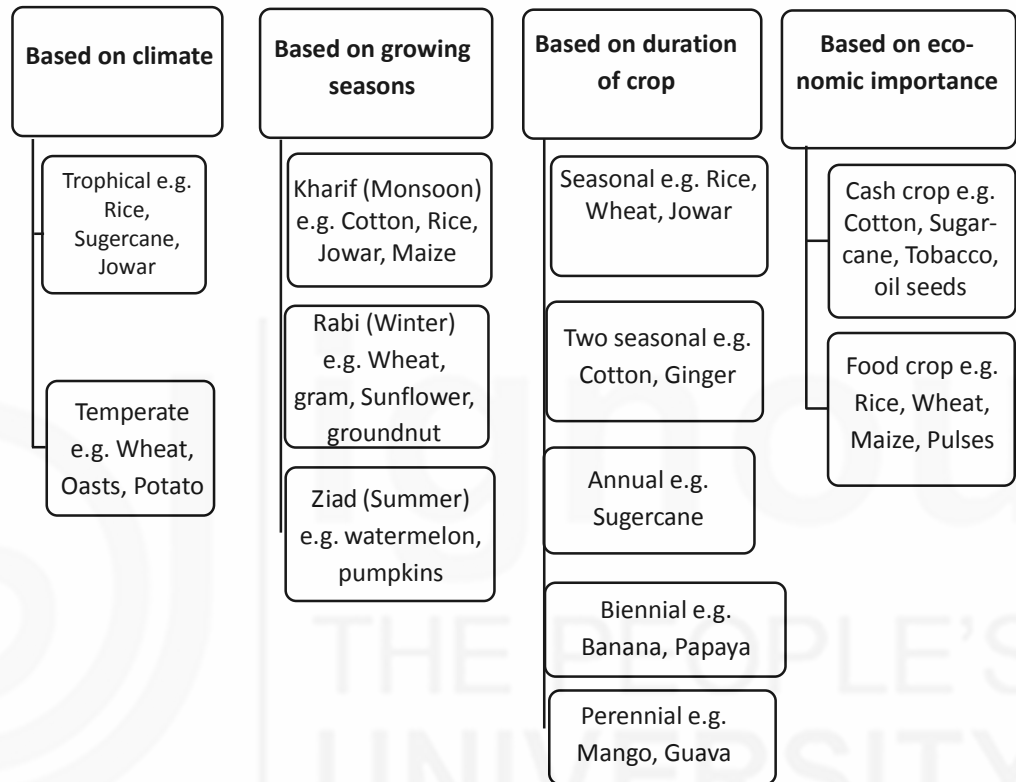


Figure 10.7: Types of Crops in India

This chart can also be used as a summary for classification of crops and children can be asked to include more examples from specific geographical areas in the list. A discussion with an agricultural expert/scientist or a progressive farmer of the area can help you in this direction.

Check Your Progress

Note: a) Space is given below to write your answer.

b) Compare your answer with the one given at the end of this Unit.

3) Discuss the types of crops on the basis of seasons with examples.

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10.6 ANIMAL HUSBANDRY

India is not a vegetarian country. Animal and animal products are major part of food in our country. Those who are vegetarians use milk, ghee, butter, etc. which are animal products whereas fish, egg, meat, etc. are the food for non-vegetarians. In India, you must have seen that farming of goat, sheep, poultry and fish are major small scale industries. Its management using scientific methods is called Animal Husbandry.

Let us take some examples and discuss how will you introduce and explain these concepts in your class.

10.6.1 Cattle and Poultry Farming

If you want to start discussion with cattle farming, ask learners about the animals, which they have seen in villages and their use. Learners will easily tell you about cow and buffaloes, two most common animals being used as milk producing animals. The industry is known as dairy industry.

In India, many breeds of cows and buffalos can be seen at any cattle farm or dairy.

Ramona has organized a visit of her learners to a nearby dairy or cattle farm and ask them to observe and note down various things. She noticed that learners have noted down following things:

- Number of cows and buffalos
- Types of cows and buffalos i.e. their breeds
- Milk production by various breeds and total milk production of dairy per day
- Various milk products are being produced at the dairy
- Feeding system and hygiene at the dairy farm
- Use of Gobar Gas as alternative source of energy

Later on, she asked learners to give a presentation. Learners informed the class that they came to know about the breeds which are giving more milk and for a longer duration (Ramona explained it as lactation period) and also some local breeds which are more resistant to diseases.

Learners also highlighted the role of cleanliness and maintenance for longer survival of the industry.

You can also organize such visits which will help your learners to understand various dimensions of dairy industry.

Another example which you can use is of poultry farming. Mukesh started this topic with the help of a TV commercial of NECC (National Egg Coordination Committee). You can use same which is available at <https://www.youtube.com/watch?v=-B-UF-tuMgg>.

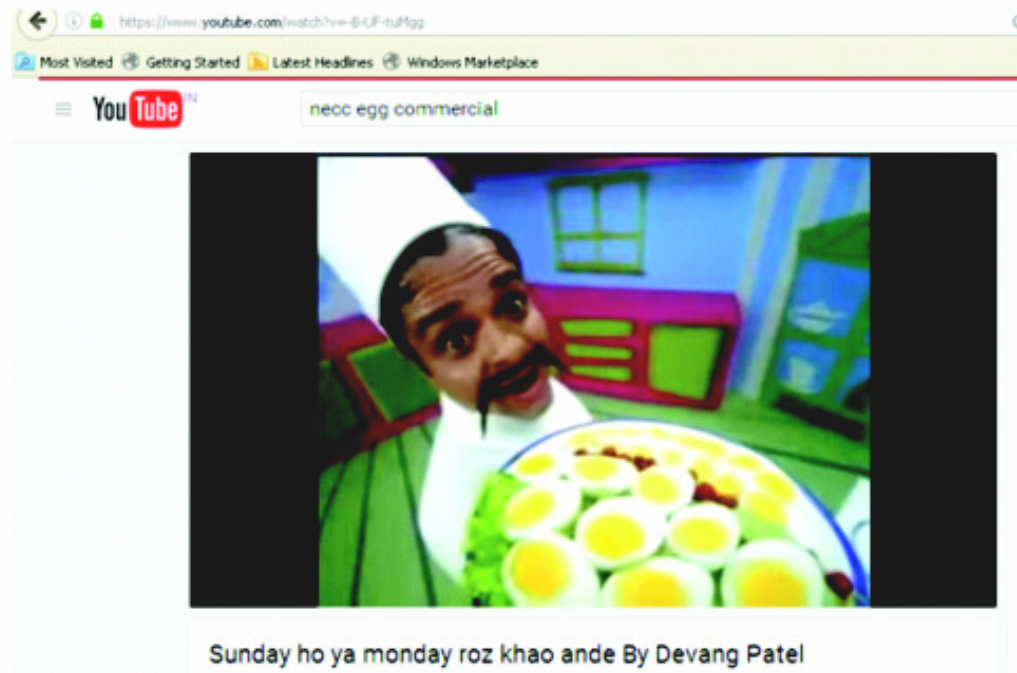


Fig. 10.8

This ad helped him to initiate the discussion on egg production and consumption. Discussion moves towards poultry farming as an industry and issues like cross breeding programme between Indian and foreign breed were discussed. One learner asked about Broiler production, which Mukesh explained as chickens which are fed with vitamin rich supplementary feed for good growth rate and better feed efficiency.

He also discussed about the role of maintenance of temperature, hygienic conditions in housing and poultry feed. Discussion moved forward by the inputs of a learner on bird-borne diseases and virus attacks. In order to help learners in more concrete form, Mukesh organized a visit to a nearby poultry farm for the learners.

Activity 7

Organize a visit to a nearby poultry farm and encourage your learners to clear their doubts. They should be asked to prepare a visit report highlighting various important aspects of poultry industry.

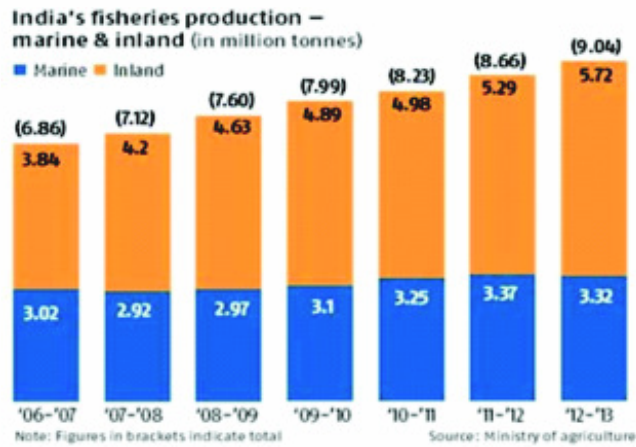
10.6.2 Fish Production

Another big source of food in India is fishes. Fishes are cheap and rich source of protein. When we talk about fish production, it includes production of prawns and molluscs also.

In India, fishes are captured from ponds, rivers as well as from sea. In coastal areas of India, fish catching is major source of income for millions of Indians. Fishing in India can be done in two ways i.e. catching from natural resources or culturing fishes in artificially developed ecosystem.

Indian Fisheries is classified into two categories, i.e. **Inland Fisheries and Marine Fisheries.**

Monika, a science teacher in a School at Vijayawada, used this chart to introduce the comparative picture of Inland and Marine Fisheries in India. She asked learners to go through the chart and analyze the category in which production is growing continuously. And in which category is it almost stagnant. She also asked learners to find out the reasons for it.



Source: www.business-standard.com

Fig. 10.9

Such activities can help you a lot in discussing various issues.

Suggested Activity:

- Learners may be asked to visit nearby fish market and enlist the types of fishes being sold there and source of their production.
- Learners may take interview of people involved at various levels in fisheries industry and analyze their problems.
- You can show any video/animation on all the processes involved in fish production, procurement and distribution.
- Learners may be asked to collect information on fishery industry in India and other countries and present a comparative picture of India's position.

Check Your Progress

Note: a) Space is given below to write your answer.

b) Compare your answer with the one given at the end of this Unit.

4) How will you introduce the concept of Bee Keeping in your class?

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10.7 LET US SUM UP

The unit started with discussion on components of food and explained that nutrients are needed for our body which we take from various food items. Importance of balanced diet is also highlighted. While talking about nutrition, autotrophic and heterotrophic nutrition are differentiated between. Activities are suggested which you can use to introduce these concepts. Nutrition in animals like amoeba and human digestive system is also explained in the unit. Table of role of various organs in digestion will help you to revisit the content and design

activities to explain it. Use of info-graphs has been introduced while discussing the section on how to get higher yields. You can also collect many such info-graphs in the news papers and magazines, which can be used to making your topic interesting. Motivating success stories like the story of Lakshmi can be used effectively while introducing concepts like organic manure. The Unit talks about using pictures and graphs while discussing irrigation patterns and crop production. Issues like cattle and poultry farming and fisheries were discussed to give you an idea about how such content can be introduced in the class and how you can use various resources available in your nearby region.

10.8 UNIT END EXERCISES

- Organise a discussion cum presentation as group activity on need and importance of various components of food in your class. Ask learners to reflect on presentation of various groups and prepare a report covering various aspects which have been discussed, learners' participation and achieved learning outcomes through the activity.
- Ask learners to design a role play on human digestive system and demonstrate functions of various organs of human digestive system.
- Discuss with learners about various animal products they use. They should be asked to collect information on the sources of these products and classify whether they are being produced on a large scale as industry or in natural habitats.

10.9 SUGGESTED READING AND REFERENCES

NCERT (2011). Science Textbooks for Class VI-X, National Council for Educational Research and Training, New Delhi.

NCERT (2013). Pedagogy of Science, Part I and II, Textbook for B.Ed., National Council for Educational Research and Training, New Delhi.

10.10 ANSWERS TO CHECK YOUR PROGRESS

- 1) Suggest the activity that you will plan to explain the concept of heterotrophic and autotrophic nutrition in your class.
- 2) Small intestine receives secretions from liver and pancreas. Complete digestion process takes place here. Digested food is absorbed by blood vessels called absorption. Absorbed substances are transported to various body parts through blood to build complex substances like proteins. This process is called assimilation. (Suggest the activity on your own)
- 3) Various types of crops on the basis of seasons are:
Kharif(Monsoon) e.g. Cotton, Rice, Jowar
Rabi (Winter) e.g. Wheat, gram, Sunflower
Zaid (Summer)e.g. Groundnut, watermelon, pumpkins
- 4) Suggest the activity or plan which you will adopt to introduce the concept based on your understanding on this unit.