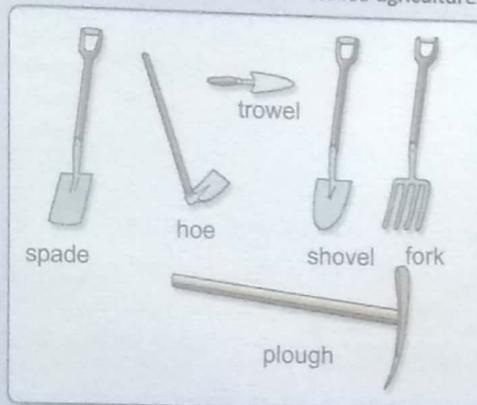




Introduction

The plants grown and tended in a field for getting food are known as **crop plants**. The produce from these crop plants may be in the form of grains, roots, fibres, etc. The term agriculture is derived from the Latin words 'ager' means 'field' and 'cultura' means 'cultivation'. The science that deal with the growth, development and culture of plants and animals for food and human use is called **agriculture**.



Sidak and Rhea saw some tools like spade, hoe, trowel, shovel, fork, plough, etc. in the field when they visited their village. They want to know the uses of these tools.

Their grandmother tells them that, these tools are meant for producing food from field. They further enquired, do you know the importance of food ?

Sidak wants to know, how can we provide food to a large number of people since all of us need food for living ?



Zaheen tells her that, this can be achieved by doing crop production on a large scale.



Food is essential for the existence of all living beings. All organisms, directly or indirectly, depends on plants for their survival. It is so because, only plants have the ability to make their own food through photosynthesis. Due to this reason, they are called **autotrophs**. On the other hand, the animals are called **heterotrophs** since they cannot synthesise food and so they feed on either plants or other animals.

Learning New Words

Agriculture : Science dealing with growth, development and culture of plants and animals.

Agricultural practices : The various tasks and plannings undertaken by farmer for raising crops.

Soil preparation : It involves loosening and mixing of soil through ploughing for better root penetration.

Sowing : The process of putting seeds in the soil for germination.

Manure : The organic substances obtained from the decomposition of dead plants and animal wastes.

Fertilizer : The man-made mineral salts which are added to the soil to provide the specific nutrients.

Irrigation : The process of watering the plants in a field.

Weeding : The process of removing weeds.

Harvesting : The process which involves both cutting and gathering of mature crop.

Animal husbandry : The rearing of animals at farms by providing proper food, shelter and care.

Silo : The big and tall cylindrical structures for the storage of grains.

Granaries : The large storage structures like godowns are also known as granaries.

Threshing : The process of separating the chaff from the grain.

Tilling : Agropreparation of soil by ploughing.

1.1 CROP PRODUCTION

To meet the increasing demand of the fast growing human population, we need extensive and intensive crop production. You might be surprised to know this fact that, this type of crop production has already been started in our country since 1960. This type of crop production has led to green revolution in our country. This has occurred due to the continuous efforts of

Dr. M.S. Swaminathan who is considered to be the “father of green revolution in India”. Successful crop production depends upon many factors such as :

- (i) Understanding how crops grow and develop.
- (ii) Affect of various nutrients, climate and water on the growth of the plant.
- (iii) Modification and the management of each factor for increasing the yield of the crop.



Know the fact!

- Agriculture has two main branches namely; **Agronomy** (rearing and management of crop plants). **Animal husbandary** (rearing and management of domesticated animals).
- Horticulture** is the science of growing and management of fruit and flowering plants in orchards and gardens.
- Olericulture**, is science of growing and management of vegetables.
- Agriculture**, sometimes also known as farming, is the scientific practice of raising plants and animals as crops.

In order to provide food for a large population, regular production, proper management and distribution of food are necessary. Let us find out how this is achieved.

1.2 AGRICULTURAL PRACTICES

Until 10,000 B.C. man was still nomadic and wandering in groups from place to place in search of food and shelter. He started hunting for animals that provided him meat for food. Later on, he could cultivate land and produce rice and wheat. This led to the development of ‘Agriculture’. It changed man’s way of life.

Crop is the term used to describe a plant that is grown in large quantities, especially as food or fodder for livestock. e.g. wheat crop, maize crop, cereal crop, vegetables and fruit crops.

Classification of crops : Crops are classified on the basis of seasons in which they are grown and seasons depend on temperature, humidity and rainfall. Three categories of crops are generally grown in our country :

Category of crop	Time of sowing	Time of harvesting	Examples
Kharif (Rainy season)	June-July	Oct-Nov.	Paddy, Maize, Soyabean, Groundnut, Cotton, etc.
Rabi (Winter season)	Oct-Nov.	March-April	Wheat, Gram, Mustard, Linseed, etc.
Zayed (Summer season)	March-April	July-Aug	Sunflower, Moong, Gourd, Cucumber, Bitter gourd, Water melon, Musk melon, Flowers, and Vegetables, etc.



Know the fact!

- Paddy** requires a lot of water during its growth and therefore, it cannot be grown during summer and thus requires rainy season.
- Hydroponics** is the cultivation of plants without soil, using specially prepared solutions of mineral salts.

Sidak and Rhea both want to know, how the crop plants are able to obtain nourishment from the soil.

Grandmother tells them, plants obtain nourishment in the form of various nutrients.

Now, they want to know about plant nutrients.

1.3 PLANT NUTRIENTS

Just like animals, plants also require nutrients for their proper growth. The mineral elements required by plants for their growth are called **nutrients**. It has been found that, 16 elements are required for the growth of plants. On the basis of the quantities required, the

various elements needed for plant growth can be categorised into the following two types :

(i) **Macronutrients** : The mineral elements which are required by the plants in large amounts are called **macronutrients**. They are required for the growth of the plant body. They are **nine** in number.

Carbon, Nitrogen, Oxygen, Hydrogen, Phosphorus, Sulphur, Potassium, Magnesium and Calcium.

(ii) **Micronutrients** : The mineral elements which are required by the plants in very small amounts are called micronutrients. They are involved in the functioning of various plant enzymes. They are **seven** in number.

Iron, Copper, Zinc, Molybdenum, Manganese, Chlorine and Boron.



Deficiency of any nutrient in soil affects the crop yield. The three most important nutrients for plant growth are : **nitrogen, phosphorus and potassium (NPK)**. Such requirement of nutrients is met by using chemical fertilizers and manures in the soil which we will study further in this chapter.

The products obtained from the crops are called produce which may be in the form of grains, roots, leaves, fruits, fibres, etc. See table 1.1 which gives a list of common crop plants grown in our country.

Table 1.1 Some Common Crop Plants grown in India

(a) Cereal crops	Rice, Wheat, Barley, Maize, Ragi
(b) Fibre crops	Cotton, Jute, Hemp
(c) Pulses or Legumes	Grams, Peas, Beans
(d) Oil seeds	Mustard, Sunflower, Groundnut
(e) Tuber crops	Potato, Tapioca
(f) Sugar crops	Sugarcane, Beetroot
(g) Plantation crops	Coffee, Tea, Rubber, Coconut
(h) Root crops	Sweet potato.

How agricultural practices are performed ?



The various tasks and plannings undertaken by farmer for raising crops are known as **agricultural practices**.



1.4 STEPS OF AGRICULTURE

To raise a crop, a farmer has to carry out certain important basic steps in his field. To perform these steps various implements are required which are discussed here under.

We shall now discuss each of the above mentioned agricultural steps in detail.

AGRICULTURAL STEPS	IMPLEMENTS USED
Preparation of the soil	
(a) Ploughing	wooden or iron ploughs.
(b) Levelling	wooden or iron levellers.
Sowing of seeds	ploughs, hand sowing, seed drills.
Manuring	manually or with drills.
Irrigation	tubewells, sprinklers, wells, canals, rain dependent.
Weeding	<i>khurpa</i> (trowel), harrow.
Crop protection	knapsack sprayer (manual), aerial spray (aircraft, helicopters).
Harvesting	sickle, harvesting machine.
Threshing and Winnowing	animals, threshers, combines (can do harvesting and threshing both).
Storage of grains	wooden, clay or metal containers, silos, gunny bags.

(1) Preparation of the soil :

This is the first step in raising a crop. As top soil is the most fertile layer of the soil. It has to be loosened and aerated so that the roots are able to penetrate deeper. This process of loosening and turning the soil is called **ploughing or tilling**.



Fig. 1.1 : An iron plough.

This is done by a wooden or an iron plough (See fig. 1.1). Ploughing is done by using tractor driven cultivator or animals are used for this purpose.

(i) First ploughing is done on dry land then afterwards large soil lumps are further broken down into small pieces using a wooden or iron plank. This is called **levelling** (See fig. 1.2)

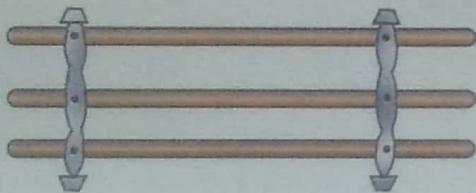


Fig. 1.2 : Wooden plank (leveller).

(ii) After ploughing the soil is levelled and furrows are made. If the soil is very dry, it may need watering before ploughing. The ploughed field may have big pieces of soil called **crumbs**.

It is necessary to break these crumbs with a plank. The field is levelled for sowing as well as for irrigation purposes. The levelling of soil is done with the help of a leveller.

Sometimes, manure is added to the soil before tilling. This helps in proper mixing of manure with soil.

(iii) The soil is watered before sowing is carried out.

Advantages of ploughing :

- (i) Ploughing loosens and aerates the soil.
- (ii) It helps in the growth of microorganisms and worms present in the soil and thus, maintains the fertility of the soil.
- (iii) It allows proper mixing of organic matter (humus) and nutrients evenly throughout the soil.

Advantages of levelling :

- (i) It helps in uniform distribution of water.
- (ii) It compresses the loosened top soil thus, decreasing erosion.
- (iii) It helps in proper sowing and uniform growth of crop plants.

Agricultural Implements :

Before sowing the seeds, it is necessary to make soil granular to get better yield. The main tools used for ploughing are plough, hoe and cultivator.

Plough : It is a large piece of farming equipment which is used for digging and turning over soil, especially before seeds are planted. It makes the soil soft for the easy penetration of roots of the growing plants. In olden days wood plough



Fig. 1.3 (a) : Traditional plough being used.

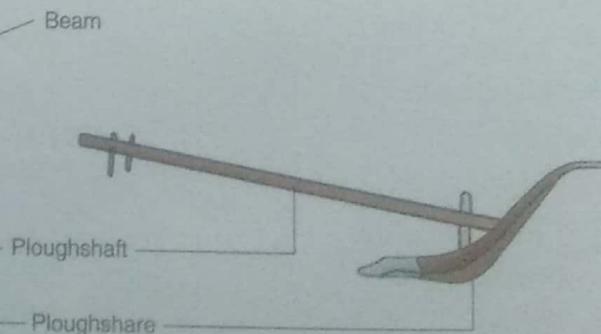


Fig. 1.3 (b) : The plough.

was used and now-a-days iron plough is used. It contains a curved blade which helps in tilling. Earlier used plough contained a curved plate of wood or iron called **ploughshare** which is attached to a long wood shaft known as **plough shaft**. This ploughshaft contains a handle which is fixed to thick beam and this beam is placed on the bulls neck and tied with ropes to the hooks attached on the beam (See fig. 1.3 (a) and (b)). This type of plough can be used easily by a pair of bulls and a man. But now-a-days single plough are not used any more. These are replaced by a series of curved blades called **cultivator** which can be attached with a tractor (See fig. 1.4). The use of cultivator saves both labour and time.



Fig. 1.4 : Cultivator.

Hoe : It is a simple tool with a long handle and a blade which is used for removing weeds and breaking up soil. (See fig. 1.5)

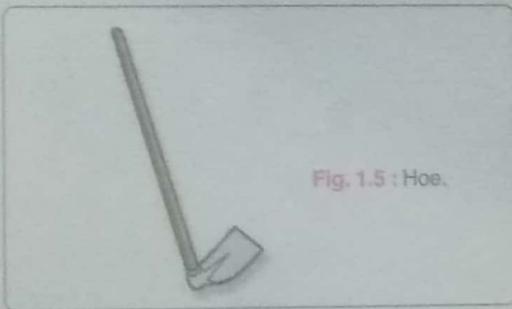


Fig. 1.5 : Hoe.

(2) Sowing of seeds :

After the preparation of the soil, seeds are sown. Sowing is the process of putting seeds in the soil. When the sowing of seeds is done, the following precautions must be taken :

- (i) The seeds should be high yielding varieties, healthy and disease-resistant.
- (ii) The seeds should be sown at the right depth. At greater depth the seeds will not

get sufficient oxygen for respiration and their shoots may not be able to come out from the greater depth. If seeds are scattered on the surface of the soil, then they will be eaten by birds.

- (iii) The soil should have sufficient moisture, otherwise seeds will not germinate properly.
- (iv) There should be proper spacing between the seeds. If the spacing is too little, then the seedlings will not get enough nutrients, sunlight and space to grow. And if the spacing is too large, then the production becomes low and a large amount of field space is wasted.

Time of Sowing : Time of sowing is a very important factor for proper establishment, growth and yield of a crop. It varies with season and availability of irrigational facilities.

Depth of Sowing : Depth of sowing is an important aspect for establishing a good crop yield. Shallow or deep sowing results in lesser plant population, as all seeds do not germinate. The crop shows uneven spread of plant with large number of gaps, and serious weed problems.

There are two methods of sowing seeds :

- (i) Sowing of seeds by hand (manually).
- (ii) Sowing of seeds by using a seed drill (mechanically).

(i) Sowing of seeds by hand :

The process of sowing seeds by hand is called **broadcasting**. In this method, the seeds are scattered in the field by the farmer in standing position. This method has few disadvantages, like :

- The seeds may not be properly distributed in the field.
- The seeds may fall in clusters at one place and at another place there may be none.
- The seeds may not get into the right depth and therefore, can be easily picked up by the birds. The seeds of maize, wheat, bajra, mustard, etc., can be sown by this method.

(ii) Sowing of seeds by using a seed drill :

A seed drill has a funnel shaped opening leading to long tubes. These tubes are attached to a plough. Seeds are put into the funnel. As the

plough makes furrows in the soil, the seeds are deposited, at right distance and right depth, in the soil by the drill. The method of sowing seeds by using a seed drill is better than broadcasting as the seeds are sown at regular intervals and at a proper depth (See fig. 1.6 and 1.7).

Moreover, this method of sowing is much faster and economical.

All type of seeds, except very light weight, can be sown by this method.

Selection of Seeds :

One day Sidak saw her mother put some gram seeds in a vessel and pour some water on them. After a few minutes some seeds started to float on the top. She wondered why some seeds floated on water ?

Traditional tool used for sowing seeds :

It is a funnel shaped implement having two or three pipes with sharp ends. Seeds are filled into the funnel which enter into the soil through pipes (See fig. 1.6).

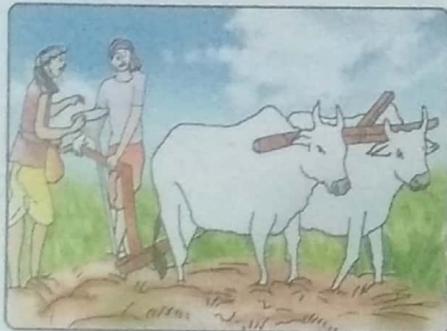


Fig. 1.6 : Traditional method of sowing.

Modern tool (Seed drill) for sowing seeds :

This implement gets attached with the tractor and it sows the seeds uniformly at a proper depth. It also helps in giving proper distance between the seeds and cover seeds with soil so that they are not taken away by birds. In this way it saves both time as well as labour (See fig. 1.7).

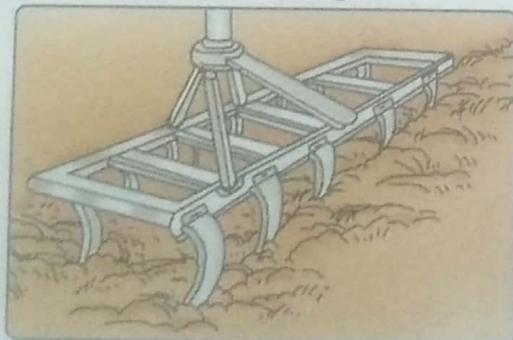


Fig. 1.7 : A seed drill.



Activity 1

Take a beaker and fill half of it with water. Put a handful of wheat seeds and stir well.

After sometime you may see that some seeds float on the top while the rest sink and settle at the bottom. Damaged seeds become hollow and are thus lighter, which makes them float.

This is a good method for separating good, healthy seeds from the damaged ones.

(iii) Sowing of seedlings by transplantation method :

For certain crops the seeds (seedlings) are not directly sown in the field. Instead, they are first sown in nurseries and then the seedlings are transferred to a field. This is known as *transplantation*. (See fig. 1.8). This method of sowing seedlings has few advantages also like :

- (i) It enables the farmers to select the healthier seedlings.
- (ii) It allows better development of root and shoot system of plants.
- (iii) It allows proper spacing between the plants so that they get proper sunlight, water and nutrients.
- (iv) The plants which are grown by transplantation method includes rice, chillies, brinjal, tomato, onion, cauliflower, etc.



Fig. 1.8 : Transplantation being done for Rice (Paddy) crop.

(3) Manuring :

Plants continuously utilize the nutrients present in the soil for their growth. Thus, soil nutrients gradually get depleted. They have to be replenished (restored) by adding manures or fertilisers. The substances which are added to the soil in the form of nutrients for the healthy growth of plants are called **manure** and **fertilisers**.

- (i) The organic substances obtained from the decomposition of dead plants and animal wastes is known as **manure**. Compost is a manure made by leaving dead plants and animal waste buried in a pit with alternating layers of soil. It is dark brown in colour. It is rich in organic matter (humus) and has greater water holding capacity.
- (ii) Fertilisers are man-made mineral salts which are added to the soil to provide the specific nutrients like nitrogen, phosphorus and potassium.

The mineral nutrients which are essential for the growth of the crop are obtained from the soil. If soil is not left uncultivated for one season, then it leads to loss of particular nutrient from the soil making it less fertile. Therefore, manure is added to the fields to replenish soil with nutrients which are utilised by the previous crop. Manure is made by the decomposition of plant or animal wastes in pits at open places. The bacteria decompose the undigested cellulose, nitrogen and phosphorus in waste to useful nutrients which can be easily utilised by the plants.



The soil loses its nutrients when farmers grow crop after crop in the same field. The field is never left uncultivated or fallow to replenish the lost nutrients. Following is the process of leaving the field uncultivated for the replenishment of lost nutrients.

Disadvantages of Manure

Manure is made from dung of farm animals. The slurry of water and dung which after decomposition forms the manure, can cause environmental pollution as it causes the release of gases like, CH_4 , CO_2 and H_2S .

Disadvantages of Fertiliser

The application of too much fertiliser results in the leaching of nitrates and phosphates into the rivers causing *eutrophication*. Nitrates in ground water find their way into drinking water which may be harmful.

CROP PRODUCTION

Advantages of Manure

- It enriches the soil with organic material.
- It increases the water holding capacity.
- It aerates the soil by making it porous
- It helps in the growth of microorganisms.
- It improves the soil texture.
- It increases the crop production.

Advantages of Fertiliser

- It provides nutrients to the soil immediately in concentrated form.
- It increases the crop production several times.
- It is easy to store and transport.
- It is easy to use.
- It is easily available in all seasons.



Activity 2

Take moong or wheat seeds and germinate them. Take three equal sized seedlings out of these. Now take three empty glasses or similar vessels. Mark them A, B and C. Take some soil in glass A. To glass B add same amount of soil mixed with a little cow dung manure. In glass C put same amount of soil mixed with a little urea. Now pour some water and plant the seedlings in each of them. Keep them in a safe place and water them daily.

After 7 to 10 days observe their growth. (1) Did all the plants in all the glasses grow at the same pace? (2) Which glass showed better growth of plants? (3) In which glass the growth was fastest? (See fig. 1.9 for hint).

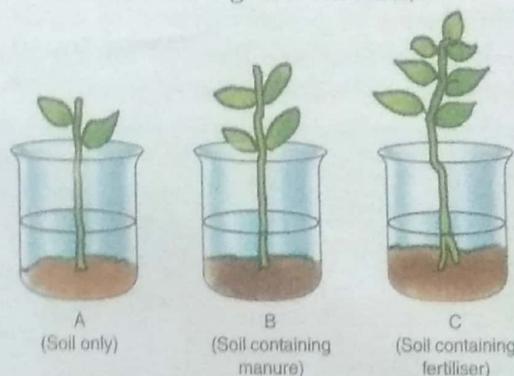


Fig. 1.9 : Growing seedling with manure, fertiliser.

Thus, we have seen that, the use of manure improves soil texture as well as its water retaining capacity. It replenishes the soil with all the nutrients.

Another method of replenishing the soil with nutrients is by avoiding the cultivation of the same crop year after year. It can be done by growing another crop alternately. This is called **crop**

Table 1.2 Differences between manure and fertiliser

Manure	Fertiliser
1. Manure is a natural substance obtained by the decomposition of cattle dung, human waste and plant residues.	1. A fertiliser is an inorganic salt.
2. Manure can be prepared in the fields.	2. It is synthesized in factories from chemicals.
3. It improves the quality and texture of soil as it provides humus content to the soil.	3. It does not provide any humus to the soil.
4. It restores the water retention ability of soil.	4. It does not help in water retention by the soil.
5. It is slowly absorbed by the plants.	5. It is readily absorbed by the plants.
6. It is bulky, so its transportation is not easy.	6. It is easy to transport in bags.
7. It cannot be stored in a house.	7. It can be stored in a house.
8. It is not always available as it is formed slowly by the decomposition process.	8. It is always available as it can be produced rapidly in the industries.
9. It is needed in large quantity.	9. It is needed in less quantity.
10. Manure is not very rich in plant nutrients.	10. Fertilizers are very rich in plant nutrients like nitrogen, phosphorus and potassium.

rotation. Earlier, farmers in northern India used to grow legumes as fodder in one season and wheat in the next season. This helped in replenishment of soil with nitrogen.

Some nitrogen fixing bacteria such as *Rhizobium species*, live in the root nodules of leguminous plants such as pulses, pea, beans, etc. They convert atmospheric nitrogen into water soluble nitrates.

(4) Irrigation :

Water is essential for the growth of plants. The process of watering the plants in a field is known as **irrigation**. Fields are usually irrigated by canals, wells or tubewells. [See Fig. 1.10] Irrigation should be proper. Excess of water or scarcity of water both are harmful for the crop. Excessive supply of water to the crop results in a



Fig. 1.10 : Irrigation through a tubewell.

condition called **water logging**. The chances of water logging is more in fields with clayey soil. If water logging continues, then it reduces the supply of air to the roots and stops growth of crop. It also increases the amount of salts in the soil and thus

can damage the crop permanently. To prevent the damage to soil, excess water is drained out from the field and this is also necessary for the preparation of the next crop. Sometimes, fast and strong winds accompanied by rains result in the fall of mature crop. This condition is called **lodging** and it results in poor produce.

Some plants, for example-rice, needs plenty of standing water in the field.

For lifting water, pumps are commonly used. Diesel, biogas, electricity and solar energy are used to run the pumps. The pumps of various power are available. They are selected according to the requirement of the particular field.



Zaheen wants to know how irrigation was done traditionally and how is it done now a days.

Traditional Methods of Irrigation

Different methods are used for lifting water available in wells, lakes and canals to the fields. Traditional methods utilised cattle or human labour. Although these methods were cheaper but they were less efficient.

Some of the traditional methods of irrigation are :

- Pulley system commonly known as Moat.
- Rahat.
- Chain pump.

(d) Lever system commonly known as Dhekli [See fig. 1.11(a), (b), (c) and (d)]



Fig. 1.11 (a) Moat.

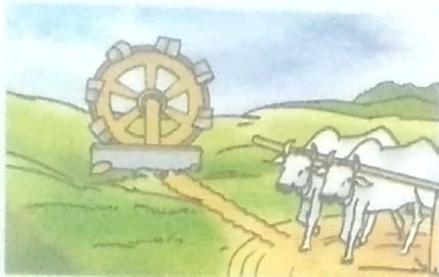


Fig. 1.11 (b) Rahat.

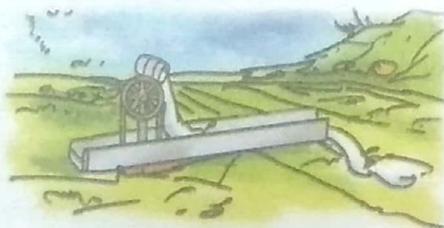


Fig. 1.11 (c) Chain pump.



Fig. 1.11 (d) Dhekli.

Modern Irrigation Methods : These methods utilise electrical motors and thus use water more economically and efficiently. Some of their methods are :

1. Sprinkler System : It is more effective on the uneven lands where water is available in

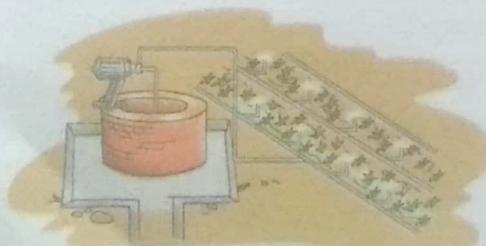


Fig. 1.12 : Sprinkler system.

lesser quantity. In this method water from revolving nozzle is sprinkled like rain on uneven grounds. This method is very useful for sandy soils. (See fig. 1.12)

2. Drip system : In this method, water is not wasted and is very effective for watering gardens, trees and fruit plants. It provides drop by drop water and is very useful where availability of water is very less. (See fig. 1.13)

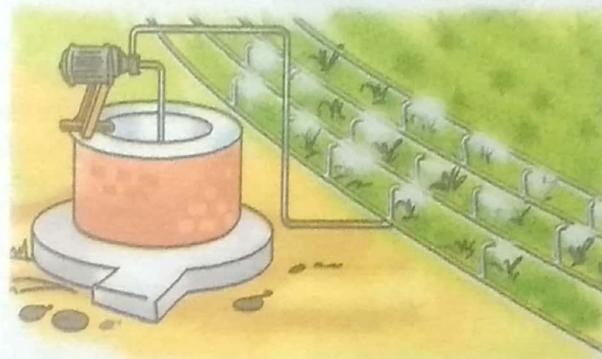


Fig. 1.13 : Drip system.

Water falls drop by drop through nozzles that are grounded at the position of roots, hence this method is also referred as **drip system**.

(5) Weeding :

The unwanted plants growing alongwith the main crop in a field are known as **weeds**. They compete with the main crop for water, soil nutrients, sunlight and thus hamper the growth of the crop plants. They also spread pests on to the crops and sometimes produce poisonous substances which are harmful to the crop, thus reducing the yield of crop. So, the weeds must be destroyed. The process of removing weeds is called *weeding*.

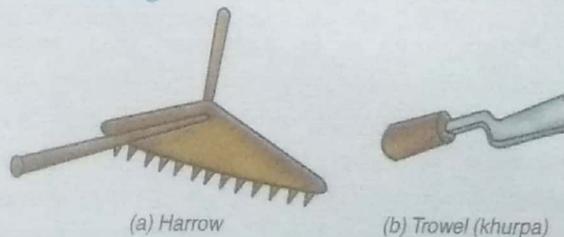


Fig. 1.14 : Tools used for physical removal of weeds.

Methods of removing weeds :

Weeds can be removed by using various methods, like :

- 1. Manual method :** It involves uprooting the weeds manually.
- 2. By using tools :** It involves using tools like harrows, spades or trowels (kharpa) (See fig. 1.14).
- 3. By chemical method :** It involves spraying chemicals called weedicides which destroy the weed.

The weedicides are sprayed during the vegetative growth of weeds before flowering and seed formation. Spraying of weedicides may affect the health of farmer. So they should use these chemicals very carefully. They should



Fig. 1.15 : Spraying weedicide.

cover their nose and mouth with a piece of cloth when they spray. (See fig. 1.15)

- 4. By biological control method :** This method of weed control involves use of insects or some other organisms which destroy the weed plants only without affecting the main crop plants.

(6) Crop Protection :

(a) Protecting the plants from pests :

Plants have to be protected from certain organisms which damage them and thereby make them unfit for human consumption. Such organisms are known as *pests*. Rodents (rats and rabbits), birds and insects cause a lot of damage to the crop. For example : Locusts fly in swarms and damage leaves of sugarcane and wheat crops. Stem borers make hole in the stem while termites damage roots.

Crops are also attacked by bacteria, fungi and viruses which reduce yield by causing several

diseases. For example, fungi cause rust and smut in wheat, and blight in potatoes. A bacterium causes the disease called wilt in plants which blocks the tissue that transports water. As a result of this the plant dies due to lack of water.

Different methods are employed by a farmer to minimise the damage caused by the pests.

- To scare away the birds, scarecrows are placed in the field. (See fig. 1.16)
- Certain poisonous chemicals known as pesticides and insecticides are sprayed in the field to kill insects.

Disadvantages of using the chemical method of controlling pests :

- Insecticides and pesticides cause soil pollution.
- Residue left on the fruits and seeds is harmful for human consumption.
- They destroy even the useful insects.



Fig. 1.16 : A scarecrow.

Biological method of controlling pests :

Biological control involves introduction of certain organisms in the field which eat away only particular pests.

Advantages of Pesticides :

- They kill pests quickly.
- They increase food production.
- They are easy to store and use.

(b) Protection from diseases :

Plants also suffer from diseases. Diseases are caused by bacteria, fungi and viruses. Diseases may be either seed borne, soil borne or air borne. They can be controlled, if suitable methods are employed at the right time.

Seed borne diseases can be controlled by :

1. Separating diseased seeds from the healthy ones. When the seeds are dipped in water, the diseased seeds float on the surface and can be removed.
2. Soaking the seeds in fungicidal compounds and antibiotics also help in destroying infection.
3. Fungicides and antibiotics are even sprayed on the standing crop.
4. Breeding of disease-resistant seed varieties.

(7) Harvesting :

When the crop attains maturity, it has to be cut. This is called **harvesting**, which involves both cutting and gathering of mature crops. It is either done by sickles or machines called harvesters [See fig. 1.17 (a) and (b)]. In harvesting, crops are pulled out or cut close to the ground. It usually takes 3 to 4 months for a cereal crop to mature. In our country this is the happy time of a farmer. As it marks the end of field work and crop is ready for collection. Many festivals are associated with harvesting season such as Baisakhi (in Punjab), Bihu (in Assam), Onam (in Kerala) and Pongal (in Tamil Nadu). Besides enjoyment and merriment this is also the time to offer prayers.

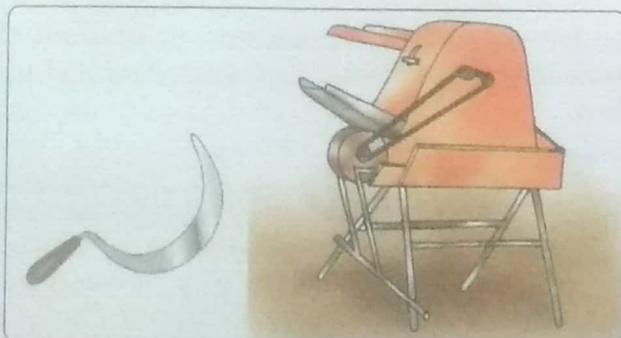


Fig. 1.17 : (a) A sickle (b) A thresher.

(8) Threshing and winnowing :

Threshing : The process of separating the chaff from the grain is known as **threshing**. This is done either with the help of machines called threshers or by the use of animals. Plants are also beaten on a stone to release the grains. It is done manually.

Now these days threshing is carried out with the help of combined harvesters. You might have seen huge size combines on roads during

harvesting season. [See fig. 1.18] which shows '**combine**'. It is called a *combine* because it is a combination of two machines, i.e., *harvester* and *thresher*.



Fig. 1.18 : Combine.

Sidak worries ! During harvesting, sometimes, stem pieces (stubs) are left in the field, which are burnt by the farmers. She requests farmers not to burn them as it causes lot of air pollution.



Winnowing : After the grains are threshed, the chaff is removed from the grains. This is known as **winnowing**.



Fig. 1.19 : The winnowing process.

Farmers with small holding of lands do the separation of grain and chaff by **winnowing** (See fig. 1.19).

Now these days, winnowing is done with the help of winnow machine (See fig. 1.20).



Fig. 1.20 : Winnow machine.

(9) Storage of grains :

The fresh crop has more moisture. The grains have to be dried before they are stored, to prevent the growth of microorganisms. If freshly harvested grains (seeds) are stored without drying, then they may get spoilt or they may lose their germination capacity. Hence, before storing them, the grains are properly dried in the sun to reduce the moisture in it. This prevents the attack by insect pest, bacteria and fungi. Farmers store their grains in jute bags (called gunny bags) or metallic bins. However, large scale storage of grains is done in silos and granaries to protect them from pests. (See fig. 1.21 and 1.22)

It is important to store grains in dry and cool places, as moisture and humidity promotes the growth of fungi. Stored grains also have to be protected from rats, insects and birds. So, pesticides are sprayed on them. This keeps the pests away from granaries.

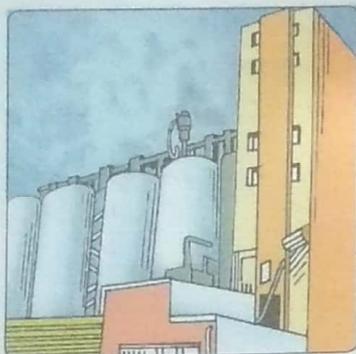


Fig. 1.21 : The grain silos – which have great storage capacity per unit volume.



Fig. 1.22 : Storage of grains in granaries.

For the large scale storage of grains, the **grain silos** are also used. The silos are big and tall cylindrical structures. They store different stocks of food items at different levels and are provided with outlets at different levels to withdraw the desired stock of grains. In our country most of the farmers depend on rainfall for irrigation. Therefore, some stocks of grains must be maintained to compensate for the shortage due to failure of monsoons in any particular year. This is known as **buffer stock**.

One day Sidak saw her mother putting some dried neem leaves in an iron drum containing wheat.

She wondered why ?

Zaheen tells her ! Dried neem leaves are used for storing food grains at home. For storing large quantities of grains in big godowns, specific chemical treatments are required to protect them from pests and microorganisms.



1.5 FOOD FROM ANIMALS



Sidak wants to know what are various foods we get from animal sources ?

Let us perform an activity to find out the various types of animal food and sources of such food.



Activity 3

Make the following table in your notebook and try to furnish the information from your surroundings to complete it.

S.No	Category of animal	Type of food/product	Sources of food/product
1.	Meat yielding animals	Meat	Sheep, goat, cock, fish
2.	Milk yielding animals		
3.	Egg yielding animals		
4.	Honey and wax producing insects		
5.	Fibre yielding animals		
6.	Silk and lac producing animals		
7.	Skin yielding animals		

Thus, we find that both plants and animals provide us with different types of food materials. The rearing and breeding of animals along with providing them with good food and shelter comes under **animal husbandry**. The main objective of animal husbandry is to improve the breeds of domestic animals and to provide them with better nutrition and atmosphere so that the yield of milk, eggs, meat, etc., can be increased.

Sidak tells Zaheen that people living in the coastal region consume fish and therefore they have strong bones and better eye-sight along with sharp brains as fish food is rich in vitamin A, D and mineral iodine.

Let's see it again

- **Crop** is the term used to describe a plant that is grown in large quantities, especially as food or fodder for livestock.
- The crops sown in rainy season are called **kharif crops**.
- The crops sown in winter season are called **rabi crops**.
- The crops sown in summer season are called **zayed crops**.
- The mineral elements which are required by the plants in large amounts are called **macronutrients**. They are nine in number.
- The mineral elements which are required by the plants in very small amounts are called **micronutrients**. They are seven in number.
- The large pieces of soil present in ploughed field are called **crumbs**. These are broken into smaller particles with the help of a plank.
- Time of sowing is a very important factor for proper establishment, growth and yield of a crop.
- The substances which are added in the form of nutrients for the healthy growth of plants are called manure and fertilisers.
- Excessive supply of water to the crop results in a condition called **water logging**.
- The felling of mature crop due to rains accompanied by fast and strong winds is called **lodging**.
- **Harvesting** is cutting of mature crop while **threshing** is the removal of the grains from the chaff.
- **Animal husbandry** involves rearing of animals in farms or at home by providing them with proper food, shelter and care.
- **Winnowing** is done to remove chaff from grains.



A. VERY SHORT ANSWER QUESTIONS (VSAQ) :

1. If wheat were sown in kharif season, what would happen ?
2. How can we control the weeds ?
3. How kharif crops differ from rabi crops ?
4. How macronutrients differ from micronutrients ?
5. Why preparation of soil is considered to be an important step in agricultural practices ?

B. SHORT ANSWER QUESTIONS (SAQ) :

1. What are rabi crops ?
2. Give two advantages of ploughing.
3. What are the advantages of levelling ?

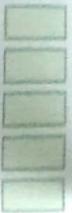
4. What is meant by transplantation technique ?
5. What is meant by crop rotation ?

C. ESSAY TYPE QUESTIONS (ETQ) :

1. Write differences between fertilisers and manure.
2. What is irrigation ? Describe two methods of irrigation which conserve water.
3. Explain how the soil is affected by the continuous plantation of crops in a field.
4. Explain the importance of the following :
 (a) Irrigation (b) Weeding (c) Transplantation
5. Define the following :
 (a) Threshing (b) Harvesting

D. ALTERNATE RESPONSE TYPE QUESTIONS (ARTQ) TRUE / FALSE :

1. Less supply of water to crops results in a condition called water logging.
2. The process of removing weeds is called weeding.
3. Combine is a combination of two machines, i.e., harvester and thresher.
4. The nutrients in the soil can be replenished by crop rotation.
5. The felling of mature crop in the field is called lodging.



E. MULTIPLE CHOICE TYPE QUESTIONS (MCTQ) :

(I) COMPLETE QUESTION FORM TYPE QUESTIONS :

1. What term is used to refer such crops which are sown in rainy season ?
 (a) Kharif crops (b) Rabi crops
 (c) Zayed crops (d) Cash crops
2. What term is used to refer such crops which are sown in winter season ?
 (a) Kharif crops (b) Rabi crops
 (c) Zayed crops (d) Cash crops.
3. What term is used to indicate the felling of mature crop due to rains accompanied by fast and strong winds ?
 (a) Water logging (b) Lodging
 (c) Threshing (d) Harvesting
4. What term is used to refer such crops which are sown in summer season ?
 (a) Kharif crops (b) Rabi crops
 (c) Zayed crops (d) Cash crops.
5. What term is used to describe the condition which arises ?
 (a) Water logging (b) Lodging
 (c) Threshing (d) Harvesting.

(II) INCOMPLETE STATEMENT TYPE QUESTIONS :

1. The big pieces of soil in the ploughed field are called :
 (a) Crumbs (b) Flakes (c) Lumps (d) All of these.
2. The simple tool used for removing weeds and for loosening the soil is called :
 (a) Hoe (b) Plough (c) Cultivator (d) Sickle

3. The process of sowing seeds by hand is called :
 (a) Broadcasting (b) Lodging (c) Cultivation (d) Weeding
4. The spraying of weedicides in the field is done during :
 (a) Vegetative growth of weeds (b) Before flowering of crop plants.
 (c) Before seed formation of crop plants (d) All of these.

F. MATCHING TYPE QUESTIONS (MTQ) :

(i) SINGLE COLUMN

The question, in this section, contains statements given in two columns which have to be matched. The statement in column I match with only one statement in column II.

COLUMN I	COLUMN II
1. Large scale grain storage	(a) Harvesting
2. Cutting of mature crop	(b) Rabi crops
3. Separating chaff from grain	(c) Kharif crops
4. Crops sown in winter	(d) Threshing
5. Crops sown in rainy season	(e) Grain silos

(ii) DOUBLE COLUMN

Each question, in this section, contains statements given in three columns which have to be matched. The statement in column I are labelled A, B, C and D while the statements in column II are labelled as p, q, r and s, and in column III, as w, x, y and z. Any given statement in column I has one correct matching with one statement in column II and column III.

COLUMN I	COLUMN II	COLUMN III
A. Macronutrients	p. Winter season	w. Wheat, gram, mustard, linseed, etc.
B. Micronutrients	q. Rainy season	x. C, N, O, H, P, S, K, Mg, Ca.
C. Kharif crops	r. 7 in number	y. Paddy, maize, soyabean, groundnut, cotton, etc.
D. Rabi crops	s. 9 in number	z. Fe, Cu, Zn, Mo, Mn, Cl, B.

(iii) MATRIX TYPE

Stimuli are presented vertically (in row) wherein responses are presented horizontally (in columns). Students are advised to check each cell in which the response on the top is true for each of the stimuli along the side.

RESPONSE

		Eutrophication	Seed drill	Hydroponics	Fertilizers	Broadcasting	Manure
S	Process of sowing seeds by hand.						
T	Addition of more fertiliser resulting in the leaching of nitrates and phosphates into the rivers.						
I	Modern tool for sowing seeds.						
M	They are nutrient specific.						
U	It increases the humus content of the soil.						
L							
I							

(iv) FILL IN THE BLANKS

1. Stock maintained to compensate for the shortage due to failure of monsoons is known as
2. Organisms which damage the crop are known as
3. The leaching of nitrates and phosphates into the rivers causes
4. The sowing of seeds in nurseries and then transferring seedlings into main field is known as
5. Micronutrients are in number while macronutrients are in number.

(v) CHECK LIST

For each of the following events in agriculture, indicate the use of correct term for a particular event.

Name of the event / Type of event in agriculture threshing /	Term which describes the event lodging / water logging / weeding / harvesting / winnowing / irrigation / crop rotation.
Cutting and gathering of mature crops.	
Growing two crops alternately in a same piece of land so as to replenish the soil with nutrients.	
Condition resulting due to excessive supply of water to the crop.	
The process of watering the plants in a field.	
Process of separating the chaff from the grain.	
Removing chaff from the grains.	
Felling of mature crop.	
Process of removing weeds.	

G. SELECT THE ODD ONE OUT GIVING REASON :

1. Kharif crops, rabi crops, zayed crops, cash crops.
2. Silos, gunny bags, granaries, fertilisers.
3. Harvester, thresher, combine, winnowing.
4. Manure, fertiliser, compost, weedicide.

Reason :

Reason :

Reason :

Reason :

SUBJECT ENRICHMENT ACTIVITY

A. DEBATE

1. There is not much significance of maintenance of buffer stock.
2. Metallic bins are move better storage structures than jute or plastic bags.
3. Storage of grains should be clone before rainy season.
4. Excessive use of fertilizers have a little impact on aquatic life.
5. Traditional methods of irrigation were less efficient than modern methods.

B. GROUP DISCUSSION

1. Weeding should be timely done.
2. Excessive water supply should be avoided.
3. Transplantation method gives better yield.
4. Seed drill is a better tool for growing crops and it increases yield also.
5. Seed selection and time of sowing determines the yield of any crop.

C. PRACTICAL / LAB ACTIVITY

1. Sow some seeds in the soil and arrange the drip irrigation system. Observe daily.
 - (a) Do you think it can save water ?
 - (b) Note the changes which can be seen especially during growth of plants from seeds. Is the growth fast or slow ?
2. Collect different types of seeds and put in small bags. Attach these in a herbarium file and label them.
3. Collect new agricultural machine pictures and paste in a file with their names and uses.

WEBLINKS

<http://www.kish.in/agriculture-in-india/>



1. What types of practices you will advice to increase the crop production keeping in mind that day by day land available for agriculture is getting reduced due to setting up of colonies and factories on such agricultural land.
2. What type of improvisation can be done in grain storage techniques keeping in mind that most of the buffer stock gets wasted due to improper storage.

