

BIOLOGY

Crop Production and Management

CBSE Std. VIII

INTRODUCTION

All organisms require food for their growth and survival.

Food is the combination of various organic and inorganic substances which are capable of providing energy for the various metabolic activities.

In all cases the food for animals comes directly or indirectly from plants.

Sources of food :

- (i) **Cereals** : These are rich in carbohydrate and thus provide energy.
eg.: Rice, wheat, maize, sorghum, barley, millets.
- (ii) **Pulses** : These are rich in protein and thus helpful for body building.
eg.: Gram, moong, pea, lentil, urd, pigeon pea.
- (iii) **Oil seed crops** :- These are rich in oil and fatty acids.
eg.: Groundnut, sunflower, soyabean, mustard, sesame.

(iv) **Vegetable crops** : These provide vitamins, minerals along with small quantities of carbohydrate protein and oils.

- Leaves : Cabbage, spinach, trigonella, lettuce
- Roots : Carrot, radish, turnip, sweet potato
- Stems : Potato, corms, rhizomes (ginger)
- Bulbs : Onion, garlic
- Fruits : Tomato, brinjal, gourd, cucumber
- Flowers : Cauliflower, bauhinia, banana

(v) **Fodder crops** : These provide green fodder to the cattle.

eg.: Berseem, sorghum, maize, oat, sudan grass, alfalfa.

Crops : Plants of same kind which are grown and cultivated at one place on a large scale are known as crops.

Different types of crops require different climatic conditions like temperature, humidity and photoperiods.

Crops are divided into two groups on the basis of growing season.

S.No.	Kharif crops	Rabi crops
1	These are autumn or monsoon crops. The sowing starts in rainy season.	The sowing starts in winter season.
2	They are sown in June-July.	They are sown in October-November.
3	They are harvested in September-October.	They are harvested in March-April.
4	They require warm and wet weather.	They require dry and cold weather.
5	They need a lot of water.	They do not need lot of water.
6	They can be converted into rabi crops if plenty of water is available.	They can not be converted into kharif crops.
	eg. – Rice, Cotton, Bajra, Jowar, Groundnut, Maize, Mango, Spinach.	eg. – Wheat, Barley, Gram, Pea, Soyabean, Mustard, Linseed, Potato, Orange, Apple.

🌱 **Kharif crops** : These crops are sown in the months of June/July and harvested in September/October every year.

eg.: Paddy, maize, sugarcane, sorghum, pearl millet.

🌱 **Rabi crops** : These crops are sown in the months of October/November and harvested in March/April every year.

eg.: Wheat, oat, barley and pea.

🍷 Horticulture is the science of growing and management of fruits and flowering plants in orchards and gardens.

🌱 AGRICULTURE PRACTICES

Activities which are carried out by the farmer to ensure good crop yield in particular sequence till the crop mature at harvest are known as agriculture practices.

(1) Soil preparation :

- | | |
|----------------|---------------|
| (a) Ploughing | (b) Levelling |
| (c) Manuring | (2) Sowing |
| (3) Irrigation | (4) Weeding |
| (5) Harvesting | (6) Threshing |
| (7) Winnowing | (8) Storage. |

1. SOIL PREPARATION

Various process are included in it.

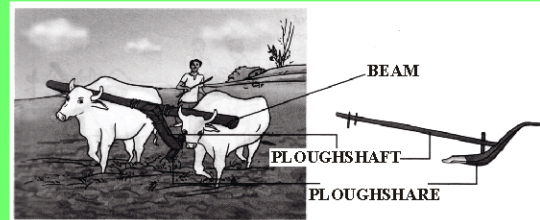
(a) **Ploughing or Tilling** – Process of loosening and turning of the soil is called ploughing or tilling.

Advantages of ploughing :

- ☑ It allows mixing of manure and fertilizer more uniformly.
- ☑ Seeds are also able to germinate more easily.
- ☑ It allows good root penetration so the plant is held firmly to the soil.
- ☑ Roots are able to breathe more easily.
- ☑ Loosened soil promotes growth of worms and microbes which help to maintain the fertility of soil.

Do You Know

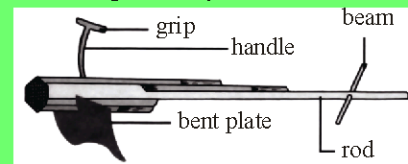
● **Agriculture implements** : The tools required for carrying out the activities involved in the cultivation of plants are known as agriculture implements.



THE PLOUGH

● **Plough** : It contains triangular iron strip called ploughshare and main part of the plough is a long log of wood called ploughshaft. One end of the shaft is handle and other end is attached to a beam which is placed on the bulls necks. One pair of bulls and a man can easily operate the plough.

● **Hoe** : This is used for removing weeds and for loosening the soil. It has a long rod of wood or iron. A strong, broad and bent plate of iron is fixed to one of its ends and works like a blade. It is pulled by animals.



A hoe

● **Cultivator** : Ploughing can also be done by tractor driven cultivator. The use of cultivator saves labour and time

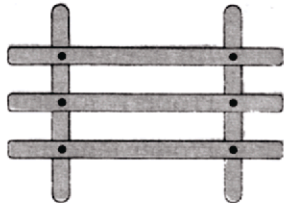


Cultivator driven by a tractor

(b) **Levelling** : Tilled soil may have big blocks of soil (crumbs). Crumbs are broken down and soil is levelled with wooden planks or iron leveller, the process called levelling. Levelling is done for better sowing and irrigation.



A plank used to level the soil



An iron leveller

Advantages of levelling

- It helps in uniform distribution of water and manure.
- It prevents the loose soil from being eroded by water or air.
- (c) **Manuring** : Farmers have to add manure to the field to replenish the soil with nutrients, the process known as manuring.
- ❖ **Manure** : These are organic substances, obtained from the decomposition of plant and animal wastes.

Advantages of manure

- It increases the number of friendly microbes.
- It improves the texture of soil by adding organic matter (humus).
- It increases soil fertility, water holding capacity and aeration.
- It reduces soil erosion.
- It is cheap.

Disadvantage of manure

- They have less amount of nutrients as compared to fertilizers.
- Manures are bulky and not easy to store and transport.

Fertilizers

These are commercially manufactured inorganic salts containing one or more essential plant nutrients like NPK, which are used to increase soil fertility.

Advantages of fertilizers

- They are nutrient specific and required in small amounts.
- They are water soluble and absorbed by the plant easily.
- They are easy to store and transport.

Disadvantages of fertilizers

- Fertilizers can change the soil structure by killing the soil microbes.
- Fertilizers can change the chemical composition of soil.
- Accumulation of fertilizers in water bodies causes eutrophication.

Types of fertilizer :

Nitrogenous : Sodium nitrate, Urea

Phosphatic : Ammonium phosphate

Potassium : Potassium sulphate

Mixed : NPK, CAN

Methods for maintaining soil fertility without use of fertilizers

Field fallow

The practice of leaving the field uncultivated for a season is called field fallow.

Crop rotation

The practice of growing different crops in succession in the same field is called crop rotation.

S.No.	Manures	Fertilizers
1	These are organic substances obtained by the decomposition of plant and animal wastes.	These are artificial inorganic salts.
2	They are rich in organic nutrients, not rich in (NPK).	They are rich in Nitrogen, Phosphorus and Potassium (NPK).
3	They are not nutrient specific.	They are nutrient specific.
4	They are not soluble in water so absorbed slowly by plants.	They are soluble in water and absorbed quickly.
5	They are not harmful to the environment.	They are harmful to the environment.
6	They have nutrients in small quantity so needed in large quantity.	They have higher amount of nutrients so required in very small quantity.
7	They are bulky substances so difficult to store and transport.	They are in concentrated form and easy to transport and store.
8	They are prepared in field.	They are prepared in factories.

2. SOWING

The process of putting the seeds in the soil is known as sowing. Before sowing good quality (healthy and good variety) seeds are selected.

Selection of seeds For separating healthier seeds from a mixture of healthy and weak seeds, the seeds are placed in water. Healthy seeds sink and weak or insect eaten seeds float on water. Healthy seeds are separated and dried before sowing.

Sowing can be done by

- (i) **Broadcasting** : Seeds are sown by hand or manually.
- (ii) **Traditional tool** : The tool used traditionally for sowing seeds has shape like a funnel. The seeds are filled into the funnel, passed down through two or three pipes having sharp ends. These ends pierce into the soil and place seeds there.



Traditional method of sowing

- (iii) **Seed drill** : Seeds are sown by the seed drill with the help of tractor. It saves time and labour.

Precautions during sowing seeds

- ▲ Use good quality, healthy and disease free seeds.
- ▲ The seeds are sown at a particular depth under the soil. Seeds left on the surface of the soil may be carried or destroyed by the insects and the birds. Seeds placed deep into the soil may either fail to germinate or may fail to come out into the air on germination.
- ▲ Distance should be proper to avoid overcrowding.
- ▲ Enough water should be there in the soil.

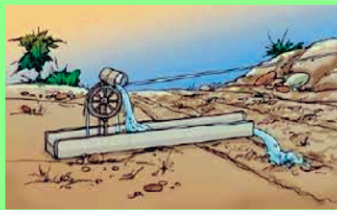
3. **IRRIGATION** The process of artificial supplying of water to crop at different intervals is called irrigation. The time and frequency of irrigation varies from crop to crop, soil to soil and season to season.

Sources of irrigation : Well, tube well, ponds, lakes, river, canal and dams.

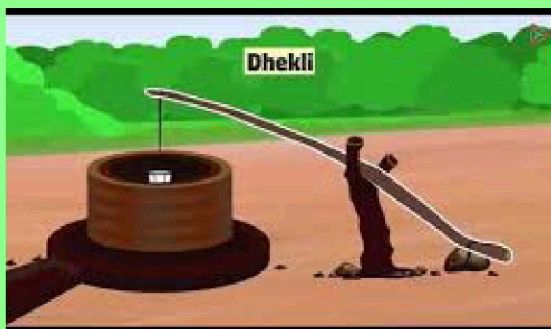
Methods of irrigation : Surface irrigation : In this type of irrigation the water is lifted from lake, well and canal by using following traditional ways like moat (pulley system), chain pump, dhekli, rahat (lever system).



Moat (pulley system)



Chain pump



Dhekli



Rahat (lever system)

- These methods are cheaper and less efficient.
- These methods require cattle and human labour.
- The lifted water is allowed to run over the field. Surface irrigation can be subdivided into furrow and basin irrigation.

Furrow irrigation : The water is allowed to run through furrow between the ridges.

Basin irrigation : The field is flooded with water by mating bunds all around it.

Disadvantages of traditional ways of irrigation

- They require more human labour and human efforts.
- They are less efficient so water is wasted in large quantity.
- They are not useful for poor water regions.

Nowadays the following modern ways of irrigation are used.

(i) Sprinkler system

- In this system the perpendicular pipes having rotating nozzels on top, are joined to main pipe line at regular intervals.
- It spreads water uniformly over crop plants and field.
- This method is useful for sandy soil and uneven land.
- It is an efficient system in the canal irrigated area of Haryana and Rajasthan.



Sprinkler System

(ii) Drip system or trickle irrigation :

- It involves the use of pipes fitted with small tubes called emitters. The pipes are laid over or under the soil and emitters release water drop by drop around the roots of the plants.
- In this method water is not wasted at all.
- This method is a boon in poor water regions.
- This is the best irrigation technique for fruit crops, garden and trees.



Drip System

Advantages of irrigation

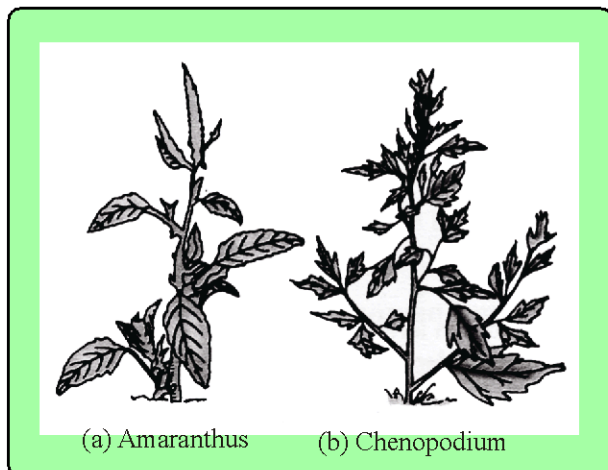
- It maintains the moisture of soil.
- It helps in germination of seeds.
- It helps in supply of essential nutrients.
- Nutrient dissolved in water get transported to each part of plant.
- It helps in growth of plants.

4. WEEDING

Removal of weeds or undesirable plants is called weeding. It can be done by khurpa (trowel) and Harrow.

Weed : They are unwanted plants which grow along with a cultivated crop in a field. They can severely reduce crop yields by competing for light, water and nutrients.

Some common weeds : *Parthenium* (Gajar grass), *Convolvulus*, *Amaranthus* (Chaulai), *Chenopodium* (Bathua), *Xanthium* (Gokhroo) and *Dandelions*.



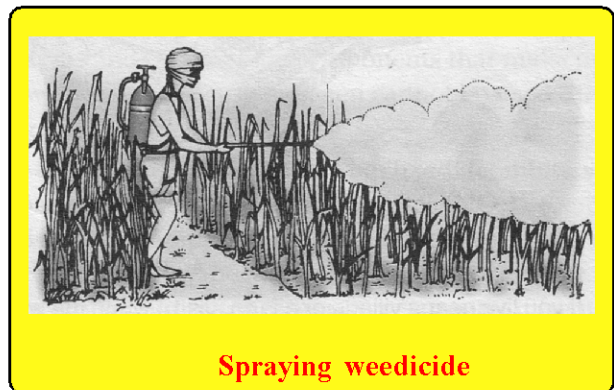
(a) Amaranthus (b) Chenopodium



(c) Convolvulus (d) Wild oat (e) Grass
Some common weeds

METHODS OF WEED CONTROL

- (a) **Mechanical control :** It can be done by ploughing, burning and cutting of weeds before they produce flowers and seeds.
- (b) **Chemical control :** It can be done by spraying weedicides or herbicides (chemical which are used to kill the weeds).
e.g. 2, 4-D, 2, 4, 5-T, MCPA, Butachlor & Atrazine.



Spraying weedicide

- (c) **Biological control :** It is done by living organisms to destroy weeds.
e.g. *Cassia* plant prevents the growth of *Parthenium* weed.
e.g. Herbivorous fish (Carp) feeds on aquatic weeds (*Hydrilla*).

Advantages of biological control

- It does not cause pollution.
- Organisms are harmless to the main crop.

Crop protection management

It includes eradication of pest, pathogens and other organisms that are harmful to the crop plants.

Pest : Organism which damage or destroy cultivated plants or plant products is called pest.

eg.: Insects, rats, mites and microorganisms.

Pathogen : Disease causing organism is called pathogen.

eg.: Bacteria, Fungi and Virus.

Pesticides or Biocides

These are chemical substances used to kill, control or repel pest.

Types of pesticides

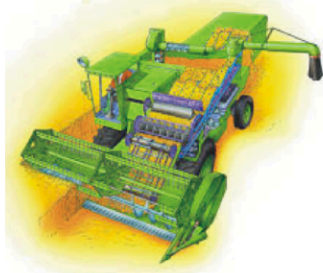
S. No.	Pesticides	Affected organisms	Example
1	Insecticides	Insects	DDT, Aldrin, Malathion
2	Fungicides	Fungal pathogens	Bordeaux mixture, Burgandy mixture,

5. HARVESTING

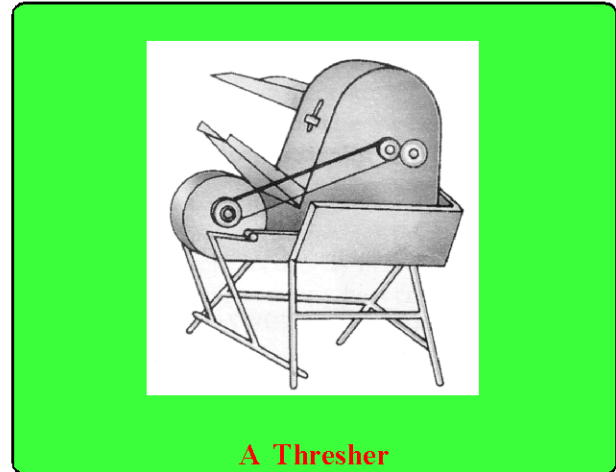
The cutting and gathering of crops after its maturation is called harvesting. It can be done manually by sickle or by a machine called harvester.

- Many festivals are associated with harvesting season such as Baisakhi, Bihu, Onum, Pongal, Holi, Diwali.
- Many crops require special harvesting machines. Cotton strippers (for cotton), corn pickers or huskers (for corn)
- Fruits and vegetables are generally hand-picked when ripe.

6. THRESHING : The process of beating out the grain from the crop is called threshing. It can be done by threshers.



A combine



A Thresher

7. WINNOWING

The process of separating the grains from the chaff is called winnowing.

- In this process, the grain-chaff mixture is gradually dropped on the ground from a height.
- The heavier seeds fall vertically down, while lighter chaff is blown away by wind.



Winnowing

8. STORAGE

Proper storage is necessary to get seasonal food regularly throughout the year. Freshly harvested grains have more moisture. If freshly harvested grains are stored without drying, then they may get spoil and lost their germination capacity. Hence before storing them the following precautions must be undertaken.

Precautions

- Grains should be safe from moisture, insects, rats, and microorganisms.
- Grains must be properly dried in the sun to reduce the moisture in it.
- Grains must be store in jute bags or metallic bins.
- Store grains in silos, granaries and godown with chemical treatment to protect them from pests.
- Dried neem leaves can be used for storing food grains at home.



Soils for storage of grains



Storage of grains in granaries

Factors affecting stored food

- (i) Biotic factors : e.g. insects, micro-organisms, mites, birds, rodents and other animals.
- (ii) Abiotic factors : e.g. moisture, humidity and temperature.

Do You Know

- **Buffer stock** : Surplus stock of grains which is preserved for emergencies like drought and floods is called buffer stock.
- Food grains are stored in large godowns by agencies like Food Corporation of India (FCI) and state warehousing corporations.
- Fruits and vegetables which have high water content are stored at 0°C to 1°C temperature.
- Drying, canning, and freezing are some of the methods of crop preservation.
- Drying reduces the moisture content, canning prevents the microbial growth, and freezing reduces the rate of respiration of microbes.

CROP IMPROVEMENT

- **Green revolution** :- Yield of crop per hectare greatly increased due to the use of genetically improved variety of seeds.
- Developed new varieties of rice, wheat and maize increased food production of India.
- The desirable superior character in a variety can be incorporated through various methods of genetic improvement of crops like plant breeding and genetic engineering.
- **Plant breeding** : The science of improving crop varieties is called plant breeding. These involve introduction, selection of plant and than hybridization.

Do You Know

Important plant breeders :

1. N.E. Borlaug – A maxican plant breeder who was awarded Nobel prize (1970) for developing high yielding varieties of wheat *Sonara-64* and *Lerma roja-64*
[Father of green revolution]
 2. Dr. M.S. Swaminathan – He has produced *Sharbati sonara* a variety of wheat by mutation which is responsible for green revolution in India.[Father of green revolution in India]
- **Hybridization** : The process of crosss breeding between two geneticaly dissimilar individuals is called hybridization. This process helps to produce hybrid variety with desirable characteristics.

Some hybrid/Gm seeds

Wheat	Kalyan, sarbati, sonalika
Maize	Ganga, ambar, jawahar
Rice	Jaya, padma, pusa basmati, IR8
Bajra	Hb-1, HB-3 and 4
Soyabean	JS 335
Pea	Bougainvilleae
Brinjal	Pusa purple, Pusa Kranti
Cotton	G-57, Bt (Gm)

ANIMAL HUSBANDRY

The branch of agriculture that deals with the feeding, caring and breeding of domestic animals is called animal husbandry.

- The main elements of animal husbandry are
 - (i) Proper feeding
 - (ii) Providing good shelter
 - (iii) Proper health
 - (iv) Proper breeding
- **Poultry** : The rearing and caring of birds for obtaining eggs and meat for the commercial purpose is known as poultry farming.
- It includes chickens (fowls), ducks, geese, turkeys, guinea-fowls, peafowls, pigeons and guails.
- **Fisheries** : The rearing of fish on a large scale is called **pisciculture**.
- **Piculture** : The rearing of honey bees for the large scale production of honey and bee wax, is know as **apiculture**.
- Bees are reared in wooden boxes for the commercial production of honey called **apiaries**.

Very Short Answer Type Questions

1. Why does the soil need to be turned and loosened?
2. What is a crop?
3. Give two examples each of
 - i. Cereals
 - ii. Vegetables
4. What are kharif crops? Give two examples
5. List the basic practices of crop production.

Short Answer Type Questions

6. What is a seed drill? What are its advantages?
7. What is irrigation? Name any six sources of irrigation.
8. Draw a neat labeled diagram of a plough?
9. Draw a neat labeled diagram of a hoe?
10. What is tilling? How is it carried out?
11. What are Crumbs? Why is the field leveled?
12. Describe a traditional method of sowing seeds.
13. Name three main tools that helps to break soil to the size of grains? What is the difference between a plough, hoe and cultivator?

Long Answer Type Questions

14.
 - a. What is animal husbandry?
 - b. Tabulate any four different type of foods and its sources from animals.
15.
 - a. Make a flow chart of sugarcane crop production.
 - b. Describe a modern method of irrigation most suitable in drought hit areas.
16.
 - a. How will you demonstrate the effects of manure and fertilizer on seedlings?
 - b. How can a farmer maintain the fertility of soil of his field?
17. Describe traditional methods of irrigation.
18.
 - a. What is a weedicide? Give an example.
 - b. How are weedicides used by the farmer?
 - c. Do weedicides affect the handler? What measures should they take to prevent any adverse effects?
19.
 - a. Mention any three differences between fertiliser and manure.
 - b. List four advantages of manure.