Chapter
1

Crop Production and Management

Learning Objectives

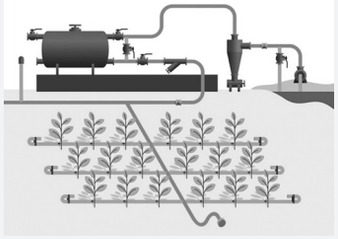
- Agricultural Practices
- Basic Practices of Crop Production
- Preparation of Soil
- Sowing
- Adding Manure and Fertilizers
- Irrigation
- Protection from Weeds
- Harvesting
- Storage
- Food from Animals

Exam Mirror

- Category of two main Crops
- Tools used for Ploughing
- Advantages of Manure
- Advantages of Fertilizers

Critical Concepts

- Methods of Irrigation
- Agricultural Implements
- Tools used for Sowing seeds
- Methods of Soil preparation



INTRODUCTION

All living organisms require food. Plants can make their food themselves. Green plants synthesise their own food by the process of photosynthesis.

Animals including humans can not make their own food. We get our food from plants or animals or both.

We eat food because it provides energy and that energy is utilised by organisms for carrying out their various body functions such as digestion, respiration and excretion. In order to provide food for a large population regular production, proper management and distribution is necessary.

AGRICULTURAL PRACTICES

Crop

Crop is a plant or plant product that can be grown or cultivated and harvested extensively for profit or subsistence. For example, if all the plants of maize are grown in a field, then it is called a maize crop. Similarly, if all the plants of wheat are grown, then it is called a wheat crop.

Crop can be used as:

- ☞ food crops, for human consumption (e.g., wheat, potatoes).
- ☞ feed crops, for livestock consumption (e.g., oats, alfalfa).
- ☞ fibre crops, for ropes and textiles (e.g., cotton, hemp).
- ☞ oil crops, for consumptions or industrial uses (e.g., cottonseed, corn).
- ☞ ornamental crops, for landscape gardening (e.g., dogwood, azalea); and industrial uses.
- ☞ secondary crops, for various personal and industrial uses (e.g., rubber, tobacco).

DID YOU KNOW?

The earliest cultivated crops were cereals like wheat, barley, rice and maize known for their carbohydrate- rich seeds. These staples are vital in diet worldwide, with wheat being the most significant cereal, followed by rice and maize.

Table : Some other examples of crops

Crops	Examples
Cereal crops	Wheat, Paddy, Millet, etc
Pulses	Gram, Peas, Beans
Oil seeds	Mustard, Groundnut, Sunflower
Vegetables	Tomato, Cabbage, Spinach
Fruits	Banana, Mango, Orange etc.

All the crops are grown in their specific seasons. Paddy, for example, is grown during rainy season while maize is grown during winter season. Therefore, **on the basis of seasons, all the crops are categorised into two main groups** —kharif crops and rabi crops.

(i) Kharif crops : The crops grown in rainy season during the months of June to September are called Kharif crops. They are also known as summer or monsoon crop. These crops require warm, wet weather at major period of crop growth and also required short day length for flowering. Soyabean, maize, sugarcane, groundnut, paddy and cotton are the examples of Kharif crops.

(ii) Rabi crops : The crops grown in winter season from October to March are called rabi crops. They are also known as winter crop. These crops grow well in cold and dry weather and require longer day length for flowering. Wheat, barley, mustard, peas gram, linseed etc. are some examples of rabi crops.

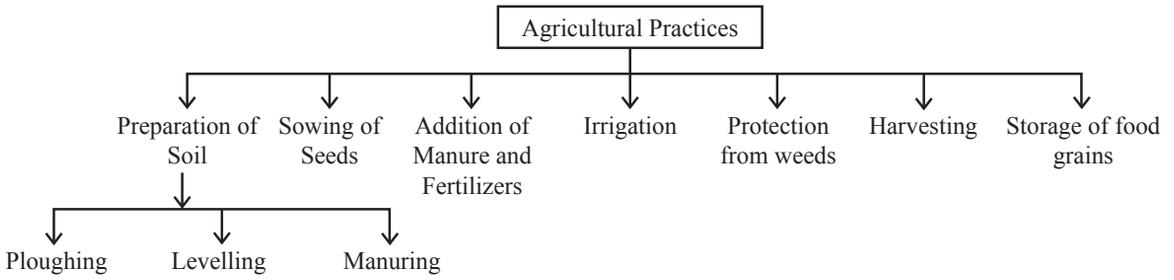
Another type of crop is **summer/zaid crops**. These crops are grown in summer month from March to June. They require warm day weather for major growth period and longer day length for flowering. E.g. groundnuts, watermelon, pumpkins, gourds.

BASIC PRACTICES OF CROP PRODUCTION

Farmers carry out certain activities in a particular sequence till the crops matures at harvest. These activities are known as *agricultural practices*. These practices increases the overall yield of a crop.

DID YOU KNOW?

Agriculture forms a complex web of product, producer, distributor and consumer. All of them are interconnected and dependent upon each other for survival.



Outline classification of basic agricultural practices carried out at various stages of crop production

PREPARATION OF SOIL

Crop quality greatly depends on the soil composition. The ideal soil is balanced, well-drained, fertile and with a pH (acidity level) ranging between 6 and 7. It is important to add decomposed manure or compost which, in addition to improving soil structure and composition, will supply nutritive elements required by the plants. Preparation of soil is the first step to be followed before growing a crop. It is usually employed to loosen the soil. Plants absorb water, nutrients and salts from the soil. Therefore, it is important to prepare soil for a healthy produce.

Methods of Soil Preparation

The soil is prepared for sowing the seeds of the crop by ploughing, levelling and manuring.

Ploughing

The process of loosening and turning the soil is called ploughing or tilling. A properly set up plough will break and turn the soil so that all the weeds, (grass), crop residue and debris are buried without any scrap of waste present in the field. It also provides a seed free medium for planting an alternative crop.

If the soil is very dry, it may need watering before ploughing. The ploughed field may have big clumps of soil called crumbs. It is necessary to break these crumbs.

Levelling: Levelling the field is beneficial for sowing as well as for irrigation levelling of soil is done with the help of a leveller.

Manuring: Sometimes manure is added to the soil before tilling. This helps in proper mixing of manure with the soil. The soil is moistened before sowing.

CONNECTING TOPIC

What is composting?

Composting is the process of converting dead organic matter into rich humus. The waste materials such as cow dung, vegetable waste, sewage waste etc are dumped into a pit. The pit is then covered with mud to prevent air and light entering it. It is then left undisturbed for few months. During this process, the microbes decompose the animal and plant waste and convert it into inorganic materials. These inorganic materials are excellent nutrients for plants.

Sometimes, the process of composting is done with the help of earthworm. Then this process is known as vermi-composting. Earthworms can consume practically all kinds of organic matter. This organic matter undergoes biochemical change in the intestine of earthworm. Hence, earthworm converts organic matter into rich humus, thereby enriching the soil with nutrients. The process of composting ensures the continuance of fertility cycle. Composting is considered as the best recycler in nature.

Friendly Earthworms

Earthworms are called best friends of farmers. They can consume practically all kinds of organic matter. They pull down any organic matter that is deposited on the soil surface such as leaf fall, debris etc. This organic matter then undergoes biochemical change in the intestine of earthworm. Hence, earthworm converts the dead organic matter into rich humus, thereby enriching the Soil's nutritional value.

Earthworms are important to farmers in the following respects :-

(i) It improves the soil fertility.
(ii) It maintains the physical condition of the soil.
(iii) It helps in mixing of sub soil and top soil.
(iv) It helps in providing required nutrients to plants.
(v) It helps in recycling of waste materials in the surroundings.

Let's Connect

1. (i) Earthworm improve the soil fertility.
(ii) Earthworm helps in mixing sub soil and top soil.
(iii) Earthworm helps in recycling of waste materials in the surrounding.
(iv) Earthworm maintains the physical condition of the soil.
Select the option which has all the correct statements regarding earthworm.
(a) (i), (ii) (b) (i), (iv) (c) all of the above (d) none of the above

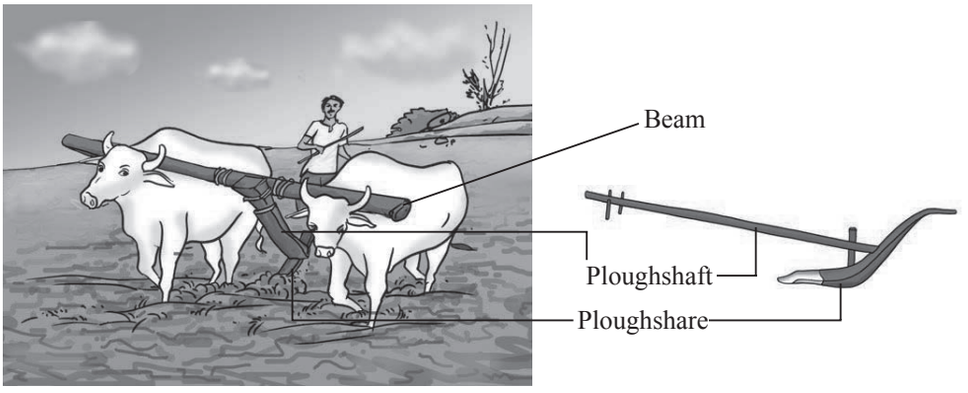
2. The process of converting dead organic matter into rich humus is called
(a) Composting (b) Ploughing (c) Levelling (d) Transplantation

Solutions:
1. **(c)** all of the above
2. **(a)** Composting

Agricultural Implements

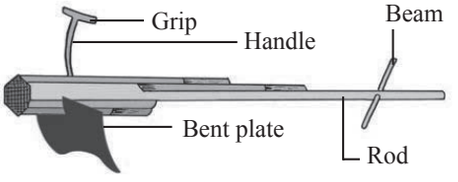
Tools used for ploughing are : plough, hoe and cultivator.

(i) Plough : It is the most ancient method for ploughing the seed. Ploughs were traditionally drawn by working animals such as horses or cattle, but in modern times they may be drawn by tractors. A plough are made of wood, iron, or steel. It contains a triangular iron rod which is called ploughshare. Then there is a long log of wood called ploughshaft. The one end of the shaft has a handle and the other end is attached to a beam which is placed on a pair of bulls or other animals such as camel, horse etc.



The Plough

(ii) Hoe : Hoe are bladed tools that have a long rod of wood or iron. The one end of wood has a fixed strong blade and a bent plate of iron that works like a blade. The other end is attached to a beam that is placed on a pair of bull during ploughing the field.



A hoe

(iii) Cultivator : It is the modern method of ploughing used these days. It is an instrument equipped with shovels, blades etc. and used to break up soil and remove seeds.

The tractor type cultivator tiller is suitable for large scale farming especially when you want to plant grain crops like wheat, corn and others.

Cultivator driven by a tractor

SOWING

Sowing of seeds is an important step of crop production.

However seeds those are to be selected for growing should be of good quality. The quality of seed depends on the plants that are used for collecting seeds.

Selection of Seeds

Traditional Tool

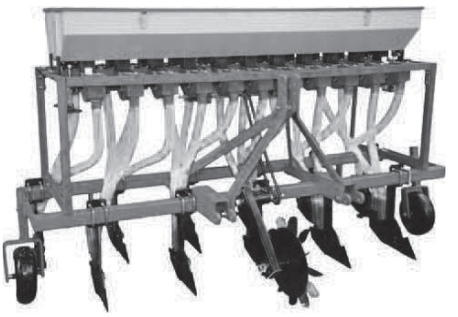
It is a funnel shaped tool and is driven by plough. The seeds are filled into the funnel that has a long pipe with sharp ends. The seeds from the funnel moves into the pipe placed into the soil as plough move.

Modern Method (Seed drill)

Seed drill is a machine for planting seed at a controlled depth and in specified amounts. These days seed drills are used (for sowing seed) that involves the use of tractors.

It allows uniform distribution of seeds into the soil at a proper depth, this allows plant to get sufficient sunlight, nutrients and water from soil. It also protects the seeds from birds. It saves time and labour.

Traditional method of sowing

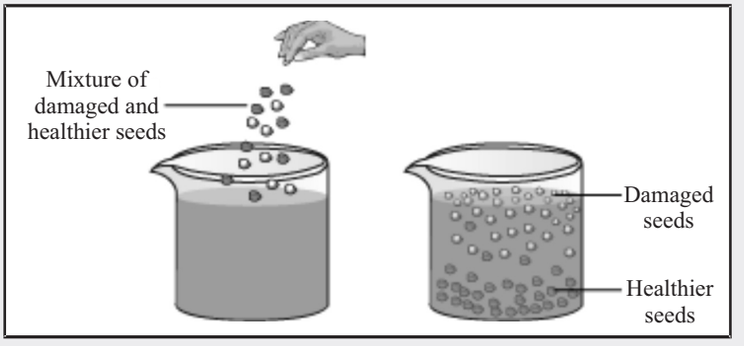


Modern method of sowing (Seed drill)

Let's Do Activity

Aim:- *How can you find whether the given sample of seeds are healthier or not?*
Requirement:- *Jar, Water, Seeds (damaged and healthy).*
Procedure:-

- ☞ *Take a clean jar half filled with water. Put some seeds (damaged and healthy) into the jar and stir it well.*
- ☞ *Now observe the seeds present in jar.*



Observation:- *You can see some of the seeds are floating on the surface while some of them settle down at the bottom.*
Result:- *The seeds that float on water surface are actually damaged seeds. They are hollow from inside. Hence, they are lighter in weight and floats at the top. Whereas healthier seeds sink to the bottom of jar. Healthy seeds are heavier and healthy in all respects.*

Illustration 1 :

Why we classify crop plants?

Solution :

We classify crop plants:

(i) To get acquainted with crops.
(ii) To know the adaptability of crops.
(iii) To know the growing habit of crops.
(iv) To know the growing season of the crop
(v) To understand the climatic requirement of different crops.
(vi) To know the economic products of the crop plant and its use.
(vii) To understand the requirement of soil & water for different crops.
(viii) Overall to know the actual condition required for the cultivation of plant.

Illustration 2 :

What will happen if the farmer grows Rabi crops during rainy season instead of winter?

Solution :

If Rabi crops are sown in rainy season i.e. from June to September, then the whole plant crop will get destroyed. This could be because of absence of factors required to maintain the crops such as lack of optimum temperature, adaptability, availability of pests and many more. Hence, Rabi crops such as wheat, mustard etc. should be sown only in winter season

Illustration 3 :

Why seeds are not sown in dry and highly wet soil?

Solution :

Moisture in the soil is necessary for germination. So, if seeds are sown in dry soil, they may not germinate. Similarly, if the seeds are sown in a highly wet soil, then on drying, the soil surface becomes too hard that the germinating seedling might not be able to come out of ground.

Illustration 4 :

Find out more examples of crops that are cultivated by transplantation method ?

Solution :

Tomatoes and chillies

CHECK POINT-1

1. Paddy crops are grown only in rainy season because-
(i) they require less quantity of water
(ii) they require large quantity of water
(iii) they grown in rainy season to fulfill their excessive water requirement
(iv) they grown in rainy season to lose more water
Which two statements are correct?
(a) (i) and (iv) (b) (i) and (iii) (c) (ii) and (iii) (d) (ii) and (iv)

2. What are the methods of sowing of seeds?
(i) Sowing by hand (ii) Sowing by seed drill (iii) Hoe (iv) Cultivator
Which two statements are correct?
(a) (i) and (iv) (b) (ii) and (iii) (c) (iii) and (iv) (d) (i) and (ii)

Solutions:

1. (c) 2. (d)

ADDING MANURE AND FERTILISERS

The plants require number of essential nutrients for their growth and development. All the nutrients required by plants can be obtained from air, water and soil. Deficiency of any of these nutrients might affect the life activities of plant, which in turn can reduce the net yield of the crop. The substances which are added to soil in form of nutrients for the healthy growth of plants are called manure and fertilizer.

Manure

Manure is a natural fertilizer. It is prepared by the decomposition of plant and animal waste. It is known to have a large quantity of organic materials and little amount of plant nutrients. Thus, manures provide a lot of organic matter like humus to the soil. The humus improves the physical and chemical properties of the soil. It also improves the soil texture for better retention of water and aeration of soil.

Since manure is produced by decomposition of animal's excreta and plant waste, it protects the environment from harmful chemicals. Thus, it helps in recycling of farm wastes.

Farmers may add manure directly to the soil in the fields or after converting it into compost by burying it in pits.

Advantages of Manure

(i) It enriches the soil with organic material.
(ii) It increases the water holding capacity of soil.
(iii) It aerates the soil by making it porous.
(iv) It helps in the growth of micro-organisms.
(v) It improves the soil texture.
(vi) It increases the crop production.
(vii) It replenishes the soil with all manures.

Fertilisers

Fertile soil contains minerals, organic matter and a number of microscopic forms of plant and animal life. The soil should also contain soluble minerals. If the soil is deficient in these minerals, fertilisers must be added to ensure healthy crop production.

Fertilisers are commercially available plant nutrients. Fertilisers are produced in factories. Some examples- urea, ammonium sulphate, super phosphate, potask NPK. So they provide quick replenishment of plant nutrients in the soil and restore its fertility. They also have high solubility in water, so are easily absorbed by the plants.

Fertilisers are good only for short term use, as it is harmful to the symbiotic microorganism that lives in soil. The excess use of fertilisers also causes water pollution.

Excessive use of fertilisers degrades the quality of soil in the long run, for example, excessive use of nitrogenous fertilisers makes the soil and water rich in nitrates.

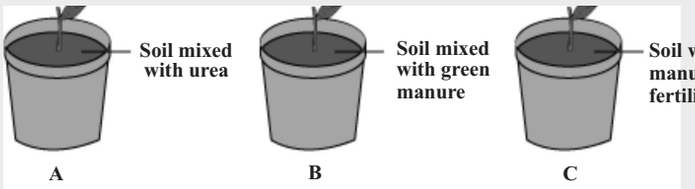
Let's Do Activity

Aim:- *Let us perform an activity to find out how fertilisers and manure affects the plant growth.*

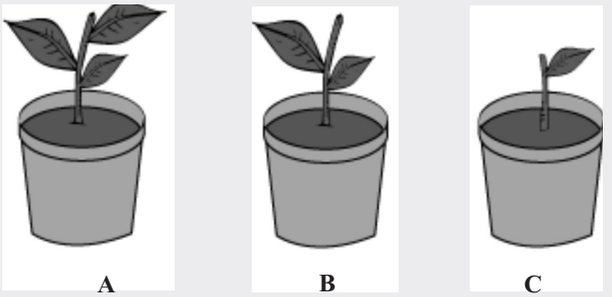
Requirement:- *Flower pot and some healthy gram seeds.*

Procedure:-

- ☞ *Take healthy gram seeds and allow them to germinate in a pot.*
- ☞ *Then take three empty jars and label them as A, B and C.*
- ☞ *In jar A, add little amount of soil mixed with urea, a fertiliser.*
- ☞ *In jar B, add similar amount of soil but mixed green manure.*
- ☞ *In jar C, add similar amount of soil without any manure or fertiliser.*
- ☞ *Now water all these vessels bearing soil.*



☞ *Now from the pot, select three equal sized seedlings and plant them in jar A, B and C. Keep the vessel in a safe and lighted place. Water them regularly and observe the growth.*



Observation:- *You can observe that seedlings develop into small plantlets in all the three jars after few days. However, their growth varies in all the three.*

Result:- *Jar A shows maximum growth while jar C showed the least growth.*

Plantlets in jar A showed the maximum growth because urea is readily soluble in water and acts quickly. When it is supplied to the soil, nitrogen is rapidly changed into ammonia. Later seeds use this ammonia for its growth and development.

The plantlets in jar B also show the growth but less compared to jar A.

The growth of plantlet in jar C is least because soil is infertile as it lacks certain essential soil nutrients.

Table : Difference between manure and fertilisers

	Manure	Fertilisers
(i)	Manure is a natural substance that is prepared by decomposition of animal excreta and plant wastes.	Fertilisers are commercially available plant nutrients produced from chemical substances.
(ii)	They have large quantity of organic material and little amount of plant nutrients.	They are man-made inorganic in nature.
(iii)	They help in enriching the soil with organic matter and nutrients.	They help in enriching the soil with organic matter and nutrients in concentrated form.
(iv)	It provides humus to the soil.	It does not provide any humus to soil.
(v)	It protects the environment and helps in recycling of waste.	Its excessive use can cause pollution.
(vi)	It is slowly absorbed by the plants.	It is readily absorbed by the plants.
(vii)	Example– animal excreta, plant waste, sewage waste etc.	Example– sodium nitrates, urea, ammonium sulphate etc.

Crop Rotation

Crop rotation is the practice of growing two or more varieties of crops on the same land in sequential seasons.

The continuous growing of same crop over and over again might reduce the particular nutrient from the soil. Hence, farmers employ crop rotation so that they can replenish the lost nutrients from the soil.

In crop rotation, the cereal crops like wheat, maize etc are grown alternately with leguminous crops like pulses, beans, peas, etc. Legumes have nitrogen fixing bacteria in their root nodules that can fix atmospheric nitrogen.

For example, when maize crop is grown first, it takes away a lot of nitrogen from soil for its growth and development and makes the soil nitrogen deficient. And next, when leguminous crops are grown in the same field, leguminous crops with its nitrogen fixing bacteria enriches the soil with nitrogen compounds and increases its fertility. When another cereal crop like wheat is grown after that, then wheat can utilize this extra nitrogen from soil for its growth and produce a crop with increased yield. In this way, rotating different crops (leguminous and non-leguminous crops) in the same field replenishes the soil with nitrogen naturally and thereby increases the crop production.

IRRIGATION

Water is essential for the growth of plants. It transports all nutrients required by the plant to each and every part of the plant body. It also maintains the moisture content of soil and prevents soil from drying.

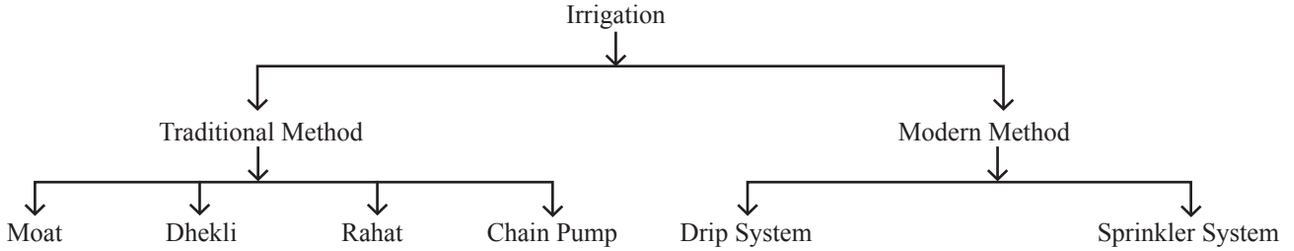
It is therefore, necessary to supply water to crop plants in the fields, periodically. The process of supplying water to crops in the fields is called irrigation. Irrigation is used to assist in the growing of agricultural crops, maintenance of landscapes, and revegetation of disturbed soils in dry areas and during periods of inadequate rainfall. The time and frequency of irrigation varies according to different seasons, crops and soil types.

Sources of Irrigation

The various sources of irrigation are wells, canals, rivers, dams, ponds and lakes. Even rain is a source of irrigation of crops.

Methods of Irrigation

Two methods of irrigation that helps in conservation of water are : **traditional method** and **modern method**.

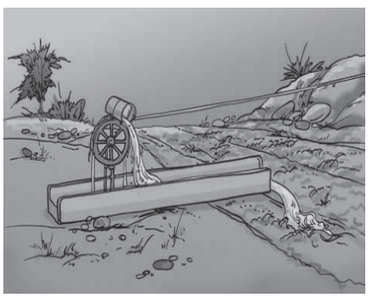


Traditional Methods of Irrigation

The water available in wells, lakes and canals is lifted up by different methods in different region for taking it to the fields. Cattle or human labour is used in these methods. So, these methods are cheaper, but less efficient.

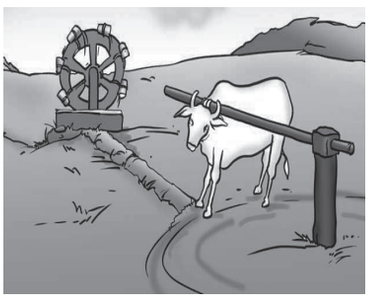
Pumps are commonly used for lifting water. Diesel, biogas, electricity and solar energy is used to run these pumps.

Moat



Chain pump

Dhekli



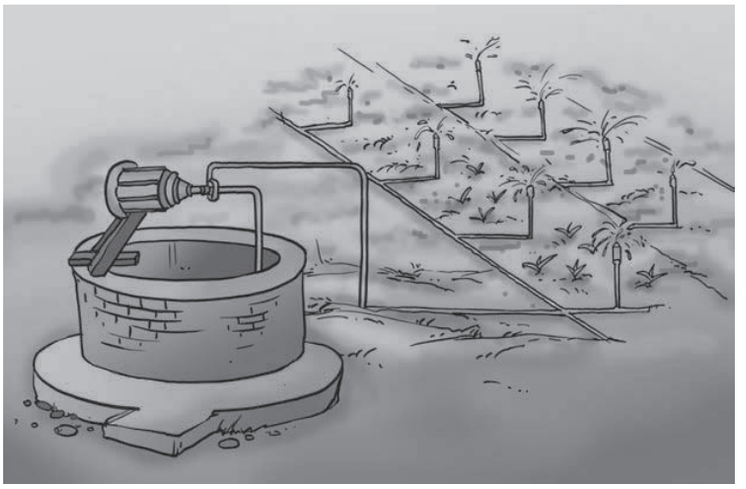
Rahat

Traditional methods of irrigation

Modern Methods of Irrigation

Modern methods of irrigation are used for supplying water to fields economically. Types of modern method of irrigation are : sprinkler system of irrigation and drip system of irrigation.

(i) Sprinkler System : This system of irrigation supplies water to plants (crops) in the form of rain. It consists of perpendicular pipe which has a rotating nozzle on to and is joined to main pipeline. Water escapes from the rotating nozzles when it passes through the main pipe under pressure with the help of a pump. In this method, water is supplied using pipes to one or more central locations within the field. Sprinkler are useful for lawns and coffee plantations. This method is more useful on uneven land that have fewer water supplies. Most of the crops such as wheat, grain, vegetable, pulses etc are irrigated by this method of irrigation.

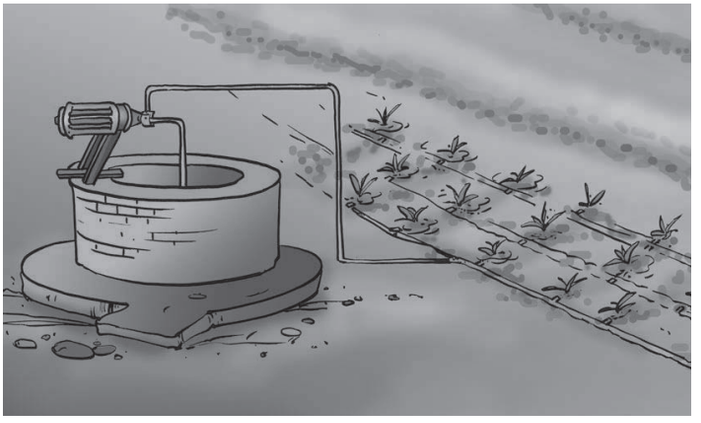


Sprinkler System

(ii) Drip System : Drip irrigation systems are methods of microirrigation wherein water is applied through emitters to the soil surface as drops or small streams. This method of irrigation is more efficient for irrigating fruits and vegetables. In this method, water is delivered at or near the roots of the plant drop by drop. Water is passed through plastic pipes that have holes in it. These plastic pipes are then laid along the rows of crop. This is the most efficient method of irrigation as there is no wastage of water at all.

DID YOU KNOW?

Net irrigation water requirement (NIWR) is the water needed for crop growth, measured in millimeters per year or cubic meters per hectare per year. It can be fulfilled by rainwater or irrigation.



Drip System

DID YOU KNOW?

It takes 100 pounds of rain water to produce a single pound of food from the crops.

PROTECTION FROM WEEDS

When you grow a food crop in the field, you must have noticed the growth of certain other plants along with major cultivated crops. These undesirable plant that grow along with crop are called **weeds**. Weeds compete with the crop for water, nutrient, space and light. As a result of competition, crops gets lesser amount of nutrients, space and light then that are required for survival. *Hence,* the productivity of crop reduces. Therefore, it is necessary to remove the weeds from the cultivated field.

Trowel (Khurpi)

Implement used for weeding

The process of removing weeds from the cultivated field is called **weeding**. Farmers adopt many ways to remove weeds and control their growth. Tilling before sowing of crops helps in uprooting and killing of weeds, which may dry up and get mixed with the soil. The manual removal includes physical removal of weeds by uprooting or cutting them close to the ground, from time to time. This is done with the help of Khurpi. A seed drill is also used to uproot weeds.

Spraying weedicide

Weeds can also be destroyed by spraying special chemicals called **weedicides** on them. 2, 4-D (2, 4 Dichlorophenoxy acetic acid) example of weedicides. They are not harmful to crops but they can be harmful to farmers. Hence, these chemical should be carefully used and sprayed. Farmers are advised to cover their nose and mouth with a piece of cloth while spraying the weedicides on crops. The weedicides are diluted with water to the extent required and sprayed in the fields with a sprayer.

HARVESTING

The process of cutting and gathering of the matured food crop is called **harvesting**. Most of the crops are harvested in autumn season. In harvesting, the crops like wheat or rice are cut close to the ground by hand using a tool called **sickle**. It is the manual method of harvesting crops. In large fields, the crops are harvested using a machine called **harvester**.

In India, harvesting is done mostly by sickle. Sickle is made up of a curved, plain blade of carbon steel. It has a wooden handle to hold the sickle. The tang of the blade is lightly fixed into the handle with a ferrule.

Sickle

Threshing

Threshing is the process of separating the grain seeds from the scaly, inedible chaff that surrounds it. Threshing does not remove the bran from the grain. It may be done by beating the grain using a flail on a threshing floor. It is a slow and time consuming process if done manually. Hence, it is carried out with a machine called "*combine*". Combine is actually a harvester as well as a thresher.

DID YOU KNOW?

The first combine harvester was designed in 1836 by America's Hiram Moore and John Hascall. It was pulled by horses.

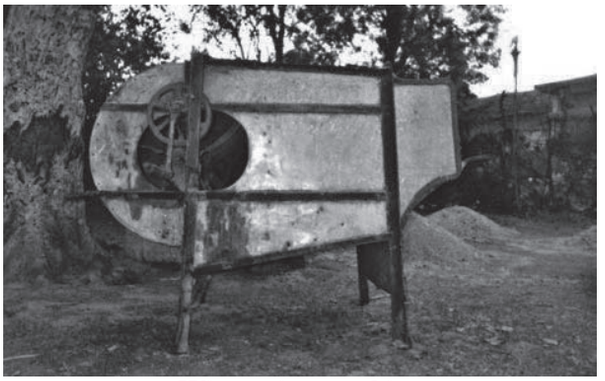
Combine

Winnowing

After grains are threshed, the chaff is removed from the grains. This process is known as winnowing. Hence, winnowing is the process of separating grain from the mixture of threshed chaff.

Harvest Festivals

After three or four months of hard work there comes the day of the harvest. The sight of golden fields of standing crop, laden with grain, fills the hearts of farmers with joy and a sense of well-being. The efforts of the past season have borne fruit and it is time to relax and enjoy a little. The period of harvest is, thus, of great joy and happiness in all parts of India. Men and women celebrate it with great enthusiasm. Special festivals associated with the harvest season are Pongal, Baisakhi, Holi, Diwali, Nabanya and Bihu.



Winnowing machine

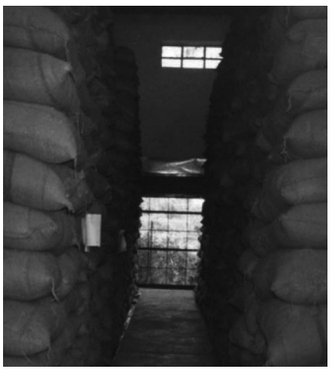
STORAGE

Storage is the most important agricultural activity. The food grains obtained by harvesting the crops are dried in the sunlight before storing. This is because higher moisture content in grain promotes the growth of fungus and moulds on them, which later damages the stored grains. *Hence*, drying crops in sunlight before storing reduces the moisture content of grains and prevents their spoilage during storage. This prevent the attack by insect pests, bacteria and fungi. The farmers store the dried grains in metal bins and jute bags. The large scale storage of food grains is done in grain **silos** and **granaries** to protect them from pests like rats and insects. 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.

DID YOU KNOW?

Pesticides like BHC, malathion and pyrethrum are sprayed in storage structures before food grains are stored. Fumigation exposes pests to chemical fumes without contaminating the grains.

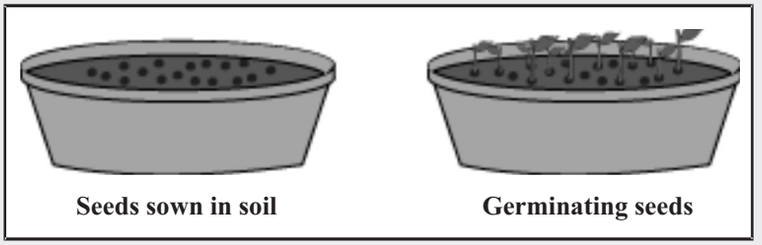
(a) Silos for storage of grains



(b) Storage of grains in gunny bags in granaries

Let's Do Activity

Aim:- *How the viability of seed can be checked?*
Requirement:- *Seeds, Tray, Water.*
Procedure:- *Take few stored seeds from the godowns. Count them and place then in a tray that contains fresh compost. Water the compost and keep the tray in a warm lighted place.*
Observation:- *Observe the growth of seeds.*



Result:- *You can see that more than half of the seeds sprout. It means that these stored seeds are viable and has good chances of germinating in the garden or field.*
The ability of the plant to produce new plants depends on the time of harvest and the conditions of seed storage. Hence, it is important to take all necessary precautions while storing the seeds.

CONNECTING TOPIC

Crop Improvement

The improvement in crop plants is necessary for increasing the crop yield and their quality.
Crop improvement can be done by breeding new varieties of crops having higher yields and resistance to pests and diseases. The agricultural scientists or plant breeders can achieve this by artificial cross-breeding or hybridization.
For example, if you want to obtain an improved variety of a crop that has higher yield as well as is disease resistant, then you should select two existing crops varieties, one having higher yield and other having more resistance to diseases. When higher yielding plant is crossed with disease resistant plant, then a new variety of plant is produced that contains qualities of both parents plants.
Thus, the new plant (hybrid) will produce higher yield and will be disease resistant.

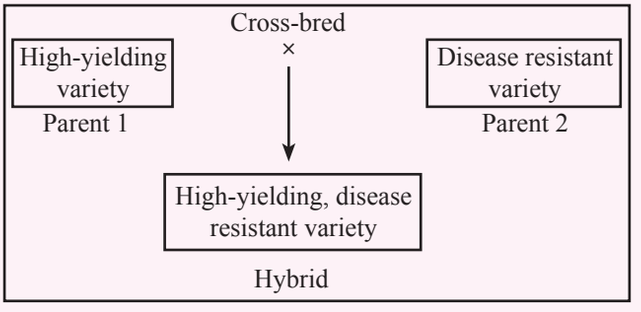


Table : Examples of high-yielding varieties of crops

Crops	High yielding varieties in India
Wheat	Sonalika, Kalyan sona, Sharbati Hira Moti Sonara
Paddy	Jaya, Padma, Pusa 215
Maize	Ganga 101, Rajit, Deccan hybrid

What is Hybridization?

Hybridization is the process of cross-breeding two different varieties of crop plant each having a desired characteristics to obtain a new crop that has both the desired characteristics. It is used extensively in agriculture, where new forms of disease resistant plants are produced commercially.

The Green Revolution

The average production of most of the crop in our country, India, has doubled during the last 30 years. But the production of wheat crop has tripled during the last 30 years. This great increase in the production of food - grain crops (especially the wheat crop) in India during the last 30 years is called green revolution. This is a sort of revolution taking place in Indian agriculture, leading to enormous food grain production.

Green revolution is a large increase in crop production in developing countries achieved by the use of artificial fertilizers, pesticides, and high-yield crop varieties. The beginning of the Green Revolution is often attributed to Norman Borlaug, an American scientist. In the 1940s, he began conducting research in Mexico and developed new disease resistance high-yield variety of wheat. By combining Borlaug's wheat varieties with new mechanized agricultural technologies, Mexico was able to produce more wheat than was needed by its own citizens, leading to it becoming an exporter of wheat by the 1960s. Prior to the use of these varieties, the country was importing almost half of its wheat supply.
Due to the success of the Green Revolution in Mexico, its technologies spread worldwide in the 1950s and 1960s.

Why green revolution is called green?

It is called green because it led to unprecedented greenery of crops everywhere in country. It has made our country self sufficient in food production and even created buffer stocks of food grains for use in times of natural calamities like drought and flood, when food production is reduced.

White Revolution

The introduction of growth of milk production and encouraging Indian dairy farmers to keep more animals for increasing production of milk and become self sufficient is called white revolution.

Livestock

Livestock are those domesticated or farm animals that are kept for use or profit. The most important livestock of India are cattle, buffaloes which yield milk and help in agriculture. On the basis of their utility animals are categorised as:

- ☞ Milk giving animals (Cows, buffaloes, goats)
- ☞ Meat and egg giving animals (Sheep, goat, pig, duck)
- ☞ Animals utilized as motive power (Buffaloes, horse, donkey, bullock, camel)
- ☞ Wool giving animals (Sheep)

Let's Connect

1. By which method was a new breed 'Hisardale' of sheep formed by using Bikaneri ewes and Marino rams?
(a) Mutational breeding (b) Cross breeding (c) Inbreeding (d) Out crossing

2. Hybridization
(a) is done to incorporate desirable characteristics into crop varieties.
(b) refers to crossing between genetically dissimilar plants.
(c) may be intervarietal or interspecific.
(d) All these statements are correct.

3. Jaya and Ratna developed for green revolution in India are the varieties of
(a) maize (b) rice (c) wheat (d) bajra

Solutions:

1. **(b)** Hisardale is a new breed of sheep developed in Punjab by crossing Bikaneri-ewe and Marino rams.
In cross-breeding, superior male of one breed are mated with superior females of another breed.

2. **(d)** Hybridization is done to incorporate desirable characteristics into crop varieties. It refers to crossing between genetically dissimilar plants that may be inter varietal or inter specific.

3. **(b)** Jaya and Ratna are two rice varieties developed for green revolution in India.
The scientific name of Jaya is IET-723. This paddy variety takes about 130 days to grow and the grain is long, bold and white. Its yield is 50-60 quintals per hectare.
The scientific name of 'Ratna' is IET-1411. It takes about 130-135 days to grow. The grain is long, slender and white. Its yield is 45-50 quintal/hectare.

FOOD FROM ANIMALS

Like plants, animal also provide us different types of food. The food provided by animals consists of milk, egg and meat. They are rich source of proteins. In fact, animal food provides certain proteins that are not present in plant foods.

DID YOU KNOW?

M. S. Swaminathan is known as "Indian Father of Green Revolution" for his leadership and success in introducing and further developing high-yielding varieties of wheat in India.

Hence, it is important to maintain the population of livestock as they provide various kinds of food to us. Maintaining lifestock includes various aspects like feeding, breeding and disease control of various animals. This process is known as **animal husbandry**.

Animal husbandry is the science of caring, feeding, breeding and raising the livestock on a large scale. It includes animals like cattle, goat, sheep, poultry and fish.

Objectives of animal husbandry are —

(i) To improve the breeds of domestic animals

(ii) To provide better nutrition and atmosphere to animals so that the yield of their product (like meat, eggs, milk etc) can be increased.

DID YOU KNOW?

Fish is good for health. We get cod liver oil from fish which is rich in Vitamin D.

Illustration 5 :

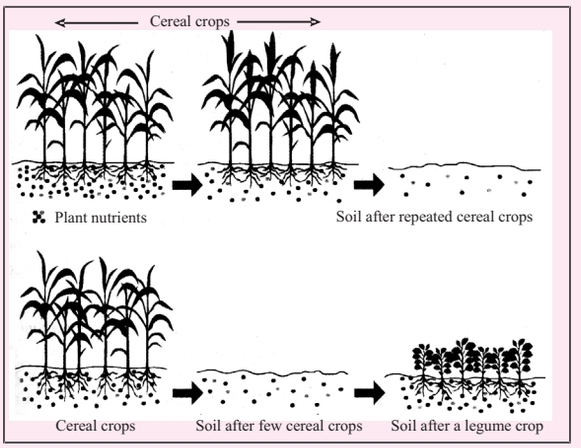
How NPK helps plants in their growth?

Solution :

Nitrogen is extremely important for leaf growth; phosphorus promotes development of roots, flowers and seeds or fruit; and potassium is necessary for the growth of strong stems and movement of water in plants, in addition to promoting flowering and fruiting.

Illustration 6 :

Study the given sequence of pictures and then answer the questions.



What happens to plant nutrients in the soil after growing cereals repeatedly in the same field for many years?

Solution :

The continuous plantation of crops in a field makes the soil poor in certain nutrients such as nitrogen, phosphorus, potassium etc. As a result, the soil fertility decreases and hence the crop yield.

Illustration 7 :

Does soil fertility decreases when only cereal crops are grown again and again?

Solution :

The soil fertility decreases when crop with similar requirements are grown again and again. For example, when a crop like maize is grown repeatatively, it takes up a lot of nitrogen from soil for its growth and makes the soil nitrogen deficient. If now, the same kind of crop or crop with similar requirement is grown then it would further make the soil nutrient deficient. Thus, the continuous plantation of any crop in field makes the soil poor in certain nutrients.

Illustration 8 :

Why gardeners need to give more water to plants in summers?

Solution :

Gardeners give more water to plants in summers because in summers, the evaporation rate is high from soil and leaves. This makes the soil deficient of important nutrients required for the growth of plant. Hence, we need to give more water to plants to prevent drying of plants.

CHECK POINT-2

1. Potted plants in our homes do not grow well if they are watered excessively because
   (a) Excess of water expels most of the air from the spaces between soil particles.
   (b) As a result, plant roots do not get sufficient air to breathe and hence they do not grow well.
   (c) Both (a) and (b) are correct.
   (d) Only (a) is correct.
2. These are the festivals associated with the harvest season
   (a) Holi, Diwali, Bihu
   (b) Christmas, Eid, Dusshera
   (c) Guru purab, Bihu, Christmas
   (d) Makar Sakranti, Eid, Bihu
3. Weeds can be destroyed by:
   (a) Weedicides
   (b) Ploughing
   (c) 2, 4 Dichlorophenoxy acetic acid
   (d) All of the above

Solutions:

1. **(c)** Both (a) and (b) are correct.
2. **(a)** Holi, Diwali, Bihu
3. **(d)** All of the above

Keywords

- **Agricultural Practices:** Farmers carry out certain activities in a particular sequence till the crops mature at harvest. There activities are known as agricultural practices.
- **Animal Husbandary:** Food is also obtained from animals for which animals are reared. This is called Animal husbandary.
- **Crop:** When plants of the same kind are cutltivated at one place on a large scale, it is called a crop.
- **Fertiliser:** Natural or artificial substance containing the chemical elements that improve growth and productiveness of plants.
- **Granaries:** Granaries are a store house for threshed grain and they protect the grains form pests and insects.
- **Harvesting:** The process of cutting and gathering of the matured food crop is called harvesting.
- **Irrigation:** Supply of water to crops at appropriate intervals is called irrigation.
- **Kharif:** The monsoon season.
- **Manure:** The decomposed form of dead plants and animals, which is applied to the soil to increase production.
- **Plough:** A large farm tool which is pulled by a tractor or by an animal.
- **Rabi:** The spring season.
- **Seeds:** Seed refers to the fertilized, matured ovule that contains an embryonic plant, stored material and a protective coat.
- **Silo:** Large metallic bins or huge containers that are used to store grains.
- **Sowing:** The process of putting the seeds into the soil for growing crops.
- **Storage:** Process of protecting the grains, by keeping them in the closed containers.
- **Threshing:** Separation of the grains from the chaff is called threshing.
- **Weeds:** Weeding involves removal of unwanted and uncultivated plants called weeds.
- **Weedicides:** Chemicals that kill weeds.
- **Winnowing:** The methods in which heavier components of the mixture are separated from the lighter substances with the help of wind.

CASE STUDY : Crop Production

CASE - I : ***For a farmer with a huge land, which technique is best suitable for harvesting?***

On a huge farm, manual labour will not be efficient. Therefore, the farmer needs to deploy a technique like combine which is less time consuming, and can perform the function of both harvester as well as thrasher. These machines are efficiently for harvesting large areas quickly, reducing the need for manual labor and increasing productivity.

CASE - II : ***For a farmer with an uneven land, which methods of irrigation can be employed?***

For an uneven land, modern methods of irrigation like sprinkler and drip system are more efficient. By selecting the appropriate irrigation method and implementing proper water management practices, farmers can effectively irrigate thin crops or uneven terrain while conserving water and minimizing soil erosion.

CASE - III : ***In the month of June, Kishor grows barley on a piece of land. He later found out that the whole crop is destroyed. What can be the reason behind this?***

Barley is a rabi crop and should be sown in winter season from November to April. Planting barley in june, which falls during the summer season, would reasult in unfavourable growing conditions for the crop. As a result, the crop may have failed to germinate properly, experienced that stress or faced other challenges associated with being planted out of season, ultimately leading to its destruction.

Think Out of the Box

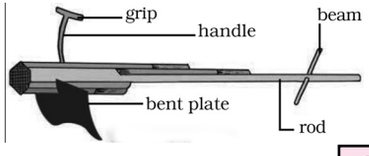
Q 1. How can a farmer prevent overcropping?

Q 2. Ram goes to the market to bring seeds. What is the best way to check the viability of seeds?

Crop Production and Management

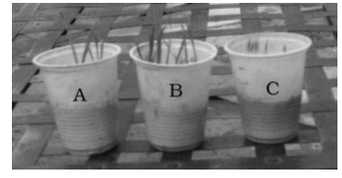
- **Agricultural Practices**
  - **Kharif Crops** eg: Maize, Cotton
  - **Rabi Crops** eg: Wheat, Gram
- **Basic Practices of Crop Production**
  - **Preparation of Soil**
    - Plough

    - Hoe



    - Cultivator

  - **Manure and Fertilisers**

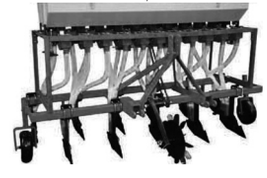


  - **Protection from Weeds**

  - **Storage**

  - **Sowing**
    - Traditional Tool

    - Seed Drill



  - **Irrigation**
    - Traditional Method

    - Modern Method

  - **Harvesting**

Let's Revise Through FIB & T/F

1. Crops such as _____ requires a constant supply of water.
2. _____ crop is grown during the month of June to September.
3. Cotton is a Rabi crop. **(T/F)**
4. Rabi crops are grown in winter. **(T/F)**
5. The seeds of paddy are first grown in small plots called _____.
6. Groundnut enriches the soil with nitrogen. **(T/F)**
7. _____ is the first step to be followed before growing a crop.
8. The substances that are added to the soil in the form of nutrients for the healthy growth of plants are called _____ and _____.
9. Nitrogenous fertilizer is required for growing nitrogenous crops. **(T/F)**
10. _____ are a good source of nitrogen, phosphorus and potassium but are good for only short term use.
11. Plough is used for adding manure or fertilizers to the crop. **(T/F)**
12. The process of converting dead organic matter into rich humus with the help of earthworm is known as _____.
13. _____ is a simple tool which is used for removing weeds and for loosening the soil.
14. Rotation of leguminous crop with wheat or maize is an example of _____.
15. _____ are like artificial rainmakers.
16. In _____ system of irrigation, water is delivered at or near the roots of the plant drop by drop.
17. The excess water in the field is known as _____.
18. The excessive use of manure causes water pollution. **(T/F)**
19. Weeds can be removed manually with a _____.
20. The agricultural practice, called harvesting comes before weeding. **(T/F)**
21. Rotation of crop helps in controlling weeds. **(T/F)**
22. Organisms that damage the crop are known as _____
23. Combine is a combination of harvester and thresher. **(T/F)**
24. In addition to gunny bags, metal bins are also used for storing food grains on large scales. **(T/F)**
25. _____ is the agricultural practice of breeding and raising livestock.

EXERCISE -1 Master Board

Multiple Choice Questions

DIRECTIONS : *This section contains multiple choice questions. Each questions has 4 choices (a), (b), (c) and (d) out of which only one is correct.*

1. Supply of water to crops at appropriate intervals is called
   (a) irrigation (b) cultivation
   (c) harvesting (d) sowing
2. Which instrument is used for spraying weedicides ?
   (a) sprayer (b) cultivator
   (c) plough (d) combine
3. The process of separation of grain from the chaff after harvesting is known as
   (a) tiling
   (b) threshing
   (c) spraying
   (d) weeding
4. The government agency responsible for purchasing grains from the farmers, safe storage and distribution is
   (a) CBI (b) FBI
   (c) FCI (d) FDI
5. In agriculture, broadcasting is used for
   (a) ploughing the fields
   (b) rotating the crops
   (c) removing the weeds
   (d) sowing the seeds
6. Which of the following is not a rabi crop?
   (a) Wheat (b) Mustard
   (c) Sugarcane (d) Peas
7. The method of turning and loosening of soil is called
   (a) tilling (b) harvesting
   (c) threshing (d) irrigation
8. Which of the following is a modern method of Irrigation?
   (a) Rahat (b) Moat
   (c) Chain pump (d) Drip system
9. The method of putting seeds in the soil for germination is known as
   (a) sowing (b) manuring
   (c) weeding (d) tilling
10. Ploughing in bigger fields is done by using
    (a) hoe (b) cultivator
    (c) combine (d) sickle

11. An example of manure is
    (a) cow dung
    (b) urea
    (c) ammonium sulphate
    (d) super phosphate
12. Use of neem leaves or turmeric during grain storage serves the purpose of
    (a) bio-pesticides
    (b) providing nutrients
    (c) impart the desired colours to the grain
    (d) preparation of biofertilizers
13. Insect pests damage the crop by
    (a) cutting the root, stem and leaf.
    (b) sucking the cell sap.
    (c) boring into the stems and fruits.
    (d) All of these
14. Eutrophication is caused by
    (a) excessive use of fertilizers
    (b) excessive growing of crops
    (c) monocropping
    (d) None of the above
15. The main source of food and fodder is
    (a) lichen (b) cereals
    (c) fungus (d) cotton
16. Which of the following has maximum genetic diversity in India?
    (a) Rice (b) Mango
    (c) Wheat (d) Groundnut

Assertion & Reason Questions

DIRECTIONS : *The questions in this segment consists of two statements, one labelled as "Assertion A" and the other labelled as "Reason R". You are to examine these two statementss carefully and decide if the Assertion A and Reason R are individually true and if so, whether the reason is a correct explanation of the assertion. Select your answers to these items using the codes given below.*

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

1. **Assertion :** Crop improvement can be done by breeding new varieties of crops having higher yields.
   Reason : The main aim of plant breeding is to produce new crops superior to existing one.
2. **Assertion :** Use of fertilizers enhances the crop productivity.
   Reason : Irrigation is very important in increasing crop productivity.
3. **Assertion :** Gram and cloves are Rabi crops.
   Reason : They are grown during the months of November to April.
4. **Assertion :** Ploughing soil is a pre-requisite before sowing.
   Reason : At the end of the plough, a sharp chesel like iron nail is attached, which helps in ploughing the soil.
5. **Assertion :** Manure and biofertilizers should be used in place of chemical fertilizers.
   Reason : Chemical fertilizers cause pollution by releasing excess nutrients in water bodies.

Passage/Case Based Questions

DIRECTIONS : *Read the passage (s) given below and answer the questions that follow.*

Ramesh is a small scale farmer and hold 3 acre of land. He would like to increase the wheat production in his farm. Harshit a student of M.Sc advised him to go to his agriculture department centre of his locality to get high yielding variety of wheat crop and explain the difference between Kharif and Rabi crops. He also suggested not to use chemical fertilizer.

1. Which of the following is not a Kharif crop?
   (a) paddy (b) mustard
   (c) maize (d) groundnut
2. Which of the following is not a Rabi crop?
   (a) soyabean (b) wheat
   (c) peas (d) linsced
3. Which of the following cannot be provided to the soil by chemical fertilizer?
   (a) Nitrogen (b) Humus
   (c) Potassium (d) Phosphorus

Very Short Answer Questions

DIRECTIONS : *Give answer in one word or one sentence.*

1. Name two primary cropping pattern in India.
2. What is a crop?
3. Which is the first step in cultivation of a crop?
4. What is tilling?
5. Name the implement used for ploughing the fields.
6. Which step in the preparation of soil loosens and turns the soil in the fields?
7. What is sowing?
8. Name the implement used in sowing.
9. Name the practice used for cultivating rice.
10. Name the various sources of irrigation in our country.
11. What is meant by term "water logging" as used in agriculture?
12. Name two substances that are added to fields by farmers to maintain the fertility of soil.
13. What is a compost?
14. Name two fertilizers.

15. Which crop is grown between two cereal crops in crop rotation?
16. What is crop rotation?
17. *Xanthium*, growing in a wheat field is known as_____.
18. Give one advantage of drip system of irrigation.
19. Name two implements used for weeding.
20. What are weedicides?
21. Name the chemical substances that are sprayed on crops to protect them from damage.
22. Which agricultural practice is carried out with the help of sickle?
23. Name the process in which grains are separated from chaff and hay with the help of wind.
24. Name the two ways in which farmers store food grains.
25. Name the machine used both for harvesting and threshing.
26. Give two examples of Rabi crops.
27. Give two examples of Kharif crops.
28. What do you mean by nitrogen fixation?
29. Give two example of crop grown from June to September.
30. Name the nitrogen fixing bacteria present in root nodules of leguminous plants.

Short Answer Questions

DIRECTIONS : *Give answer in 2-3 sentences.*

1. How Kharif crop is different from Rabi crop?
2. Give four importance of soil loosening.
3. What are the advantages of levelling?
4. Write down differences between fertilizers and manure?
5. Why is manure better than fertilizer?
6. How are weeds removed manually? When is the best time to remove them?
7. List the steps involved in crop production in sequential order.
8. Differentiate between insecticides, rodenticides and fungicides.
9. Why grains are dried before storage?
10. Which of the following are Kharif crops and which are Rabi crops?
    Soyabean, Barley, Mustard, Peas, Cotton, Groundnut
11. What types of crops are grown :
    (i) During October to March?
    (ii) During June to September?
12. Name three steps involved in the preparation of soil for sowing the seeds.
13. Which of the following are cultivated by transplantation?
    Paddy, Chillies, Tomatoes, Maize, Wheat
14. State two advantages of the process of transplantation of growing crops?
15. What is the necessity of irrigating the crops?
16. How do weeds affect the growth of crops?
17. What is weeding? State the various methods of weeding.
18. Define the terms –
    (i) Harvesting (ii) Threshing
    (iii) Winnowing
19. What do you understand by "combine" that is used in agriculture? State its function.
20. What is the advantage of storing food grains in gunny bags?
21. What is done to protect the grains stored in gunny bags in big godowns from damage?
22. Explain the irrigational methods that are used in modern times.
23. How are manure prepared?
24. Why should farmer cover the nose and mouth with cloth while spraying weedicides? **(Reasoning Based Questions)**
25. Explain why, the frequency of irrigation of crops is higher in summer season. **(Reasoning Based Questions)**
26. Why is it necessary to dry the harvested food grains before storage? **(Reasoning Based Questions)**
27. Why do farmers carrying out levelling of the ploughed fields? **(Reasoning Based Questions)**
28. Why wheat cannot be sown in the Kharif season? **(Reasoning Based Questions)**
29. Explain why, the seeds should be sown at right spacing? **(Reasoning Based Questions)**
30. Why is weeding necessary. **(Reasoning Based Questions)**

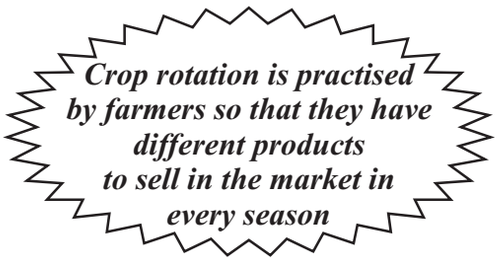
Long Answer Questions

DIRECTIONS : *Give answer in 4-5 sentences.*

1. Explain how soil is affected by the continuous plantation of crops in a field? Why preparation of soil is considered to be an important step in agricultural practices.
2. What are *Rhizobium* bacteria? Why are they useful? What enables leguminous plants to fix nitrogen?
3. What precautions should be taken while sowing the seeds?
4. What are pests? What steps are taken to protect crops from pests? Why should the grains, fruits and vegetables be washed properly before use?

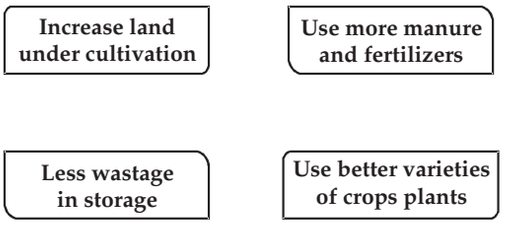
HOTS Questions

1. Why do farmers normally use a mixture of manures and fertilizers in the fields?
2. Which method of irrigation will you use if you live in a dry area with shortage of water?
3. Discuss two methods of weeding in which poisonous chemicals are not used.
4. Why does the government maintain a buffer stock of grains?

5. 

Do you agree? Give reason in support of your answer.

6. Four students proposed four different ways to fulfil the food requirement to a large number of people in our country.
Which method according to you can bring about the maximum increase in crop production in our country?



7. What happens if the farmer grows Mustard during rainy season instead of winter?
8. "Indian farmers gamble with the monsoon". Illustrate this statement.
9. The recent incidents of farmers' suicides in different states of our country are the result of indebtedness. Do you agree with this?
10. How do pest reduce crop productivity?
11. How does continuous rainfall affect crop production?

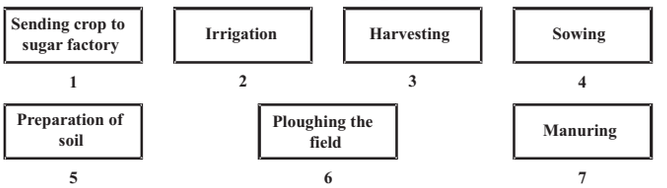
EXERCISE -2 NCERT Questions

Text Book Questions

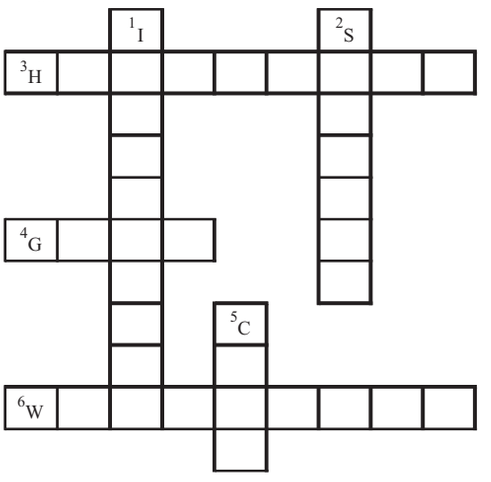
1. Select the correct word from the following list and fill in the blanks. float, water, crop, nutrients, preparation
   (a) The same kind of plants grown and cultivated on a large scale at a place is called _____.
   (b) The first step before growing crops is _____ of the soil.
   (c) Damaged seeds would _____ on top of water.
   (d) For growing a crop, sufficient sunlight, _____ and _____ from the soil are essential.
2. Match items in column A with those in column B.

A	B
(i) Kharif crops	(a) Food for cattle
(ii) Rabi crops	(b) Urea and super phosphate
(iii) Chemical fertilisers	(c) Animal excreta, cow dung, urine and plant waste
(iv) Organic manure	(d) Wheat, gram, pea
	(e) Paddy and maize

3. Give two examples of each.
   (a) Kharif crop
   (b) Rabi crop
4. Write a paragraph in your own words on each of the following.
   (a) Preparation of soil
   (b) Sowing
   (c) Weeding
   (d) Threshing
5. Explain how fertilisers are different from manure.
6. What is irrigation? Describe two methods of irrigation which conserves water.
7. If wheat is sown in the kharif season, what would happen? Discuss.
8. Explain how soil gets affected by the continuous plantation of similar crops in a field.
9. What are weeds? How can we control them?
10. Arrange the following boxes in proper order to make a flow chart of sugarcane crop production.



11. Complete the following word puzzle with the help of clues given below.



Down
1. Providing water to the crops.
2. Keeping crop grains for a long time under proper conditions.
5. Certain plants of the same kind grown on a large scale.

Across
3. A machine used for cutting the matured crop.
4. A rabi crop that is also one of the pulses.
6. A process of separating the grain from chaff.

Exemplar Questions

1. Which one of the following condition is not essential to grow maize?
(a) High temperature (b) Humidity
(c) Low temperature (d) Rainfall

2. Propagation of ginger is generally done using
(a) seed (b) stem (rhizome)
(c) root (d) leaf

3. Which of the following statement is not true for organic manure?
(a) It enhances water holding capacity of soil.
(b) It has a balance of all plant nutrients.
(c) It provides humus to soil.
(d) It improves texture of soil.

4. The term used for the process of separation of grains from chaff is
(a) sieving (b) threshing
(c) winnowing (d) hand picking

5. Read the statements given below.
(i) Seeds require moisture for germination.
(ii) Plants can absorb nutrients mostly in dissolved form.
(iii) Irrigation protects crops from both frost and hot air currents.
(iv) Irrigation improves soil texture.
Choose the combination of statements which indicate the need to irrigate crops.
(a) (i) and (ii) (b) (i), (ii) and (iii)
(c) (i), (ii), (iii) and (iv) (d) (i) and (iii)

6. Which of the following tools would a farmer use to remove weeds from the field?
(a) Hoe (b) Plough
(c) Axe (d) Cultivator

7. Which of the following is not true for fertilisers?
(a) They increase the yield.
(b) Their excessive use disturbs the balance of nutrients in soil.
(c) They are generally used in small quantity.
(d) They are environment friendly.

8. Given below are statements about the harmful effects of weeds on crop plants.
(i) They interfere in harvesting.
(ii) They help crop plants to grow healthy.
(iii) They compete with crop plants for water, nutrients, space and light.
(iv) They affect plant growth.
Choose the correct combination of statements.
(a) (i), (iii), (iv) (b) (iii) only
(c) (iii), (iv) (d) (i), (ii), (iii), (iv)

9. The process of loosening and turning of soil is called
(a) irrigation and manuring
(b) digging and winnowing
(c) tilling and ploughing
(d) harvesting and storage

10. The monsoon season in our country is during the months
(a) April to December
(b) June to September
(c) November to March
(d) January to May

11. The system of irrigation where in water is supplied drop by drop near the roots of plants, is called
(a) pulley system (b) drip system
(c) sprinkler system (d) leveller system

12. If you are given a dry piece of land for cultivation what will you do before sowing the seeds?

13. During which months do farmers grow mustard in India?

14. Which activity of the farmer can promote growth of earthworms and microbes in the field?

15. What are organic foods?

16. (a) Name the tool used with a tractor for sowing seeds in the field.
(b) What are the advantages of using this tool?

17 (a) Name the practice followed for large scale rearing of farm animals.
(b) What facilities are provided to farm animals?

18. Despite favourable climatic conditions, a farmer's crop failed to give good yield. What could be the possible reason for this.

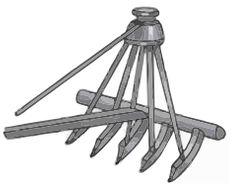
19. As a part of eco-club activity students were asked to raise a kitchen garden in the school premises. They were provided with some materials given in the box. List the other materials you would require. How will you plan the garden? Write the steps.
khurpi, water-can, spade, shovel
Note: You have been asked to use only environment friendly

EXERCISE -3 Foundation Builder

Multiple Choice Questions

DIRECTIONS : *This section contains multiple choice questions. Each questions has 4 choices (a), (b), (c) and (d) out of which only one is correct.*

1. Identify the agricultural tool shown in the figure and select the incorrect statement regarding it. **[Olympiad]**



(a) This tool is used to separate the grain from the chaff.
(b) This tool is used for sowing seeds at equal distances and proper depth.
(c) This tool ensures that seeds get covered by the soil after sowing.
(d) This tool has a funnel shaped opening leading to long tubes.

2. Read the given list of few methods of irrigation. **[Olympiad]**

(i) Moat (ii) Sprinkler system
(iii) Dekhli (iv) Chain pump
(v) Drip system (vi) Rahat

How many of these are traditional methods (p) and modern methods (q) of irrigation?

	p	q
(a)	3	3
(b)	4	2
(c)	5	1
(d)	2	4

3. Refer to the given figures showing seeds/fruits of three different plants. **[Olympiad]**

Select the option which contains plants that can replace X, Y and Z, respectively based on the mode of dispersal of their seeds.

	X	Y	Z
(a)	Lotus	Beans	*Calotropis*
(b)	Castor	Coconut	*Acer*
(c)	Hiptage	Balsam	Cocklebur
(d)	Mango	Cotton	Maize

4. Match the following: **[Olympiad]**

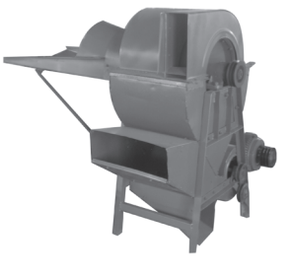
	Column A		Column B
(i)	*Sowing*	*(A)*	*Butachlor*
(iii)	*Irrigation*	*(B)*	*Sickle*
(iii)	*Weeding*	*(C)*	*Seed drill*
(iv)	*Harvesting*	*(D)*	*Drip system*

(a) (i – D), (ii – A), (iii – C), (iv – B)
(b) (i – C), (ii – D), (iii – A), (iv – B)
(c) (i – C), (ii – D), (iii – B), (iv – A)
(d) (i – B), (ii – D), (iii – A), (iv – C)

5. Crop plants may be attacked by pests which affect the crop production. Fungi are such type of pests which cause diseases like **[Olympiad]**

(a) Smut of wheat (b) Citrus cranker
(c) Blight of potato (d) Both A and C

6. Identify the agricultural implement given in the figure and select the correct statement regarding it. **[Olympiad]**



(a) It is used for separating grain from the harvested crop.
(b) It is used for separating grain from the chaff.
(c) It is used for sowing seeds in the soil at an equal distance.
(d) It is used for loosening and turning the soil for making it breathable for plants.

7. Person known for his pioneering efforts in promoting the green revolution in India is

(a) Benjamin Franklin
(b) Norman Borlang
(c) Robert Brown
(d) Albert Einstein

8. Which of the following crops would enrich the soil with nitrogen?

(a) Apple (b) Beans
(c) Paddy (d) Potato

9. Threshing is the process of

(a) separating chaff from the grain
(b) cutting of mature crop
(c) sowing seeds by hands
(d) turning and loosening of soil

10. Which of the following statements is not correct about fertilizer?
(a) It enriches the soil with organic material.
(b) It provides nutrients to the soil immediately in concentrated from.
(c) It increases the crop production several times
(d) It is available in all seasons.

11. Which of the following is incorrectly matched?

	Agricultural Steps	Implements Used
(a)	Ploughing	Hoe
(b)	Irrigation	Sprinklers
(c)	Weeding	Trowel
(d)	Harvesting	Harrow

12. The simple tool used for removing weeds and for loosening the soil is called.
(a) plough (b) sickle
(c) harrow (d) trowel

13. Which of the following statements is not correct about ploughing?
(a) It facilitates deeper penetration of soils.
(b) It maintains fertility of soil.
(c) It helps in proper mixing of organic matter and nutrients evenly.
(d) It helps in enriching the soil with organic matter and nutrients.

14. The process of removing weeds from the cultivated field is known as
(a) weeding (b) weedicide
(c) tilling (d) crop rotation

15. The large scale storage of food grains is done in
(a) Gunny bag + Jute bags
(b) Jute bags + Metal bins
(c) Metal bins + Grain silos
(d) Grain silos + gunny bag

16. The last step in crop production is
(a) soil preparation (b) crop harvesting
(c) irrigation (d) sowing

17. An example of fertilizer is
(a) cow dung (b) plant waste
(c) urea (d) urine

18. Which of the following statement is incorrect?
(a) Always use certified seeds to maintain the quality of crop.
(b) Harvest the crop when grains are fully matured.
(c) Use recommended dose of fertilizers.
(d) Irrigate the soil with polluted water.

19. By which method was a new breed 'Hisardale' of sheep formed by using Bikaneri ewes and Marino rams? **[NTSE]**
(a) Mutational breeding (b) Cross breeding
(c) Inbreeding (d) Out crossing

20. Select the incorrect statement regarding inbreeding. **[NTSE]**
(a) Inbreeding depression cannot be overcome by out-crossing.
(b) Inbreeding helps in elimination of deleterious alleles from the population.
(c) Inbreeding is necessary to evolve a pure line in any animal.
(d) Continued inbreeding reduces fertility and leads to inbreeding depression.

21. Homozygous purelines in cattle can be obtained by: **[NTSE]**
(a) mating of unrelated individuals of same breed.
(b) mating of individuals of different breed.
(c) mating of individuals of different species.
(d) mating of related individuals of same breed.

22. Outbreeding is an important strategy of animal husbandry because it : **[NTSE]**
(a) is useful in producing purelines of animals.
(b) is useful in overcoming inbreeding depression.
(c) exposes harmful recessive genes that are eliminated by selection.
(d) helps in accumulation of superior genes.

23. A system of rotating crops with legume or grass pasture to improve soil structure and fertility is called **[NTSE]**
(a) Ley farming (b) Contour farming
(c) Strip farming (d) Shifting agriculture

24. Which one of the following is detrimental to soil fertility?
(a) Saprophytic bacteria **[NTSE]**
(b) *Nitrosomonas*
(c) *Nitrobacter*
(d) *Pseudomonas*

25. *Bombyx mori* (silkworm) belongs to the order **[NTSE]**
(a) Lepidoptera (b) Diptera
(c) Hymenoptera (d) Coleoptera

26. An indigenous breed of chickens is : **[JSTSE]**
(a) Plymouth rock (b) Aseel
(c) White leghorn (d) Rhode Island Red

27. Causing storage losses to agricultural produce **[JSTSE]**
(a) Insects (b) Rodents
(c) Mites (d) All the above

28. In Plant hybridisation crossing is done between **[JSTSE]**
(a) Intervarietal (b) Interspecific
(c) Intergeneric (d) All the above

29. Growing of different crops on a piece of land in a pre-planned succession is known as : **[JSTSE]**
(a) Inter cropping (b) Crop rotation
(c) Hybridisation (d) None of the above

30. Leghorn is a improved variety of **[JSTSE]**
(a) Fish (b) Cow
(c) Sheep (d) Fowl

31. Which of the following is a rock bee? **[JSTSE]**
(a) Apis dorsata (b) Apis cerana
(c) Apis florae (d) Apis mellifera

32. The characteristic shown by local breeds of cow like Red Sindhi, Sahiwal is : **[JSTSE]**
(a) Long lactation periods
(b) Well built and strong
(c) Excellent resistance to diseases
(d) High milk production

33. Which of the following is the indigenous breed of chickens? **[JSTSE]**
(a) Plymonth Rock (b) White Leghorn
(c) Rhode Island Red (d) Aseel

34. A farmer made an observation in a backwater paddy field of coastal Kerala that the paddy plants wilt during noon onwards everyday but appear normal next morning. What would be the possible reason for wilting? **[NTSE]**
(a) The rate of water absorption is less than the rate of transpiration in the afternoon.
(b) The rate of water absorption is more than the rate of transpiration in the afternoon.
(c) The changes in the rate of water absorption and transpiration are not associated with wilting.
(d) The rate of water absorption is not related to the rate of transpiration.

35. Manure formed by earthworms is called as- **[NTSE]**
(a) Organic manure (b) Vermi compost
(c) Manure (d) None of these

36. Weeds not only use nutrients from the soil but are also
(A) harmful for some organisms including human beings
(B) useful for the crops and harmful for human beings
(C) harmful to the crops and some animals
(D) crop specific **[NTSE]**
Select the alternative which includes all correct statements.
(a) (A), (C) and (D) (b) (B), (C) and (D)
(c) (A), (B) and (C) (d) (A), (B) and (D)

37. A few gram seeds were placed in each of the three pots A, B and C containing soil. The soil in Pot A is mixed with some green twigs and leaves. The soil in pot B is mixed with old cow dung while soil of pot C is mixed with urea. Pots are watered regularly. Which of the following will be observed after 10 days? **[NTSE]**
(a) Lot of growth in A
(b) Not much growth in B
(c) Lot of growth in B but very little growth in C
(d) Little growth in A and lot of growth in B and C

38. Which of the following rotation of crops will reduce dependence on the use of chemical fertilizers? **[NTSE]**
(a) Rice and Chilli (b) Wheat and Potato
(c) Potato and Rice (d) Gram and Rice

39. Rani had an uneven plot of land in which water was scarce. What system could she adopt for irrigation? **[NTSE]**
(a) Canal (b) Sprinkler
(c) Drip (d) Hand pump

40. Causing storage losses to agricultural produce **[JSTSE]**
(a) Insects (b) Rodents
(c) Mites (d) All the above

41. Growing of different crops on a piece of land in a pre-planned succession is known as : **[JSTSE]**
(a) Inter cropping (b) Crop rotation
(c) Hybridisation (d) None of the above

42. A farmer made an observation in a backwater paddy field of coastal Kerala that the paddy plants wilt during noon onwards everyday but appear normal next morning. What would be the possible reason for wilting? **[NTSE]**
(a) The rate of water absorption is less than the rate of transpiration in the afternoon.
(b) The rate of water absorption is more than the rate of transpiration in the afternoon.
(c) The changes in the rate of water absorption and transpiration are not associated with wilting.
(d) The rate of water absorption is not related to the rate of transpiration.

Assertion & Reason Questions

DIRECTIONS : *The questions in this segment consists of two statements, one labelled as "Assertion A" and the other labelled as "Reason R". You are to examine these two statementss carefully and decide if the Assertion A and Reason R are individually true and if so, whether the reason is a correct explanation of the assertion. Select your answers to these items using the codes given below.*

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

1. **Assertion :** Gram and Barley are Rabi crops.
Reason : They are grown during the months of November to April.

2. **Assertion :** Fertilizers provide quick replenishment of plant nutrients in the soil and restore its fertility.
Reason : They are easily absorbed by the plants.

3. **Assertion :** A fertilizer provides a lot of organic matter like humus to the soil.
Reason : They are very rich in plant nutrients like NPK.
4. **Assertion :** Crop improvement can be done by use of manures.
Reason : The objective of plant breeding is to raise new crops superior to existing ones.
5. **Assertion :** When the crop is changed during crop rotation, the weeds associated with it usually disappear.
Reason : The weeds are very choosy about the crop with which they grow.
6. **Assertion :** Earthworm are called a farmer's friends.
Reason : The burrowing action of earthworms helps to loosen the soil particles.

SOLUTIONS

Brief Explanations of Selected Questions

Let's Revise Through FIB & T/F

1. Paddy
2. Kharif
3. False. Cotton is a Kharif crop.
4. True
5. Nurseries
6. True. Groundnut is a leguminous crop.
7. Preparation of soil
8. Manure, fertilizers
9. False. Nitrogenous fertilizer is not required for growing nitrogenous crops, since leguminous crops can fix the atmospheric nitrogen themselves by using nitrogen fixing bacteria present in their root nodules.
10. Fertilizers
11. True
12. Vermicomposting
13. Hoe
14. Crop rotation
15. Sprinklers
16. Drip
17. Water logging
18. False. The excessive use of fertilizer causes water pollution.
19. Harrow/Khurpi
20. False. Harvesting comes after weeding.
21. True
22. Pests.
23. True
24. False. In addition to gunny bags, silos are also used for storing food grains on large scales. Metal bins are used for small scale storage.
25. Animal husbandry

EXERCISE-1 **Master Board**

Multiple Choice Questions

1. (a) 2. (a) 3. (b) 4. (c) 5. (d)
6. **(c)** Sugarcane is not a Rabi crop. It is a Kharif crop. Kharif crops are grown in rainy season.
7. **(a)** The process of turning and loosening of soil is called ploughing or filling. Harvesting is the process of cutting the crop and gathering them to transport it to the market. Threshing is the process of separating the chaff from the grain. Irrigation is the process of watering the plants in a field.
8. **(d)** Drip system of irrigation is a modern method of irrigation. In this method water is delivered at or near the roots of the plant drop by drop. Moat, Rahat and chain pump are traditional methods of irrigation, they are cheaper but less efficient.
9. **(a)** Manuring is addition of manure to the soils to improve its fertility. Weeding is the removal of undesirable, unattractive, or troublesome plant especially one growing where it is not wanted. Tilling is to prepare (land) for the raising of crops, as by plowing and harrowing.
10. **(b)** Ploughing in bigger field is done by cultivator. Cultivator is a mechanical implement for breaking up the ground and uprooting weeds. Hoe is a long-handled gardening tool with a thin metal blade, used mainly for weeding. Sickle is a hand-held agricultural tool with a variously curved blade. It is used for harvesting grain crops or cutting succulent forage chiefly for feeding livestock. Combine is a farm machine used for both threshing and harvesting.
11. **(a)** Cow dung is an example of manure. Manure is organic matter used as organic fertilizer in agriculture. It contributes to the fertility of the soil by adding organic matter and nutrients, such as nitrogen, that are trapped by bacteria in the soil. Urea, ammonium phosphate and superphosphate are fertilizers.
12. **(a)** Use of neem leaves or turmeric during grain storage serves the purpose of bio-pesticides.

13. **(d)** Insect pests damage the crop by cutting the root, stem and leaf; sucking the cell sap or boring into the stems and fruits.
14. **(a)** The tremendous increase in the amount of algae and other organic matter in the waters of lakes, ponds, rivers due to the presence of nitrates and phosphate salts (fertilizers), often leading to serious depletion of dissolved oxygen in water is called eutrophication.
15. **(b)**
16. **(a)** During the period 1960 to 2000 rice production went up from 35 million tonnes to 89.5 million tonnes. This was due to the development of semi-dwarf varieties of rice. there are 2,00,000 varieties of rice in India.

Assertion & Reason Questions

1. **(b)** Both A and R are correct, but R is not the correct explanation of A.
   Crop improvement refes to the genetic alteration of plants to satisfy human needs. It main purpose to obtain higher yield, better quality, resistance to disease and shorter duration which are suitable to a particular environmental conditions.
2. **(b)** Both A and R are correct, but R is not the correct explanation of A.
   The direct application of fertilizer to crop or soils is a simple route to increase crop yield. Average yield per hectare has increased from 1.1 tons in 1950 to 2.3 tons in 1986 by the use of inorganic fertilizers. Irrigation is very important in increasing crop productivity as water is an essential component of vital activities of plant.
3. **(a)** Both A and R are true and R is the correct explanation of A.
   The crops grown in the winter season are called Rabi crop. Some of the examples of Rabi crop are : Wheat, Gram (Chana), Pea, Mustard etc.
4. **(b)** Both A and R are correct but R is not the correct explanation of A.
   Ploughing is the turning up of the soil of the field with the help of a plough. It is done before sowing of the seeds. It helps to loosen the soil, Hence improves air circulation in the soil.
5. **(a)** Both A and R are correct and R is the correct explanation of A.
   Manures and bio-fertilisers do not produce chemical pollutants by releasing excess nutrients in water.

Passage/Case Based Questions

1. **(b)** 2. **(c)**
3. **(b)**

Very Short Answer Questions

1. Kharif and rabi crops.
2. Large scale cultivation of plants of same kind at one place is called crop.
3. Soil preparation
4. Turning and loosening of soil.
5. Plough / Hoe
6. Ploughing
7. Process of placing seed in the ground soil for growing crop plants.
8. Seed drill
9. Transplantation
10. Wells, canals, rivers, dams, ponds and lakes
11. Water logging refers to saturation of the soil with water sufficient to prevent or hinder agriculture.
12. Manure and fertilizers
13. Compost is a mixture of various decaying organic substances, like dead leaves or manure, used as a fertilizer for growing plants.
14. Urea, Ammonium sulphate
15. Leguminous crops
16. Crop rotation is a practice designed to minimise pests and diseases, reduce chemical usage, aid in building and maintaining healthy soil, and manage nutrient requirements-all which will maximise yield.
17. Weeds
18. It avoids random watering of crops.
19. Harrow and Trowel
20. Weedicides are pesticides that are used to kill weeds.
21. 2, 4 - D (2, 4 - Dichlorophenoxy acetic Acid)
22. Harvesting
23. Winnowing
24. Small scale – Jute bags, metallic bins
    Large scale – Silos, granaries
25. Combine
26. Pea, mustard
27. Paddy, Maize
28. Nitrogen fixation is the chemical processes by which atmospheric nitrogen is assimilated into organic compounds, especially by certain microorganisms as part of the nitrogen cycle.
29. Groundnut, Maize (Kharif crops)
30. *Rhizobium*

Short Answer Questions

1.

	Rabi Crop	*Kharif Crop*
(i)	Grown in winter season	Grown in rainy season
(ii)	Seeds are sown in October and harvested in March.	Seeds are sown in June and harvested in September.
(iii)	E.g. pea, mustard, wheat, gram etc.	E.g. paddy, maize, groundnut etc.

2. Importance of soil loosening are –
(i) Roots penetrate deep into the soil and breathe easily, water holding capacity of soil increases.
(ii) Helps in the growth of microbes and earthworm which help in turning the soil and add humus to it.
(iii) The nutrient rich soil comes up and nutrients are easily absorbed by plants.
(iv) Proper mixing of manure in the soil.

3. Levelling is a process for ensuring that the depths and discharge variations over the field are relatively uniform and, as a result, that water distributions in the root zone are also uniform. It improves the efficiency of water, labour and energy resources utilization.

4.

	Manure	*Fertilizer*
(i)	Obtained by the decomposition of plant and animal waste	Obtained from inorganic salt.
(ii)	Prepared in fields	Prepared in factories
(iii)	Provides humus to soil	Does not provide humus
(iv)	Rich in plant nutrient	Less rich in plant nutrient

5. Manure is better than fertilizer because it
(i) enhances water holding capacity of soil.
(ii) makes soil porous due to which exchange of gases becomes easy.
(iii) increases number of friendly microbes.
(iv) improves texture of soil.

6. Weeds are unwanted plants that grow along with the crops. They are removed manually by using hand, khurpa, hoe or a rake in small field while in large area they are removed by ploughing, harrowing etc. The best time to remove weeds is when the soil is damp and moist.

7. Steps involved in crop production are :
(i) Preparation of soil
(ii) Seed selection and sowing
(iii) Manuring
(iv) Irrigation
(v) Weeding
(vi) Protection from animals, birds, pest and disease
(vii) Harvesting, threshing and winnowing
(viii) Storage

8. An insecticide is a substance used to kills insects. They include ovicides and larvicides used against insect eggs and larvae, respectively. Rodenticide is a chemical or other agent used to destroy rats or other rodent pests and prevent them from damaging food, crops, etc. Fungicides are chemical compounds or biological organisms used to kill or inhibit growth of fungi or fungal spores.

9. Grains are dried before storage to reduce their moisture content because moisture attracts fungus and bacteria resulting in its destruction.

10. Kharip crops : Soyabean, Cotton, Groundnut
Rabi crops : Barley, Mustard, Pea

11. (i) Kharif crops. These crops are sown in the rainy season. Example: paddy, maize, soyabean.
(ii) Rabi crops. These crops are grown in winter season. Example : wheat, mustard, and pea.

12. Ploughing, levelling and manuring.

13. Chillies and tomatoes are cultivated by transplantation. Transplantation usually refers to the practice of taking very young plants that have been started in pots or a nursery and moving them to a large production field.

14. The process of replanting the seedling from the nursery to the main field is called transplantation. Its advantages are :
(i) It enables us to select only healthy seedlings.
(ii) It promotes better penetration of roots in the soil.

15. Irrigation makes agriculture possible in areas previously unsuitable for intensive crop production. Irrigation transports water to crops to increase their yield, keep crops cool under excessive heat conditions and prevents freezing.

16. Weed affects crops by competing for water, minerals and sunlight. They also spread pests on the crops and sometimes produce poisonous substances harmful to crops. All these results in low yield of crop production.

17. Removal of unwanted plants that grow along with the crops are called weeding. Weeding can be done by
(i) Manually removing seeds by using hand or trowel or harrow.
(ii) Spraying weedicides which destroy weeds but not the crops.

18. (i) **Harvesting :** Cutting of crop plants after maturation is called harvesting. It is done by cutting the crop plants close to the ground or pulling out the crop plants.
    (ii) **Threshing :** Separation of grains from chaff is called threshing.
    (iii) **Winnowing :** Separation of grains from chaff with the help of wind is called winnowing.
19. Combines are farm machine that aids in the harvesting of grain crops by combining three separate functions into one piece of equipment. The combine harvester performs the processes of reaping, threshing, and cleaning. This allows the crop to be harvested more quickly and efficiently, and enables farmers to harvest larger amounts of crop at a time. Some crops that can be harvested using this machine includes wheat, soyabeans, oats and rye.
20. Gunny bags are jute bags which protect the food grains from rodents and other damages while their storage.
21. To protect the grains stored in gunny bags in big godowns from damage, following should be done –
    (i) Fumigation with chemicals which repel pest or kill their without affecting the grains.
    (ii) Neem leaves are kept along with grains.
    (iii) Storage area can be sprayed regularly.
22. The irrigational method that are used in modern times are –
    Sprinkler system and drip irrigation. Sprinkler system of irrigation is useful for sandy soils and drip irrigation is best technique for watering fruit plants, gardens and trees.
23. Manure is obtained from the decomposition of plant or animal wastes. Plant and animal wastes are dumped in pits at open places and allowed to decompose by microbes. The decomposition product is manure.
24. Farmer must cover their nose and mouth while spraying weedicides and pesticides because they can be in it goes inside the body.
25. The frequency of irrigation is much higher in summer due to the water loss from transpiration which is much greater as compared to other seasons.
26. Food grains which are to be stored for future use should be completely dried because of the following reasons:
    (a) Presence of moisture may be favourable for the growth of micro-organisms.
    (b) Presence of moisture and favourable temperature enhance germination of stored seeds.
27. The levelling of ploughed fields prevent the top fertile soil from being carried away by strong winds or washed away be rain water.
28. If wheat is grown in Kharif season, the whole crops might get destroyed because of many factors such as lack of optimum temperature, adaptability etc.
29. Seeds should be sown at right spacing. They should be neither sown too close nor too far apart. If seeds are placed too close, then plants formed form them will be also too close and will not get enough sunlight, heats and nutrients to grow. Thus, the seeds should be sown at right spacing to proper growth.
30. Weeding can be defined as the removal of weeds (unwanted plants) from the field. Weeding is necessary because weeds compete with main crop plant for different factors such as water, sunlight etc. Due to unwanted plants there is reduction in yield also.

Long Answer Questions

1. Continuous plantation of crops in field makes the soil poorer in important nutrients required for the growth of crops. It leads to decrease in soil fertility and hence the crop yield. Preparation of soil is considered to be an important step in agricultural practices because it helps in loosening the soil. Loosened soil allows growth of microorganisms and earthworms thus leading to its enrichment. It also helps the roots to breathe properly.
2. *Rhizobium* bacteria are soil bacteria. It forms a mutual beneficial association with plants. It plays an important role in fixing nitrogen after becoming established inside the root nodules of legumes. *Rhizobium* bacteria enable leguminous plants to fix nitrogen. It takes in atmospheric nitrogen and then converts it into a soluble form which the plant can absorb. These bacteria cannot make their own food so they provide nitrogen to the plants and in return obtains food and shelter from the host plant.
3. Precautions taken in sowing the seeds are :
    (i) Seeds should be sown at right spacing to get sufficient amount of sunlight, water and nutrients.
    (ii) Seeds should be planted at proper depth in the soil. If they are planted deep in the soil then they cannot respire properly and if planted on surface then can be eaten by birds.
    (iii) Seeds should be clean, healthy and free from disease.
    (iv) Seeds require water for germination. The soil therefore should have water in it during the process of sowing.
4. A pest is any organism that spreads disease, causes destruction or is otherwise a nuisance. Some examples of pests are mosquitoes, rodents, and weeds. Crops can be protected by using pesticides. Grains, fruits and

vegetables should be washed properly before using to remove pesticides coated on them. Because pesticides are harmful poisonous chemicals which affects our health.

HOTS Questions

1. Farmer use a mixture of manures and fertilizers in the field so that the nutrients which cannot be fulfilled by the manures can be fulfilled by the plants and the nutrients which are not in the fertilizers can be fulfilled by the manures, *e.g.* -NPK [nitrogen, phosphate and potassium] fulfil the nutrients which are not present in the manures.
2. Sprinkler system of irrigation. This system is used on the uneven land where less water is available. Sprinkler irrigation is a method of applying irrigation water which is similar to natural rainfall. Water is distributed through a system of pipes usually by pumping. It is then sprayed into the air through sprinklers so that it breaks up into small water drops which fall to the ground.
3. Crop rotation and proper ploughing before sowing seeds helps in removing weeds. In these methods poisononous chemicals are not used.
4. An extra stock called buffer stock is maintained so that grains are available in plenty even if there is a short fall in production in a particular year, for example due to monsoon failure.
5. No, this is not true. Crop rotation helps replenishment of the soil with nitrogen.
6. To fulfil the food requirement of increasing population in our country we need to constantly increase the food grain production. This can be done by increasing the land under cultivation. But we cannot indefinitely go on increasing farmland, as this leads to environmental problems.

   Hence, improvement in the methods of agricultural practices is the most suitable alternative to increase crop produce. Better irrigation methods, proper use of manure and fertilizers etc will help improving the crop produce.

   Also, by providing better storage methods, we can reduce wastage of food grain. However, recently, an increase in crop produce has come about from using better varieties of crops that have higher yield and more resistance to diseases.

   Hence, these days, use of better varieties of crop plants has brought about maximum increase in crop production in our country.
7. Mustard is a Rabi crop which requires cold and dry weather. Therefore, in rainy season it will not grow well and gets destroyed in excess water.
8. (i) Uneven distribution of rainfall-spatial and temporal
   (ii) Uncertainty of monsoon.
   (iii) Lack of irrigation facilities
   (iv) Frequent flood and drought is a common phenomenon associated with the monsoon.
9. Yes, the reasons are as follows :
   (1) Less income or savings.
   (2) Crop failure
   (3) Difficult procedure of financial institution which has pushed them to borrow from private money lenders at high rate of interest.
   (4) Inadequate support price of procurement of crops
   (5) Low returns from agriculture.
   (6) Lack of implementation of land reforms.
10. Pests are organisms that attack and damage crops. They can limit crop productivity.
11. Continuous rainfall will make cultivation difficult and reduces agricultural output. All plants need at least some water to survive; therefore rain (being the most effective means of watering) is important to agriculture. While a regular rain pattern is usually vital to healthy plants, too much or too little rainfall can be harmful, even devastating to crops. Drought can kill crops and increase erosion, while overly wet weather can cause harmful fungus growth. Plants need varying amounts of rainfall to survive. For example, certain cacti require small amounts of water, while tropical plants may need up to hundreds of inches of rain per year to survive.

EXERCISE-2 NCERT Questions

Text Book Questions

1. (a) The same kind of plants grown and cultivated on a large scale at a place is called _ crop _.
   (b) The first step before growing crops is _ preparation__ of the soil.
   (c) Damaged seeds would __float__ on top of water.
   (d) For growing a crop, sufficient sunlight, _ water __ and ___ nutrients_ from the soil are essential.
2.

A	B
(i) Kharif crops	(e) Paddy and maize
(ii) Rabi crops	(d) Wheat, gram, pea
(iii) Chemical fertilisers	(b) Urea and super phosphate
(iv) Organic manure	(c) Animal excreta, cow dung, urine and plant waste

3. (a) Kharif crop → Paddy, maize

(b) Rabi crop → Wheat, gram

4. (a) Preparation of soil:

It is the first **method** to be followed before growing a crop. This method includes loosening of soil so that the root can penetrate deep into it. The loosening of the soil helps in the growth of several soil microbes, earthworms etc., which enrich the soil with humus and other essential nutrients. Plants require nutrients for their proper growth and functioning. The process of loosening is called ploughing. This brings the nutrient-rich soil to the top, which helps the plants to utilize the nutrients for their growth.

(b) Sowing:

Sowing is an important step in crop production. In this process the seed is placed in or on the soil for future growth. The seeds that are selected should be of good quality. This improves the net yield of the crop. Sowing is usually done with the help of a traditional tool or a seed drill. The traditional tool is like a funnel and was used earlier. Nowadays, seed drills that make the use of tractors are used for sowing. This tool disperses seeds uniformly and sows seeds at proper depth and at regular intowards. This method saves time and also protects the seeds from birds.

(c) Weeding:

Undesirable plants that grow along with the crop are known as weeds. The process of removing these weeds is called weeding. *Xanthium*, *Parthenium*, etc. are some common weeds. Weeds compete with the crop for nutrients, light, and space. As a result, crop plants get lesser nutrients, light, and space for their development which reduces their productivity. This is why, various weeding **methods** are employed.

Some important weeding methods are:

(i) Weeds can be controlled by using weedicides. It is a chemical, which is sprayed in the fields to kill all the weeds without causing any harm to the crop.

(ii) Tilling before sowing of crops also helps in removing weeds. Tilling uproots the weeds. The best time for removal of weeds is before flowering.

(iii) The manual method of weeding is done with the help of a khurpi. It involves regular uprooting of weeds close to the ground.

(d) Threshing:

Threshing involves the process of separating grains or seeds from chaff. It is done after harvesting. It is done with the help of a machine known as 'Combine'. This machine is a combined harvester and thresher. It harvests plants as well as cleans grains.

5. Differences between fertilisers and manure:

Fertiliser	*Manure*
Fertilisers are commercially available plant nutrients, obtained from chemical substances.	Manure is a natural substance. It is prepared by the decomposition of animal excreta and plant wastes.
They can be organic or inorganic in nature.	Manure is known to have a large quantity of organic materials and very little amount of plant nutrients.
They ensure healthy growth and development of plants by providing them with nitrogen, phosphorus, potassium, etc.	They help in enriching the soil with organic matter and nutrients.
The addition of fertilisers to the soil requires special guidelines such as dose time, post addition precautions, etc., to be followed.	The addition of manure does not require any special guidelines.
A fertiliser does not provide any humus to the soil.	Manure provides humus to the soil and increases soil fertility.
Its excessive use causes water pollution. It cannot replenish organic matter of soil.	It protects the environment and helps in recycling farm waste.

6. Irrigation is the method of supplying water to crops at different intervals. The time and frequency of irrigation varies according to different seasons, crops, and soil types. There are various sources of irrigation such as wells, canals, rivers, dams, ponds, and lakes. Two important methods of irrigation which are helpful in conserving water are:

(a) Sprinkler system:

In this method, water is supplied through pipes to one or more central locations within the field.

When water is allowed to flow under high pressure with the help of a pump, it gets sprinkled on the crops. This system is more useful on uneven land, having fewer water supplies.

(b) Drip system:

In this method, water is delivered at or near the roots of plants, drop by drop. This is the most efficient method of irrigation as there is no wastage of water at all. This method is important in areas having water scarcity.

7. If wheat is sown in the kharif season (from June to September), then the whole crop might get destroyed because of many factors such as lack of optimum temperature, in appropriate day length, availability of pests, excess of rain etc. Therefore, wheat crop should not be sown during this season.

8. Continuous plantation of similar crops in a field makes the soil deficient in certain nutrients such as nitrogen, phosphorus, potassium, etc. This is because plants require nutrients for their proper growth and functioning. When a farmer continues to grow crops one after the other, all the nutrients available in the soil reduces and the crop yield decreases automatically.

9. Undesirable plants that grow along with crop plants are known as weeds. *Xanthium*, *Parthenium*, etc. are some common weeds. Weeds compete with the main crop for nutrients, light, and space. As a result, crop plants get lesser nutrients, light, and space for their development. This in turn, reduces their productivity. Thus, various weeding methods are employed.

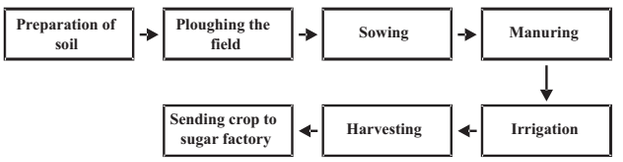
Some important weeding methods are:

(i) Weeds can be controlled using weedicides. These are chemicals, which can be sprayed in the fields to kill all available weeds. Weedicides are not harmful to the main crops.

(ii) Tilling before sowing of crops also helps in removing weeds. Tilling uproots the weeds. The best time for the removal of weeds is before flowering.

(iii) The manual method weeding is done with the help of a khurpi. It involves regular uprooting or cutting of weeds close to the ground.

10. Flow chart of sugarcane crop production:

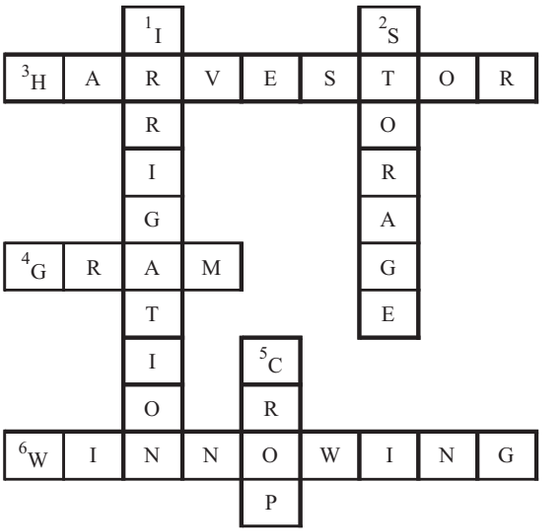


11. Down

1. Irrigation
2. Storage
5. Crop

Across

3. Harvestor
4. Gram
6. Winnowing



Exemplar Questions

1. (c) 2. (b) 3. (b) 4. (c) 5. (a) 6. (a)
7. (d) 8. (a) 9. (c) 10. (b) 11. (b)

12. The field should watered, tilled and ploughed before sowing seeds.

13. October to March.

14. Loosening the soil/maintaining high moisture levels in soil.

15. Crops cultivated without using any chemicals like fertilisers, pesticides, weedicides etc. are called organic foods.

16. (a) Seed drill.

(b) The advantages are:-

(i) seeds are sown at a uniform distance and depth to avoid over crowding.

(ii) after sowing, seeds are covered by soil which prevent them from being eaten by birds.

(iii) It saves time and labour.

17. (a) Animal husbandry.

(b) Animals are provided with proper food, shelter and care.

18. (i) He did not use good quality seeds.

(ii) His field was not well irrigated.

(iii) Manures/fertilisers were not properly applied.

(iv) Weeds were not removed.

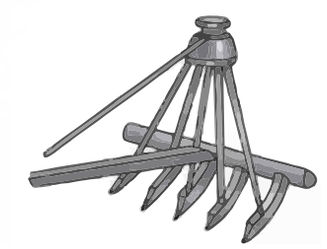
19. The following items are required – seeds and seedlings of vegetable plants from nursery, kitchen waste, water. Step for raising the garden:

1. Kitchen waste will be collected and composted in a pit.
2. A patch of land will be identified for the garden.
3. Soil will be dug up and levelled with the help of a spade.
4. Sowing of seeds / transplanting of seedlings.
5. Select seeds/seedings as per the season. Water the plants regularly with a water-can.
6. Compost will be applied.
7. Weeds will be removed periodically with the help of khurpi.

EXERCISE-3 Foundation Builder

Multiple Choice Questions

1. **(b)**



A seed drill is a device used in agriculture that sows seeds for crops by positioning them in the soil and burying them to a specific depth while being dragged by a tractor. This ensures that seeds will be distributed evenly.

2. **(b)**

- Traditional method - Moat, Dhekli, Rahat
- Modern method - Drip irrigation, Sprinkler irrigation
  - **Moat** is also known as the pulley-system and is a manual irrigation method.
  - In the **Dhekli** method, the rope and the bucket are connected to one end of a heavy stick and a heavy counterweight at the other end.
  - In the **Rahat** method, animals move and rotate the wheel, which leads to drawing the water from the well.
  - **Drip irrigation** is a process in which the distributing pipe has holes to supply water drop by drop just above the roots of each plant.
  - **Sprinkler irrigation** is a process in which a nozzle is attached in the pipe to spread water showers over an area.

3. **(c)**

		Methods of dispersion
X	Dandelion	Wind
Y	Pea	Explosion
Z	Tiger nail	Animal

4. **(c)** All the given options involve steps of farming in agriculture. Sowing involves using a seed drill, irragation makes use of a drip system, weeding involves buta chlor which is a herbicide and harvesting makes use of a sickle.
Thus, (i → c), (ii → d), (iii → a), (iv → b).

5. **(d)** Smut of wheat and citrus canker are caused by fungal infection.

6. **(b)**

7. **(b)** Dr. Norman Borlang, an American agricultural scientist was the first to promote the green revolution in India.

8. **(b)** Beans is a leguminous crop that enriches the soil with nitrogen. Leguminous crops fix the atmospheric nitrogen themselves by using nitrogen fixing bacteria present in their root nodules.

9. **(a)** Threshing is the process of separating the grain seeds from pods or chaff. The process of cutting of mature crop is known as harvesting. The process of sowing seeds by hands is known as broadcasting while ploughing is the process of turning and loosening of soil.

10. **(a)** Manure enriches the soil with organic material (humus). A fertilizer does not provide any humus to soil.

11. **(d)** Harrow is used for removing unwanted plants (weeds) from the crops. The implements used for harvesting are sickle and harvesting machine.

12. **(a)** Plough is an implement made of wood. It is drawn over soil to turn it over and cut furrows in preparation for the planting of seeds. Sickle is an implement for cutting grain, grass, etc., It consists of a curved, hook like blade mounted in a short handle. Harrow is a cultivating implement set with spikes, spring teeth, or disks and used primarily for pulverizing and smoothing the soil. Trowel is a small tool with a curved blade that is used by gardeners for digging holes.

13. **(d)** Manuring helps in enriching the soil with organic matter and nutrients.

14. **(a)** Weedicide is a chemical or organic substance which is used to remove unwanted plants mainly like weeds which effect the healthy growth of the plant. Tilling is to prepare (land) for the raising of crops, as by plowing and harrowing. Crop rotation is the practice

of growing different crops in succession on the same land chiefly to preserve the productive capacity of the soil.

15. **(d)** The large scale storage of food grains is done in grain silos and gunny bags.
16. **(b)** Crop harvesting is the last step in the production of crop. Harvesting is the cutting and gathering the mature crop.
17. **(c)** Urea is an example of fertilizer. Fertilizer is a manmade mineral salt which are added to the soil to provide nutrients like nitrogen, phosphorous and potassium.
18. **(d)** Appropriate supply of water to the crop is called irrigation. Soil cannot be irrigated with polluted water.
19. **(b)** Hisardale is a new breed of sheep developed in Punjab by crossing Bikaneri-ewe and Marino rams.
In cross-breeding, superior male of one breed are mated with superior females of another breed.
20. **(a)** Inbreeding depression, the reduction of fitness caused by inbreeding, is a universal phenomenon that depends on past mutation, selection, and genetic drift. Inbreeding depression can be overcome by the following ways:
    - Out breeding: The breeding of animals which are unrelated to each other and do not have come ancestors for 4-6 generations.
    - Out crossing: Mating done with the animals of same breed but after 4-6 generations.
    - Cross breeding: Superior male mated with superior female of another breed.
    - Interspecific hybridisations: Male and female animal of two different related species.
21. **(d)** Inbreeding increases homozygosity. So, mating of the related individuals of same breed will give homozygous purelines.
22. **(b)** Outbreeding is useful in the problem of inbreeding depression.
23. **(a)** The growing of grass or legumes in rotation with grain or tilled crops as a soil conservation measure is called Ley farming.
24. **(d)** *Pseudomonas* is denitrifying bacteria which converts nitrates present in soil to free atmospheric nitrogen, thus depleting soil fertility and reducing agricultural productivity.
25. **(a)** The silkworms belong to phylum : Arthropoda, class: Insecta, order : Lepidoptera. It is the order of insects that includes butterflies and moths. About 1,80,000 species of the Lepidoptera are described till now.
26. **(b)**
27. **(d)** Insects, Rodents and mites are the pests which damages crop shortage.
28. **(d)** Plant hybridization can be done between different varieties, species and genus.
29. **(b)** Crop rotation is a growing of crops in a pre-planned manner.
30. **(d)** Leghorn is a variety of fowl.
31. **(a)** Rock bee is a common name of Apis dorsata.
32. **(c)** The local breeds of cow like Red Sindhi, Sahiwal carrying high immunity power.
33. **(d)**
34. **(a)** When rate of water absorption is less than the rate of transpiration, plant cells loose water and thus plants wilt in the afternoon.
35. **(b)** Vermi-compost is a manure formed by earthworms.
36. **(a)** Weeds are unwanted plants that reduce available moisture, nutrients, sunlight and growing space needed by crop plants, e.g. dandelion, wild carrot, bermuda grass etc. Livestock can be poisoned or injured by certain unwanted plants while grazing or fed in stored feed, e.g. poison hemlock (*Conicum maculatum*).
37. **(d)** Very little growth in A but lot of growth in B and C because B and C have good amount of nutrients in their soil in the form of humus and fertilizers.
38. **(d)** If rice crop is grown along with a leguminous crop (e.g. Gram), then the usage of nitrogen from the soil by rice plant is compensated by the addition of nitrogen in the soil by nitrogen fixing legume. This in turn increases the soil fertility and ultimately the yield of crop.
39. **(b)** She can adopted sprinkler system which is the modern method of irrigation. In this technique, the perpendicular pipes having rotating nozzle on top are joined to the main pipeline at regular intervals and when water flows through it under pressure with the help of pump it gets sprinkled on the crop. It is useful for uneven land or where soil is sandy.
40. **(d)** Insects, rodents and mites are the pests which damages crop shortage.
41. **(b)** Crop rotation is a growing of crops in a pre-planned manner.
42. **(a)** When rate of water absorption is less than the rate of transpiration, plant cells loose water and thus plants wilt in the afternoon.

Assertion & Reason Questions

1. **(a)** Rabi crops refers to agricultural crops sown in winter and harvested in the spring. It is the spring harvest (also known as the "winter crop") in Indian subcontinent. The Rabi crops are grown between the months mid-October to March. The water that has percolated in the ground during the rains is main source of water for these crops. Examples of Rabi crop are wheat, gram, pea, mustard, linseed and barley.

2. **(a)** Fertilizers are a large number of natural and synthetic materials, containing the chemical elements that improves growth and productiveness of plants. Fertilizers enhance the natural fertility of the soil or replace the chemical elements taken from the soil by previous crops. Modern chemical fertilizers include one or more of the three elements most important in plant nutrition: nitrogen, phosphorus, and potassium.
3. **(d)**
4. **(d)** Crop improvement refers to the genetic alteration of plants to satisfy human needs. It proposes to obtain higher yield, better quality, resistance to diseases and pests, along with shorter duration which are suitable to a particular environmental condition.
5. **(a)** Weed species are typically associated with crops, and crop rotations determine their specific weed population over time. Crop rotation is the system of growing a sequence of different crops on the same ground so as to maintain or increase its fertility, to avoid depleting the soil and to control weeds, diseases, and pests.
6. **(a)** Earthworms are called farmer's friend because they play an important role in breaking down dead organic matter by a process known as decomposition. Decomposition releases nutrients locked up in dead plants and animals and makes them available for use by living plants. Earthworms are also responsible for mixing soil layers and incorporating organic matter into the soil. Charles Darwin referred to earthworms as 'nature's ploughs' because of their ability of mixing soil and organic matter. This mixing improves the fertility of the soil by allowing the organic matter to be dispersed through out the soil and the nutrients held in it to become available to bacteria, fungi and plants.

Think Out of the Box

Case Study

1. Over cropping can be prevented in a number of ways often by rotating the type of crop being produced as different crops require different types of nutrients.
2. The best way to check the viability of seeds is by Germination test.