

Chapter 1

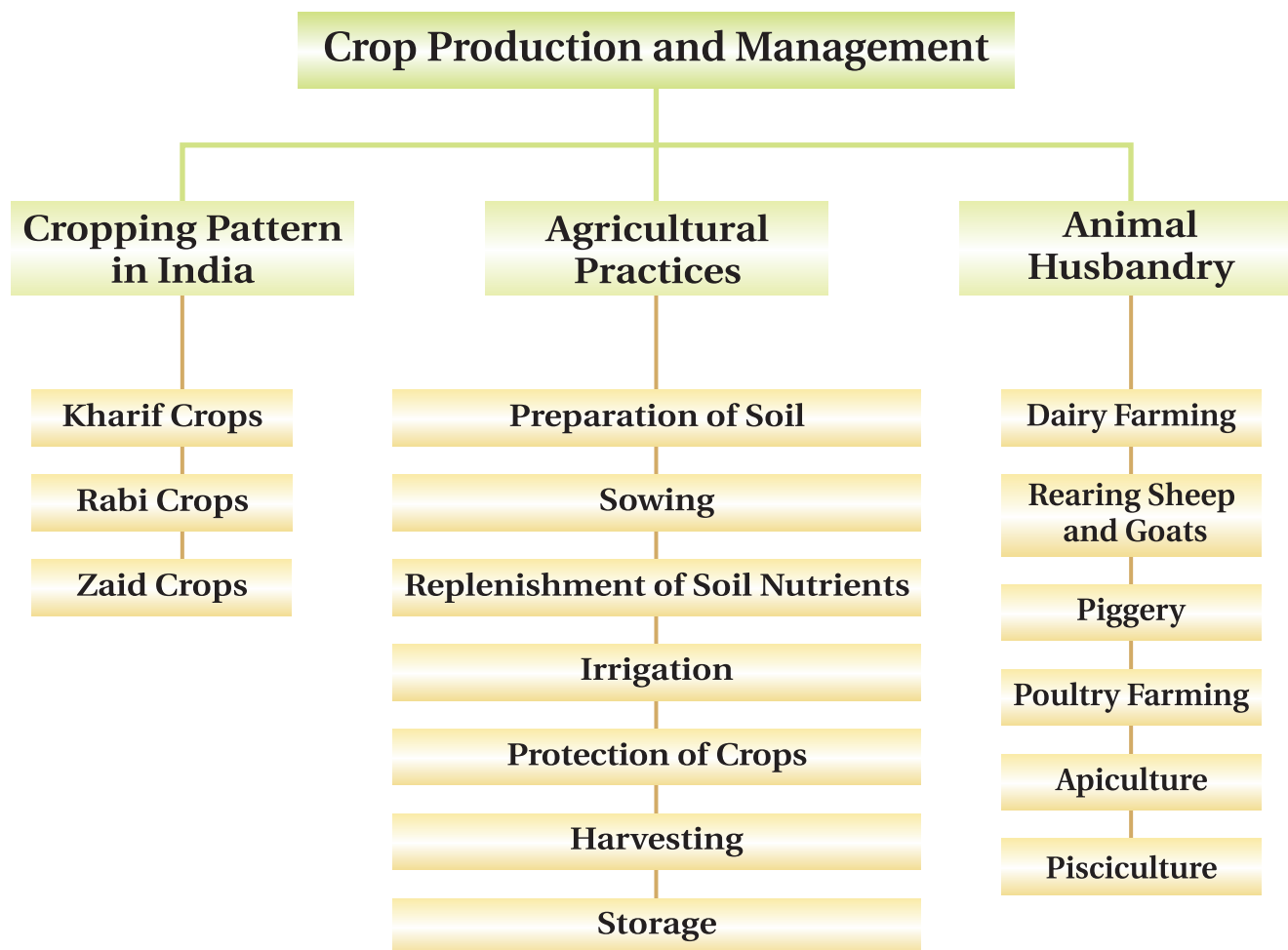
Crop Production and Management



Home Page

Human beings are dependant on food for meeting their daily energy needs. This food may be from plant or animal sources. Over the years, many techniques have evolved for ensuring that the supply meets the demand of these food products.

Learning the science of 'Crop Production and its Management' helps the farmer to get a good yield of crops. 'Animal Husbandry' is another important primary occupation like agriculture. In this chapter, we will learn about some of the processes involved in the science of crop production, its management and animal husbandry.





Retrieve

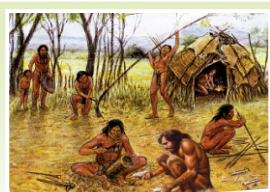
- ◆ Around 67% of people in our country are involved in agriculture and its allied fields.
- ◆ It is necessary to provide adequate information to the farmer in order to improve the yield of the produce.

Let us take a brief look at how humans innovated and adopted new techniques to satisfy their growing need for food.

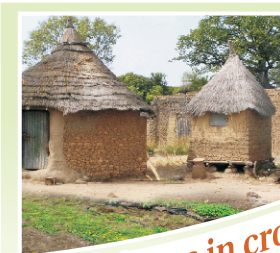
Improvements in agriculture
Use of implements such as plough, trowel, etc.

Demand and need for increase in yield

Searching for food, hunting
Nomadic life



Discovery of agriculture
Settling in small communities



Discovery and use of modern equipments such as tractors, combines, cultivators, etc. that have made farming mechanised

...modern techniques in crop production



Fertilisers to replenish the soil



Pesticides to prevent pest attack on the produce



High yielding varieties of crops

1. Fill in the blanks.

- a. Two types of crops cultivated in India are _____ and _____ crops.
- b. Humans get their food from _____ and _____ sources.

2. Choose the correct name for the following: (pulses, cereals, tubers, plantation crops, oil seeds)

- a. Rice, wheat, corn, ragi, millet, oats _____
- b. Types of beans, peas, gram _____
- c. Potato, tapioca _____
- d. Groundnut, sunflower, mustard _____
- e. Tea, coffee, rubber _____

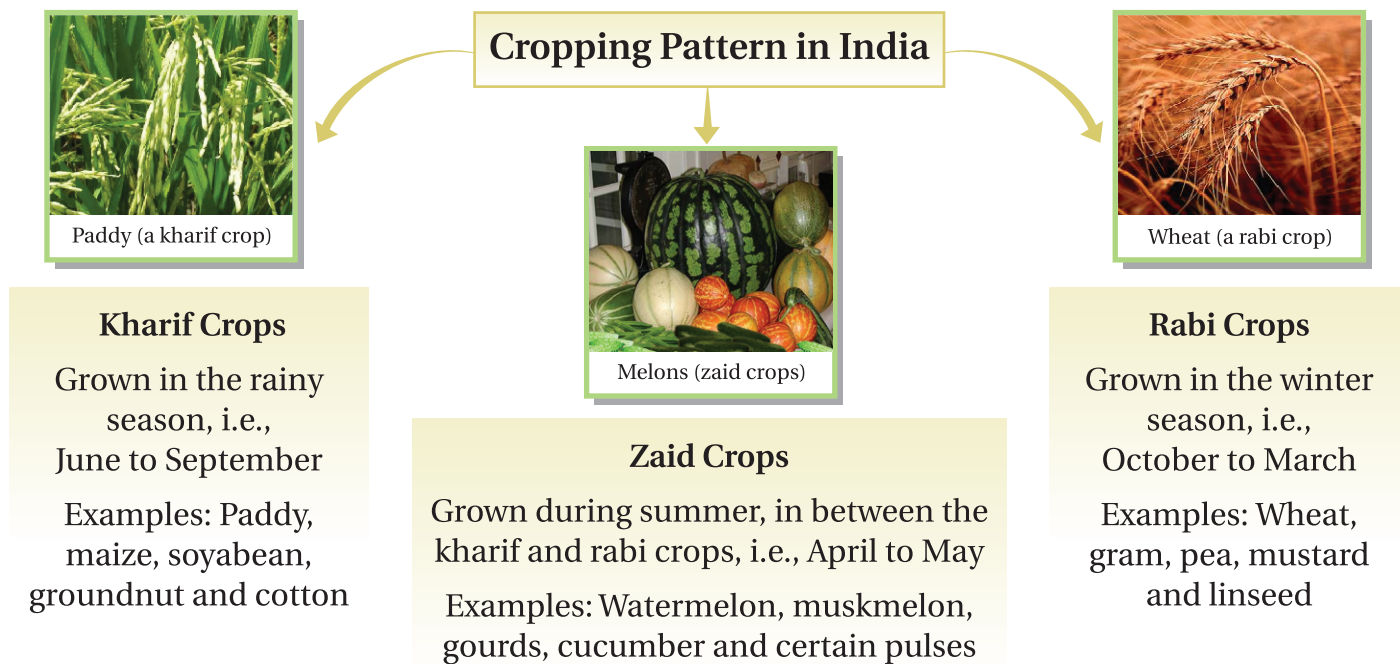


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Cropping Pattern in India

Plants of the same kind grown and cultivated at one place on a large scale are called crops. These crops are grown in fields and the yield obtained by the farmer is called the produce.

A distinct cropping pattern has emerged in India based on climatic conditions such as soil, temperature, humidity and rainfall.



Over the years, humans have learnt to match the location and available resources to select the ideal crop and obtain a good yield.

Read more at:

<http://timesofindia.indiatimes.com/india/Learning-with-The-Times-India-has-two-agri-zones-in-terms-of-crop-seasons/articleshow/4900369.cms>



Processing

1. What do you understand by the term ‘crops’?

Ans. _____

2. What are kharif crops?

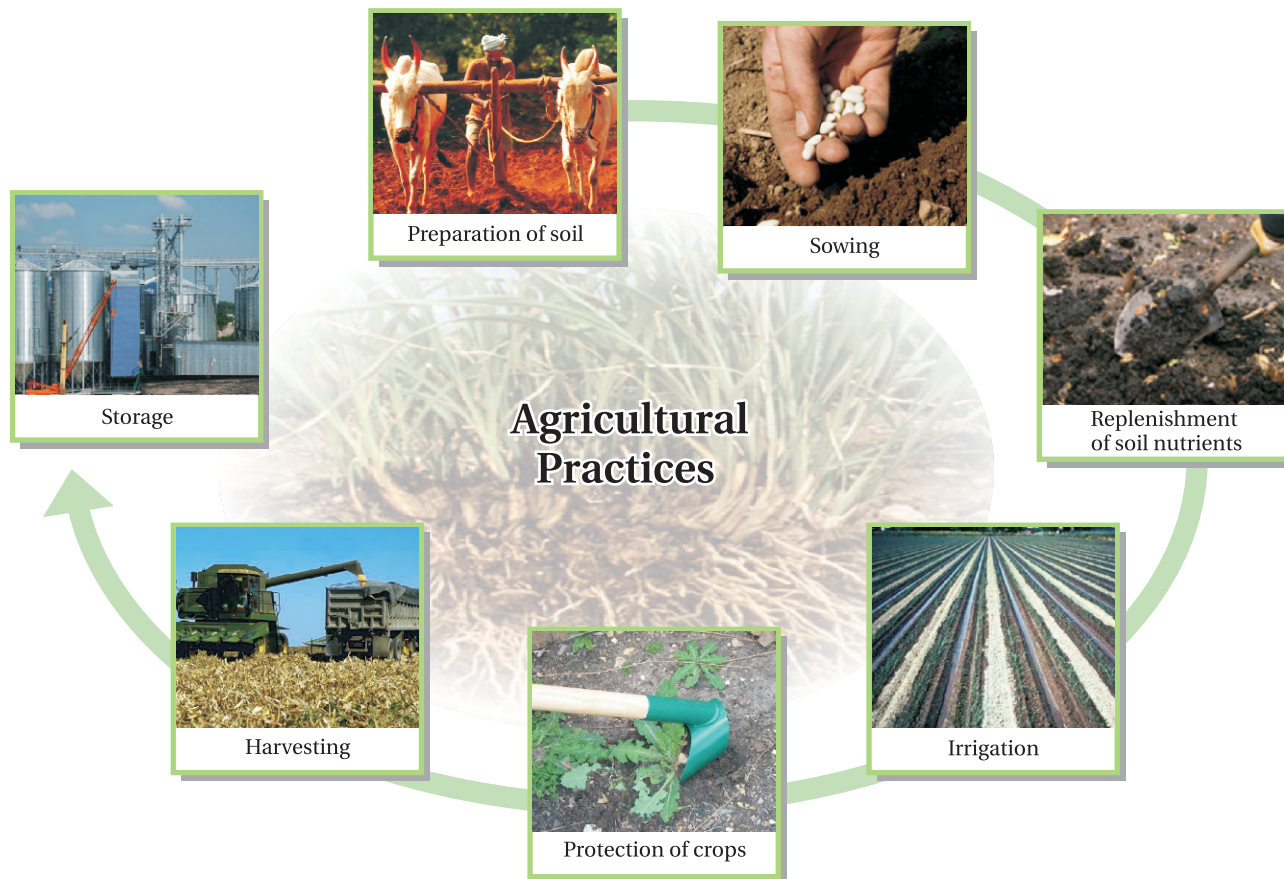
Ans. _____



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Agricultural Practices

Various activities done by farmers over a period of time to cultivate crops are called agricultural practices.



The farmer follows these procedures so that he/she can have the benefit of a good harvest.

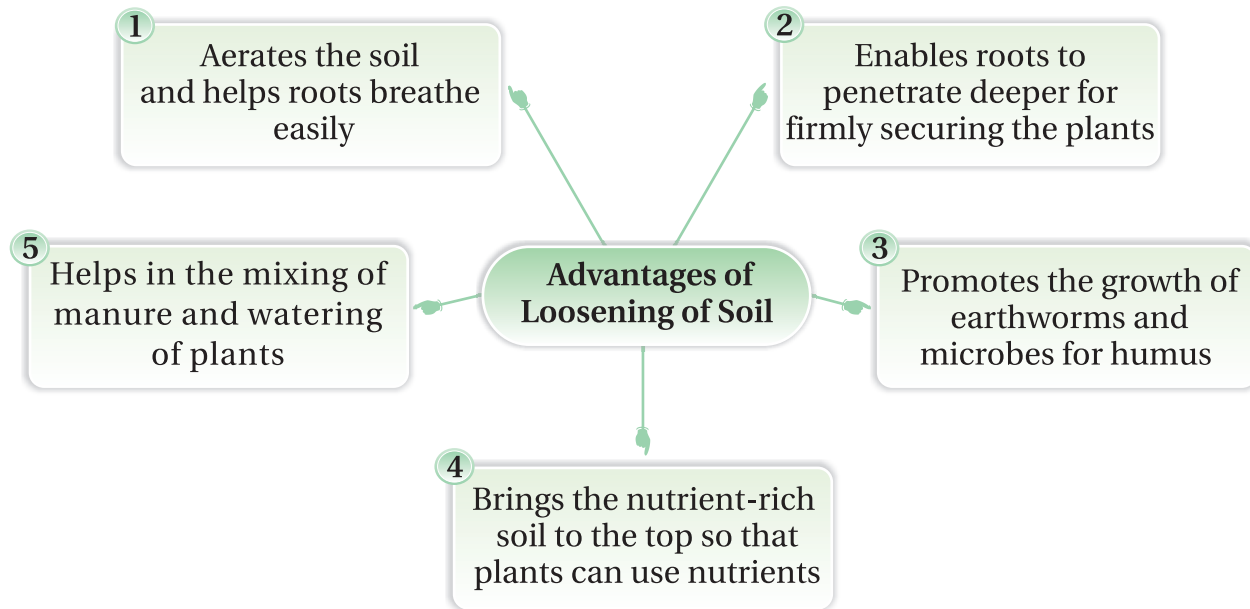
Let us study each step in detail.

Preparation of Soil

A good farmer knows the importance of the basic task of preparing the soil in his/her fields before sowing the seeds. It involves

- ◆ Loosening and turning of the soil by tilling or ploughing
- ◆ Breaking larger chunks of soil called crumbs
- ◆ Adding manure for thorough mixing with soil
- ◆ Using a wooden or iron plank called a leveller to smoothen the surface, to
 - prevent wind and water erosion
 - ensure uniform irrigation
- ◆ Adding water








Humus is the nutrient-rich, dark, fine organic matter in soil that is obtained from decomposition of plant and animal substances.

Agricultural Implements Used for Ploughing

Farmers select the appropriate ploughing tool according to the scale of farming.

| Agricultural Implements Used for Ploughing | | |
|--|---|---|
| Plough | Hoe | Cultivator |
|  |  |  |
| <p>It is made of a ploughshare and a ploughshaft. Used for</p> <ul style="list-style-type: none"> ◆ tilling the soil ◆ adding fertilisers to crops ◆ removing weeds ◆ scraping of soil | <p>It has a long wooden or iron rod with a short, broad and bent iron plate fixed to one end. Used for</p> <ul style="list-style-type: none"> ◆ removing weeds ◆ loosening the soil | <p>It is made up of a set of curved shanks fixed below a metal frame and is used for ploughing. Often tractor driven and saves time and labour. Used for</p> <ul style="list-style-type: none"> ◆ tilling the soil ◆ removal of weeds |



Updates

Scientists have identified a low-maintenance strawberry variety called as seascape which can be grown in space. The crop may produce lesser amount of strawberries than the regular ones, but they are bigger and just as tasty as the regular ones. If growing fresh fruits and vegetables in the space becomes feasible, it will significantly help astronauts to have a more balanced and nutritious diet out in space.

Read more at: <http://www.popsoci.com/science/article/2010-05/space-farms-future-might-have-strawberries>



Processing

1. What is meant by agricultural practices?

Ans. _____

2. Give any two advantages of loosening the soil.

Ans. _____

3. Name the agricultural implements used for ploughing.

Ans. _____

Sowing

Sowing is the process of planting seeds.

Farmers desire high yields from their crops. They take into consideration a number of factors for this, such as sowing seeds

- ◆ that are high yielding, clean, healthy and viable.
- ◆ during the right season according to the type of crop.
- ◆ at the right depth, as birds feast on the ones close to the surface while those sown too deep do not germinate properly.
- ◆ at appropriate distances from each other to ensure each plant gets sunlight, water and nutrients from soil.
- ◆ using the correct technique.

Providing the correct amount of water to the seeds is also necessary for germination.



High yielding seeds

Techniques Used for Sowing

Manual Sowing or Broadcasting



The farmer carries seeds in a pouch and scatters them in the field by sprinkling them with his hands.

Disadvantages

- ◆ Causes wastage of seeds
- ◆ Sowing is not uniform

Use of a Funnel



Seeds are filled into a funnel and passed through two or three pipes that have sharp ends for piercing the soil and placing the seeds.

Disadvantage

- ◆ Does not ensure that seeds get covered by the soil

Use of a Seed Drill



Seed drill is used for sowing with the help of tractors.

Advantages

- ◆ Seeds get properly covered by the soil after sowing
- ◆ Saves time and labour
- ◆ Sows the seeds at proper distances and depths

Transplantation

Some seedlings are not left *in situ*, that is, at the place where they were originally planted. They are shifted from the nursery bed where they are germinated to the main field, after they have grown to a certain height. This process is called transplantation.

Examples of plants that are transplanted are paddy, cabbage, chillies, tomatoes, etc.



Nursery bed with rice seedlings



Transplantation of healthy seedlings

Advantages

The farmer can

- ◆ select the healthy seedlings and thus get a better yield.
- ◆ space out the seedlings to ensure they get enough sunlight, water and nutrients.



Processing

1. What is meant by sowing?

Ans. _____

2. List out the advantages of sowing with the help of a seed drill.

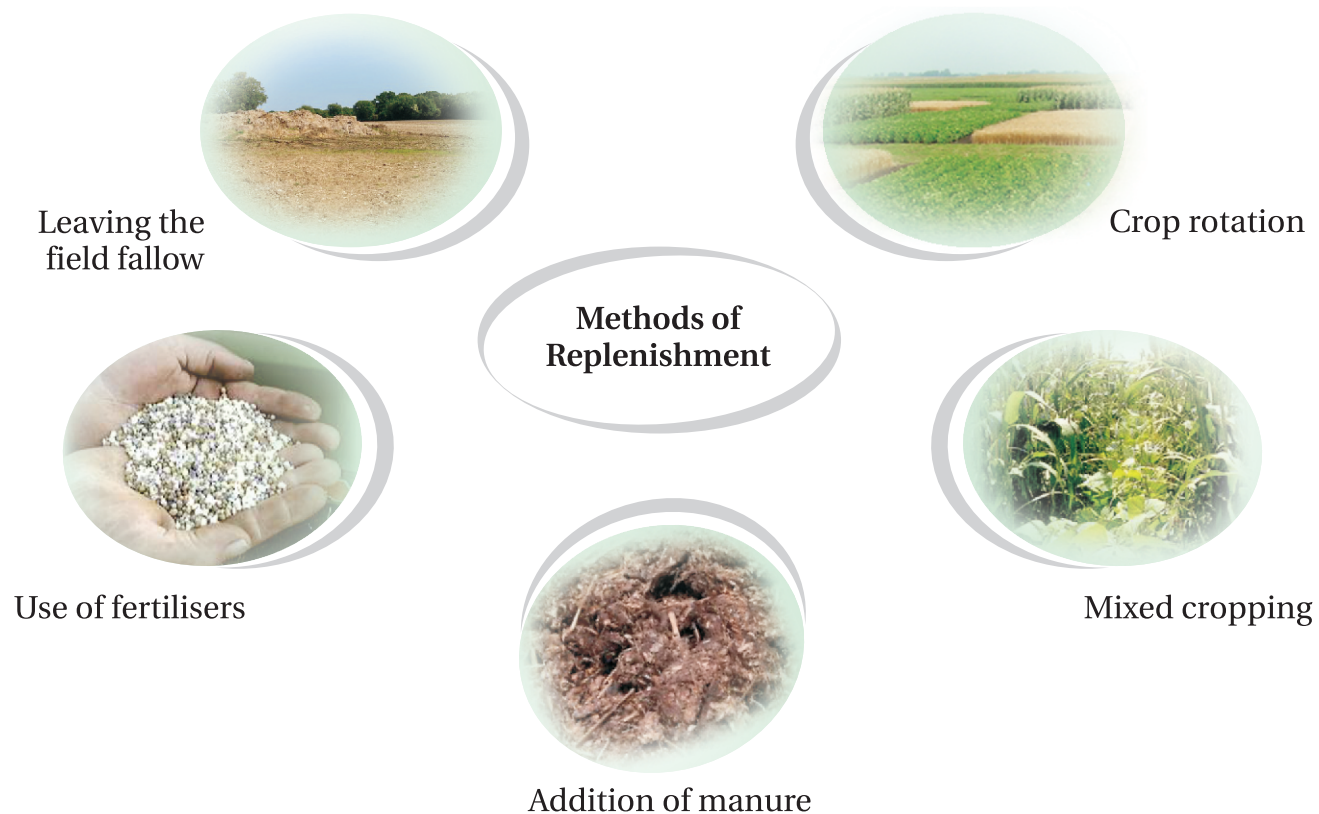
Ans. _____

3. What is meant by transplantation? Why is it needed?

Ans. _____

Replenishment of Soil Nutrients

A fertile, nourishing soil is essential to obtain a good yield. Every crop uses up mineral nutrients from the soil, thus depleting it. The farmers have different methods to top up these nutrients so that the field can support other crops.



Leaving the Field Fallow

A natural method of soil replenishment where the field is left uncultivated for a season so that the soil has enough time to regain its fertility. No longer popular now, since

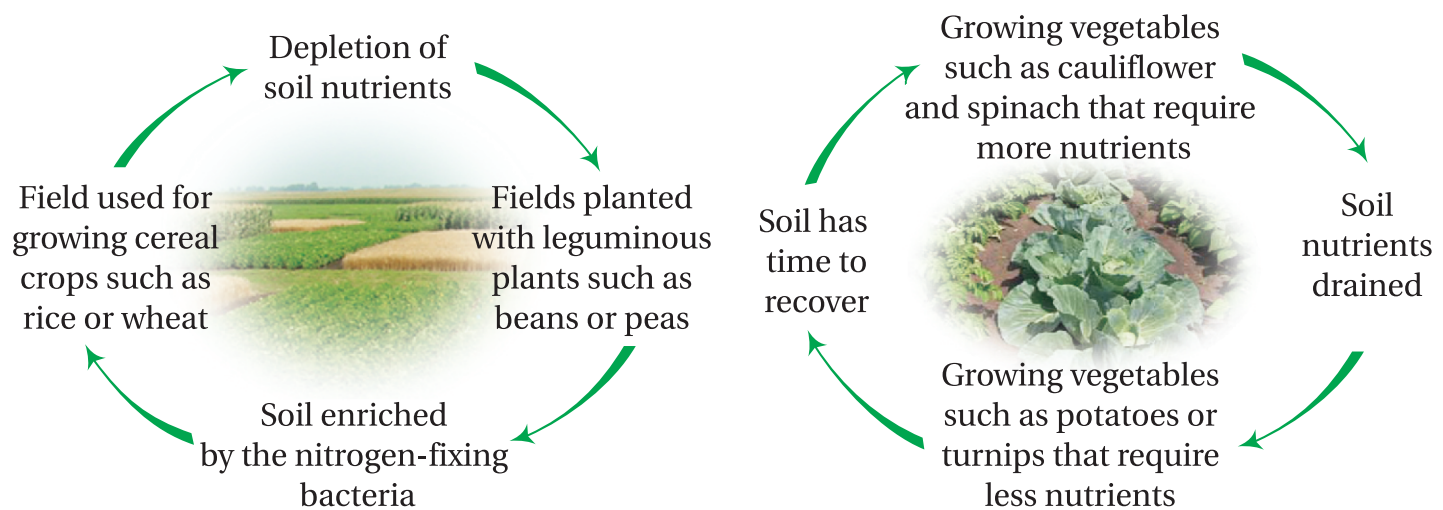
- ◆ it is not economical.
- ◆ there is high demand for foodgrains.



Fallow field

Crop Rotation

The cultivation of crops belonging to different families alternately in the same field in a planned, recurrent order is called crop rotation. The main aim is to increase the productivity of the soil.



Advantages of Crop Rotation

Higher yield from the crops occurs naturally.

Weeds are controlled.

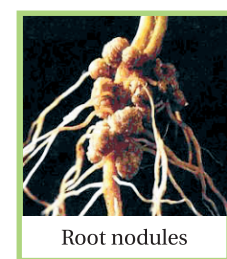
A variety of bacteria thrive, providing a range of soil nutrients as the organic matter secreted by every crop is different.

Nutrients at different levels of the soil are used up as each crop has a varying root depth.

Pests and diseases are minimised to a great extent as they require a specific plant to complete their life cycle.



Beans or pea plant has a symbiotic or a mutually beneficial relationship with bacteria called Rhizobium present in the nodules of their roots. These bacteria can fix atmospheric nitrogen and convert it to nitrogenous products in the soil, making it available to the plants.



Root nodules

Mixed Cropping

A group of plants that can benefit from each other are chosen and grown together in the same field. Mixed cropping is done by farmers to reduce the chances of incurring losses due to crop failure.

For example, cereal crops such as maize and leguminous ones such as peas are grown together.



AGRICULTURAL CONSULTANT

In Kochi, Kerala some farmers had plantations growing a single crop such as pepper. They faced losses whenever the crop failed and also if the price of the crop was low in the season.

Agricultural consultants have since recommended growing coffee, cardamom and cocoa along with pepper at suitable distances. The farmers are able to reap the benefits of such mixed farming as it supplements their income.

An agricultural consultant and scientist gives valuable inputs to the farmers and helps them by solving their problems.

Addition of Manure

The organic substance obtained from the decomposition of plant or animal waste is called manure. There are several kinds of manure.

Green manure

It is prepared by ploughing nutrient-rich crops into the soil. Example: Green manure composed of *berseem* or *mung*.

Prevents soil erosion and add nutrients to the soil.



Animal manure

It is made up of animal wastes and fecal matter from the farms.

The animal waste that is collected is decomposed before being mixed into the soil.



Compost

Made by alternating plant, animal and kitchen wastes with layers of soil in a large pit.

The microbes in the soil facilitate the conversion of the waste into humus.



Vermicompost

Clean, nutrient-rich, loose and odourless compost produced by the action of worms on waste matter.

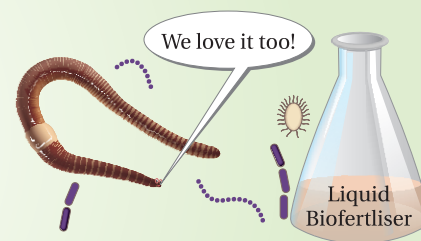
It is the vermicasts or excreta of these worms that is used as manure.





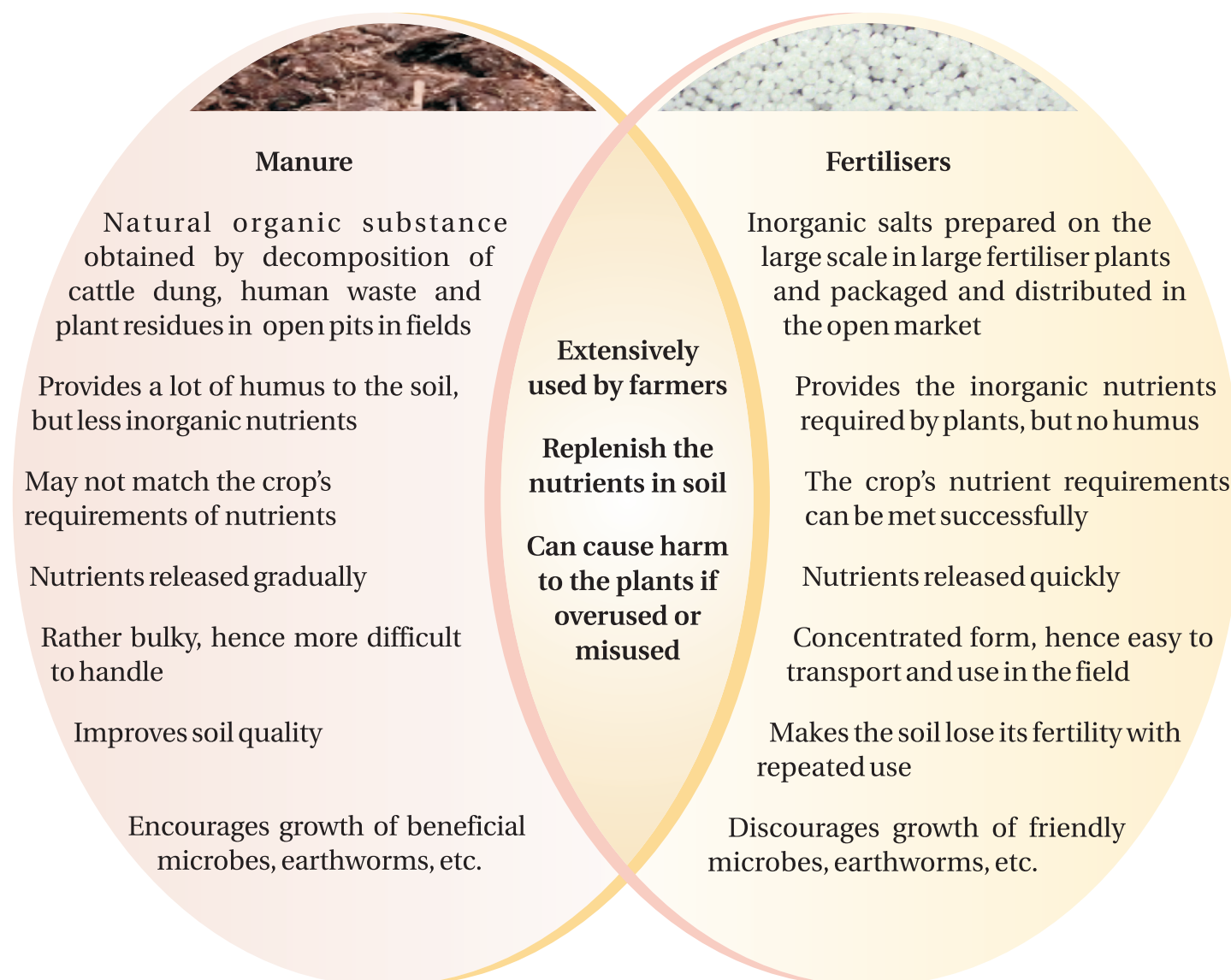
Updates

Organic is in! Many farmers are now using special techniques for growing the much sought after organic products, where only eco-friendly fertilisers are used. Recently another addition, liquid biofertilisers, was made to the pool of such resources available to replenish the soil. Read more at: www.hindu.com/seta/2010/05/20/stories/2010052051011800.htm



Use of Fertilisers

Fertilisers are chemical substances that are rich in a particular nutrient, applied to supplement any mineral deficiency in the soil, such as nitrogen, phosphorus and potassium (NPK). They are required in very small quantities as compared to manure as they are concentrated source of minerals. They are manufactured in factories and transported easily to the farms. Some examples are urea, superphosphate and ammonium sulphate.



Advantages of Manure Over Fertilisers

Addition of manure adds organic matter to the soil which improves

- ◆ its texture
- ◆ water absorbing capacity
- ◆ porosity, for better exchange of gases
- ◆ the number of beneficial microorganisms.



Apps

A compost pile is easy to make and can help your home or kitchen garden thrive.

Ask for permission to make one in a corner of your school garden.

Read the article on the website mentioned below. Discuss with your classmates and decide on five ways for making your compost pile a source of rich nutrients for the school garden.

Read more at: <http://simpleorganic.net/gardening-101-make-your-own-compost/>



Processing

1. What is crop rotation?

Ans. _____

2. How are *Rhizobium* bacteria helpful to plants?

Ans. _____

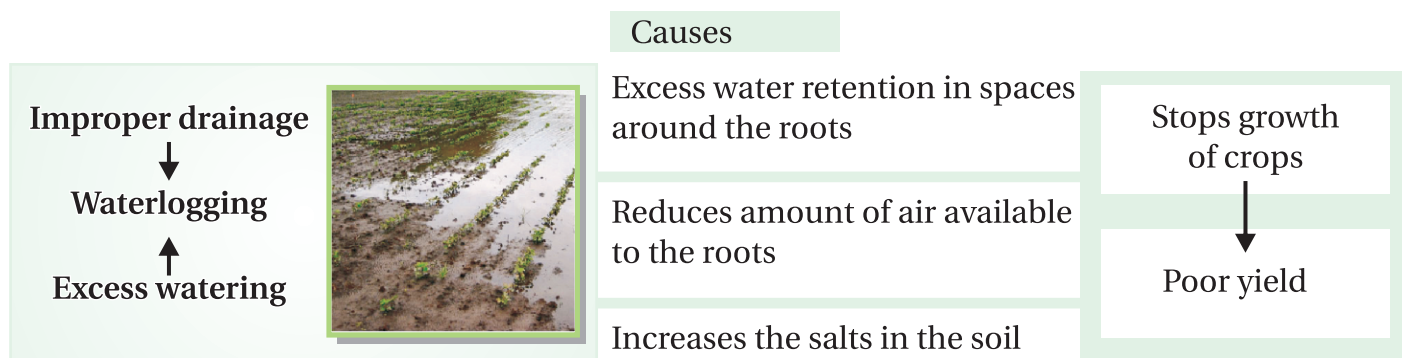
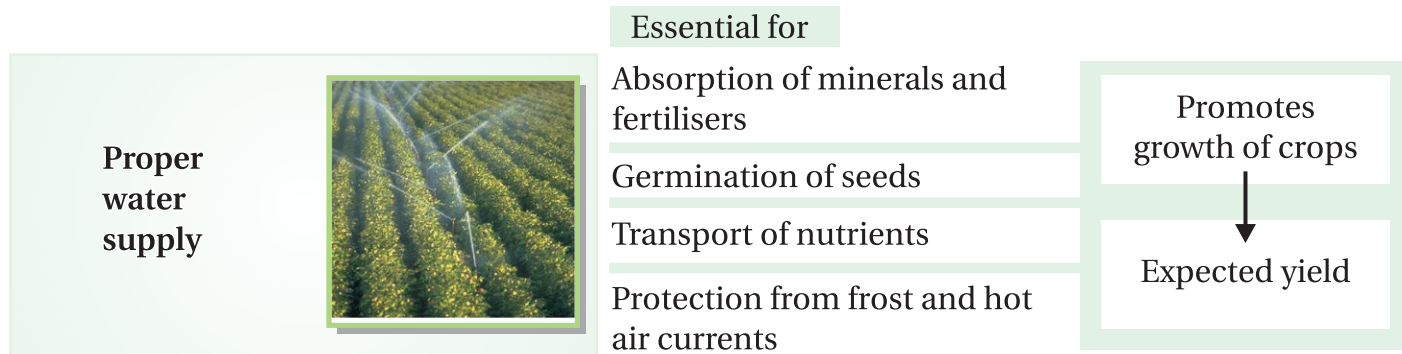
HORTICULTURIST

Replenishment of nutrients is important for all plants to grow successfully. A careful study of the type of fertiliser or manure required, among other details, ensures a healthy set of plants.

A horticulturist is involved in such choices to produce commercially viable plants. They also take care of landscapes, and may grow exotic fruits. As they apply their knowledge to the science of growing plants, they produce large, attractive flowers, choice fruits and vegetables and other horticultural products that are in great demand in the market.

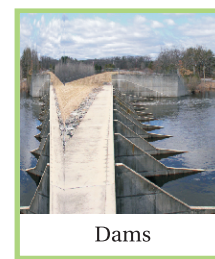
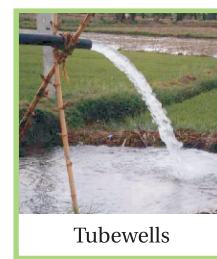
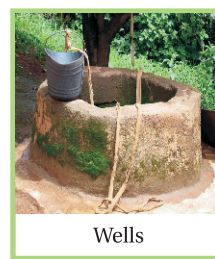
Irrigation

Watering of crops at regular intervals is known as irrigation. The amount of water to be supplied to a field of crops varies according to the season, the type of crop and the quality of soil. It is essential to remember that too much water can be as harmful as less water supply to the crops.



Sources of Irrigation

Many parts of India are still dependent on rainfall for water supply. However, more land is now being irrigated. Sources of water for this process vary from wells, ponds, lakes and rivers to tubewells, dams and canals.



Methods of Irrigation



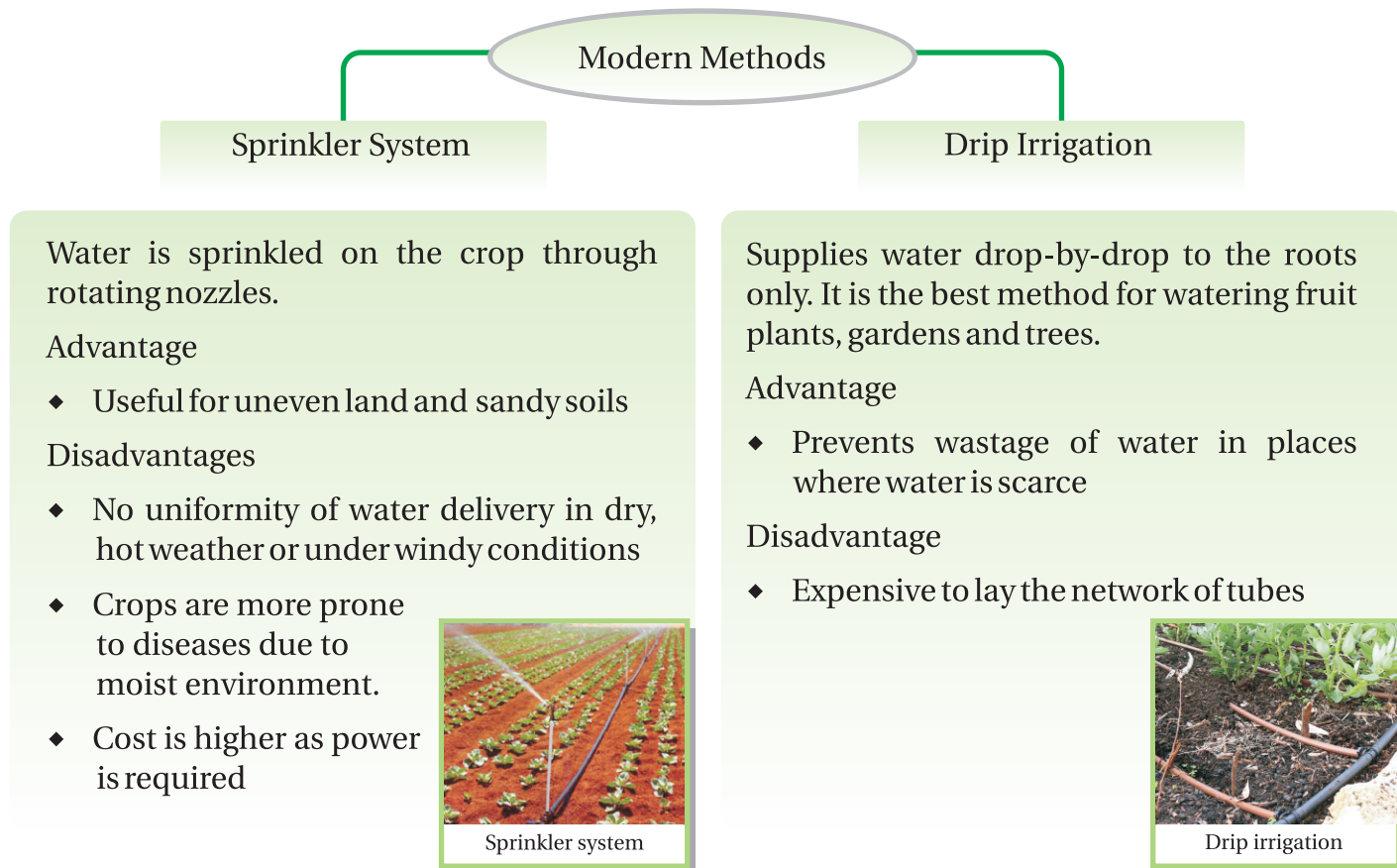
Traditional Methods

Water is drawn with the help of cattle, human labour or pumps.

Pulley system, chain pump, *dhekli*, *rahat* (lever system), etc. are some traditional methods of irrigation.

They are cheaper but less efficient.

Modern Methods



Processing

1. Define irrigation.

Ans. _____

2. Mention the traditional methods of irrigation.

Ans. _____

3. Give the main features of the sprinkler and drip systems of irrigation.

Ans. _____

Protection of Crops

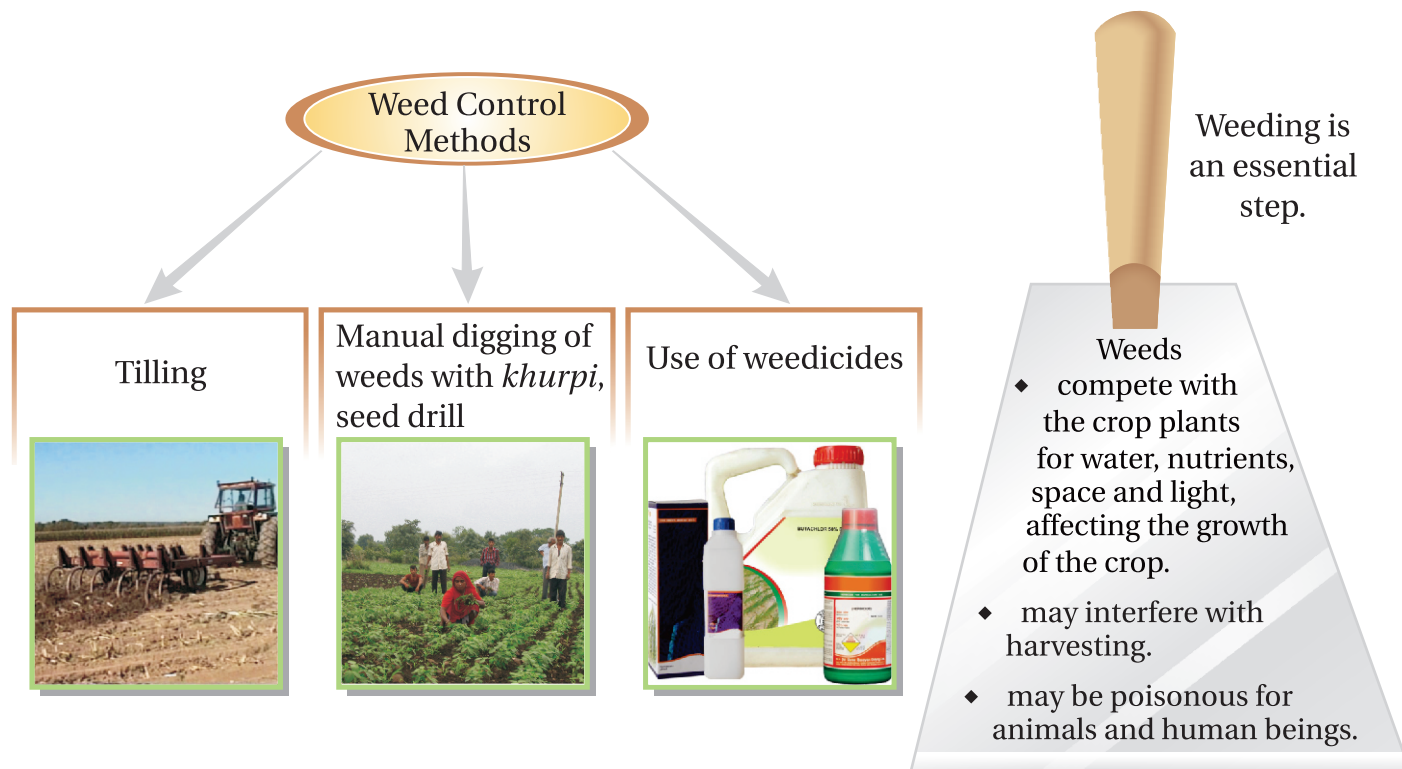
Farmers protect their crops from two main yield reducers: Weeds and Pests

Protection from Weeds

Weeds are undesirable wild plants growing naturally along with the main crop.

The removal of weeds is called weeding.

Chemicals used to remove weeds are called weedicides. These are sprayed in the fields to kill the weeds without harming the crop. For example, 2, 4-D (2,4-Dichlorophenoxyacetic acid).



Precautions while Using Weedicides

- ◆ Should be sprayed during the vegetative growth of weeds before flowering and seed formation.
- ◆ Nose and mouth of the person using the weedicides should be covered while spraying.
- ◆ Should be diluted with water to achieve the recommended concentration.



Processing

1. Why is weeding essential?

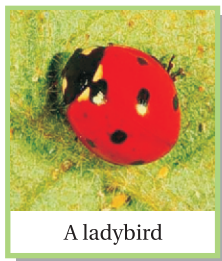
Ans. _____

Protection from Pests

Crops have to be protected from attacks by microbes, insects and rodents such as mice and rats. Common methods of protection are:

Use of Chemical Pesticides

These are sprayed on the crops using a handspray, a machine or even by air. However, there is a danger of pesticide residues being leftover on the produce.



Biological Control

Use of other organisms that target and eat the pests. For e.g., ladybirds are introduced to feed on insects such as aphids that infect the crop and reduce the yield.

Use of Rodenticides

Rodents cause huge losses in the yield besides spreading diseases such as *leptospirosis*. Baits and traps are used to control them. Specific poisons called rodenticides are used to control their population. However, they have to be used with caution as pets or harmless animals may ingest them.



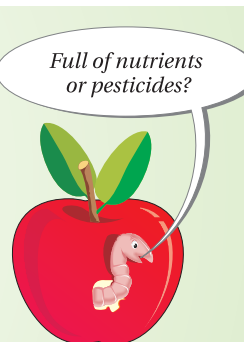
Updates

Pesticide residues: A menace to be aware and beware of!

Indiscriminate use of pesticides produces pests that become resistant to it. Some amount also remains as a residue on the produce we consume, which is very harmful for our health.

Efforts are on to negate these ills. On our part, we can ensure that we wash all farm produce thoroughly before consumption.

Read more at: <http://www.livemint.com/2008/01/07133544/IIT-Madras-develops-nanopartic.html>



Processing

1. List the methods used by farmers for protection from pests with one example of each.

Ans. _____

Harvesting

Harvesting is the process of cutting of a crop after its maturity.



Sickle

A sickle is used for manual harvesting by small scale farmers.



Paddy ready for harvesting

On a larger scale, it is done mechanically, using a harvester.



Thresher

After harvesting, the grain is separated from the chaff by the process of threshing, using a thresher.



Harvester

A machine called combine is widely used on modern farms. It functions both as a thresher and a harvester.



Combine



Debug

A thresher helps to separate grain from the chaff, whereas a combine carries out harvesting as well as threshing.

Chaff is the inedible protective outer covering present on the seeds of cereals such as wheat.



Processing

1. Define harvesting. List the methods followed by farmers to harvest their crops.

Ans. _____

TISSUE CULTURE TECHNOLOGIST

A nursery keeper started taking orders for plants by mail orders. He was keen to introduce a new variety of an ornamental plant in the market. In order to have an edge over his competitors, it was important to produce large numbers of the variety with the chosen traits.

A tissue culture technologist was able to help him with this feat by growing large numbers of this plant in the vessels with an artificial medium for growth in a short period of time. They were able to market and deliver thousands of healthy saplings. The additional benefit was that these saplings were free from diseases, pests and were of better quality than grown in the open field.

Storage

- ◆ The threshed grain has to be stored properly. This keeps them fit for consumption and also increases their shelf life.

Before Storage

Drying of grain in the sun for moisture-free storage

This prevents:

- ◆ infestation with insects and microbes
- ◆ germination of the grains



Storage

On a small scale by farmers—in gunny bags and metallic bins

On a large scale grains are stored in silos and granaries



Safe Storage

At home—dried neem leaves are used while storing foodgrains

At a large scale—specific chemical treatments are required to protect the stored grains from pests and microorganisms



Silos are large storage tanks.

Besides sun drying the grains, farmers may also use mechanical or chemical methods for drying.



Processing

1. What precautions should be taken for safe storage of grains?

Ans. _____



Upload Animal Husbandry

Large scale rearing of animals is known as animal husbandry. The aim could be to produce food or to obtain products that are valuable to consumers. Some forms of animal husbandry include dairy farming, rearing sheep and goats, piggery, poultry farming, apiculture and pisciculture.

Dairy Farming

Cows and buffaloes are the main animals reared for milk production.

Smaller dairies do not have much technical know-how while larger ones have special machines and equipments to run the business.

The products we get from milk are *ghee*, butter, cheese, *lassi*, ice cream, curd, *paneer*, etc.



Rearing Sheep and Goats

Sheep are domesticated for their wool and meat.

Goats provide milk and meat.

Herds are reared for leather.

They are kept in pens and are generally let out only to graze and are brought back in the evening.

It is a significant occupation of people in the hilly regions.



Piggery

Rearing pigs on a large scale is called piggery.

Pigs eat almost everything and are easy to keep. However, they are often infested with tapeworms.

They are a cheap source of meat, hide (skin) for leather and fat for making soap.



Poultry Farming

Rearing chicken for obtaining eggs and meat is called poultry farming.

Good poultry farms have separate divisions for hatching eggs in incubators, providing vaccines and feed for the birds, collection of eggs from the layers and for processing and packaging the meat.



Apiculture

Honeybees are reared on a large scale for obtaining honey and beeswax in an apiary. The process of rearing honeybees is called apiculture.

Honey is also used as a raw material for making medicines, jams, baked products and lotions.

Beeswax is sought after for making cosmetics, coating on candy and pills, candles, polishes and so on.



Pisciculture

Large scale rearing of fish by introducing fertile eggs in hatcheries and the subsequent care of the hatchlings till they are ready for consumption is called pisciculture.



To know more about what a department of animal husbandry does, read <http://ahdhp.nic.in/activities.htm>



Updates

Bird flu or avian influenza is a contagious viral infection commonly found in domestic poultry and other birds too. Turkeys are more commonly affected by bird flu than chicken but in 1997 millions of chickens were slaughtered in Hong Kong after the disease spread to humans. Wild waterfowl (another bird) is the main carrier of this virus and is responsible for the introduction of this infection among domestic poultry.

Other kinds of animal husbandry include sericulture where silkworms are grown for making silk and horse farming for breeding and rearing of pure breeds of horses.



Processing

1. Define animal husbandry.

Ans. _____

2. Name the different food products that can be obtained from animals.

Ans. _____

3. What is the significance of apiculture? List the significant products from an apiary.

Ans. _____

4. What are the products that we get from rearing of sheep, goats, and pigs?

Ans. _____



Apps

Ask your grandparents about the agricultural products of their native place. Find out if and how things have changed in terms of:

1. Soil fertility
2. Use of manure and fertilisers
3. Irrigation
4. Harvesting

Present your information in the form of a colourful chart or a MS PowerPoint presentation.



Add to Favourites

Crop Production and Management

Cropping Pattern in India

Kharif Crops



Rabi Crops



Zaid Crops



Agricultural Practices

Preparation of Soil

Advantages



Sowing

For high yields



Replenishment of Soil Nutrients



Irrigation

Importance

Protection of Crops Yield reducers are _____ and _____

Methods used to control weeds



Harvesting

Manual

Mechanical



Storage

Importance of Drying



Food from Animals

Implements

Definition

Techniques

Transplantation

Advantages

Some Types

Difference between Manure and Compost



Methods:

Traditional



Modern



Methods used to control pests



Threshing:

Combine:



Small and Large Scale





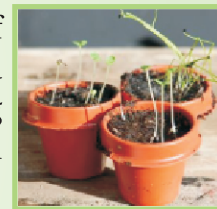
1. Name the following.
 - a. The system in which water is released in drops near the roots.
 - b. A nutrient-specific method of replenishing the soil.
 - c. Plant whose leaves are commonly used for protecting stored grains.
 - d. A process for separating grain from the chaff.
 - e. The full form of NPK.
2. Fill in the blanks.
 - a. The same kind of plants grown and cultivated on a large scale are called _____.
 - b. _____ is a tool used to remove weeds and loosen the soil.
 - c. Use of ladybirds to control pests is a method of _____ control.
 - d. Pulley system, dhekli and rahat are some _____ methods of irrigation.
3. Mark true or false against the following statements.
 - a. Water is essential for germination. _____
 - b. Cultivator is a soil leveller. _____
 - c. Crop rotation improves soil fertility. _____
 - d. Crops get damaged when weedicides are sprayed. _____
 - e. Tilling is a process of irrigation. _____
4. Arrange the given activities in chronological order:
Irrigation, Harvesting, Sowing, Adding manure and fertilisers
5. Why are the three types of cropping patterns in India?
6. What is the impact of Sun drying on the shelf life of the grains?
7. What is a 'combine' used for?
8. Explain crop rotation with the help of a graphic organiser. Use appropriate examples.
9. What is the difference between compost and vermicompost?
10. What are the advantages of modern methods of sowing over traditional methods?

11. What is the function of the leguminous bacteria present in the root nodules?
12. Would you say that preparation of soil is necessary for crop production? Why?
13. What would happen to the yield of the crop if the farmer does not pay attention to weeding? Give reasons for your answer.
14. If a farmer had a farm in a hilly, uneven region, what kind of irrigation would you recommend? What could be a way of supplementing his income?
15. If you were to guide a farmer towards organic farming, which type of soil replenishment would you suggest?
16. According to you, what is the best method for increasing humus in the soil?
17. If given a chance, what kind of changes would you bring about in the methods followed by a farmer who has been always cultivating corn in his farm by following traditional methods?
18. Why is animal husbandry growing in importance?
19. People in southern India eat more rice as compared to wheat. Why is this so?
20. A farmer 'X' relies on bio-fertilisers and uses methods of biological control only for raising and protecting his/her crop from the pests. Another farmer uses chemical fertilisers and pesticides for crop production. According to you, which among the two is the best strategy for raising crops or can you suggest some better one? Support your answer with valid reasons.



Explorer

You are now well aware that plants thrive when a number of factors are well-balanced. Your task is to conduct a scientific research on the effects of ploughing, replenishing the soil and irrigation on the plant growth. You will also record the observed pattern and compare it with the expected one.





Future Calling

I could start my own supply chain of fresh fruits and vegetables.

I could be the answer to every farmer's prayer!

Agricultural Consultant

A professional problem-solver for farmers; helps in efficient use of crop inputs, thus increasing the yields and their profits

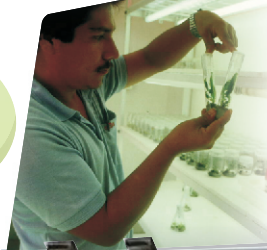
Horticulturist



Is concerned with the efficient growth, distribution and selling of flowers, trees, fruits, vegetables and plants

Hey! I could produce guavas without seeds!

Tissue Culture Technologist



Has expertise in producing healthy and viable copies of plants which have desirable characteristics

smartclass modules

- Food (Crop) Production And Food (Crop) Management
- Methods Of Agriculture
- Agricultural Practices
- Manuring, Weeding And Irrigation
- Animal Husbandry
- Food Management