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Crop Production and Management

Learning Objectives

- To list the various agricultural practices.
- To elaborate the agricultural practices with examples.
- To explain animals as a source of food.
- To understand the benefits of green revolution.

There is no doubt that food is one of the most important requirement for all living beings. Hence, growing plants to meet the food demand remained man's primary occupation for centuries. Practice of cultivating plants for human use — for food, clothing and other purposes is called **agriculture**. As in any other field, advancement in science and technology has brought about revolutionary changes in agriculture sector too. Scientific approach to the various aspects of agriculture has helped in improving the quality of product as well as the quantity of the produce. The green revolution which was rooted in 1960 in our country helped in boosting up the production of crops, making us self reliant:

Agriculture means growing crops for human consumption. Plants grown on a large scale for food or other useful purposes are called **crops**. We can classify crops as under.

- ✦ Cereals, pulses, oil seeds, sugar, etc., are **food crops**. They are grown for providing food.
- ✦ Jute, cotton, rubber, coffee, tea,

etc., are called **cash crops** since they are grown for commercial purposes. Cash crops like coffee and rubber are grown on plantations and are also referred to as **plantation crops**.

Certain crops grow in hot weather while certain others grow in cool weather. Climate determines the kind of crop one can grow. In India, according to the season of sowing, crops are divided into two categories **kharif** and **rabi** crops.

Ans D1 (a)

- ☉ **Kharif crops:** These crops are sown during monsoon season and are harvested in October. **For example:** rice, jute, maize and cotton. They are also called **monsoon crops** or **autumn harvest**.



Rice Field

- **Rabi crops:** These crops are sown in October and are harvested in March. **For**

example: mustard, gram, wheat, etc. They are also called **winter crops** or **spring harvest.**)



Wheat Field

AGRICULTURAL PRACTICES

We need air, water and food for growth, plants also require, air, water, nutrients, and protection from diseases, pests and unfavourable conditions. The steps included in the agricultural practices which take care of these requirements are:

- ☐ Preparation of soil *Ans DID*
- Sowing of seeds
- Irrigation (watering)
- Manure and fertiliser application
- Weed and pest control
- Harvesting and storage of food grains.]



Get Active

All of us would love to grow plants in our premises. Let us grow one to find out what agriculture is all about.

1. Take a pot or an old plastic bucket. Make tiny holes at the base and fill with mud. Loosen and level it with a **khurpi**. This is **preparation of soil**. The first step.
2. Next you choose the seeds you want to cultivate and sow in the soil. Of course, the seeds should be of a good quality to give you a good product.

3. You will water the pot everyday so that the soil remains moist and the seeds get water to germinate. This is **irrigation**.
4. You will add some manure or fertiliser to make sure that all the nutrients are available for the growing plant.
5. Keep a watch everyday, you'll find tiny germinating plants. A net will help to protect the young plant. A spray of **pesticide** or a **herbicide** is necessary too. Or else these little plants may be attacked by various pests. Is there a grass? It is a **weed**. You have to pull it out.
6. The plants grow to your satisfaction and what a delightful sight it would be to see your effort bearing fruit.



Preparation of Soil



Seeds



Sowing



Manuring



Pesticide Spray



Seedlings

Preparation of Soil

Preparation of soil is the first step in cultivation of crop. Loosening and turning of the soil is called **ploughing** or **tilling**. An implement used for this purpose is either a wooden or an iron the **plough** traditionally pulled by animals. On large farms, tractors

(which are mechanised) are used. These are called **cultivators**. (After ploughing, soil is levelled to crush the big lumps and even out the soil. A **leveller** is used for this purpose.) *Ans D8*



Ploughing and Tilling

Benefits of loosening and levelling of soil:

- The loose soil allows easy penetration of roots deeper into the soil.
- It lets air and water percolate very easily.)
- It helps in turning the soil inside out so that even distribution of nutrients will take place.
- It helps in the growth of the microbes, earthworms and other soil organisms, who are friends of the farmer, to thrive.
- Loosening of soil allows easy mixing of fertilisers.
- Levelling of soil helps in preventing soil erosion.
- Levelling also prevents water logging and helps in uniform irrigation of the land.

Quick Facts

A plough contains a strong triangular iron strip called **plough share**. A long log of wood is attached to it and held by the bullocks, called the **plough shaft**.



Plough Shaft



Plough Share

Quick Review

1. Which crops are also called rabi crops?
2. Which crops are also called plantation crops?
3. Differentiate between ploughing and levelling.
4. How does levelling help microbes?
5. What are the advantage of ploughing?

Sowing of Seeds

We all are familiar with the saying— *As you sow, so you reap*. It means, if you put in good quality seeds, you also get a good quality product. To get a good harvest, one has to pay attention to the following: *Ans C1 (b)*

- Selection of healthy, good quality seeds. Seeds should be free of infection.
- Sow seeds at the right depth. If seeds are too close to the surface, birds will eat them away. If they are too deep they will not get air to breathe.)
- Soil should be kept moist. Neither too little water nor too much is good.
- Overcrowding of seeds should be avoided at all costs. Enough distance should be maintained between seeds so that they don't compete with each other for water, nutrients and sunlight.
- Seeds should be sown at a proper time.

Get Active

Take a fistful of moong dal and drop it in a glass of water. Observe after a few minutes. If all the seeds have settled down, they are healthy. If you find floating seeds, they are infected.

Traditional Methods of Sowing

Manual sowing: Seeds are scattered by hand and it is called **broadcasting**.

Seed drill in sowing: It is an implement with a long funnel attached to many tubes. Seeds are placed in the plough. As the plough moves, it makes furrows in the soil. It ensures distribution at the right depth and at right intervals.



Broadcasting



Seed Drill with a Plough

Ans: E3

Transplantation: Some plant seeds like that of rice, brinjal, tomatoes, etc., are sprinkled in a small plot of land called nursery, where they grow into seedlings. When they are ready, the seedlings are transplanted into the prepared field at the right distances.



Nursery Bed

Advantages of transplantation:

- Only healthy seedlings are transplanted.
- Roots penetrate properly into the soil.
- Seedlings, when transplanted, get sufficient light, water and nutrients.)

Quick Review

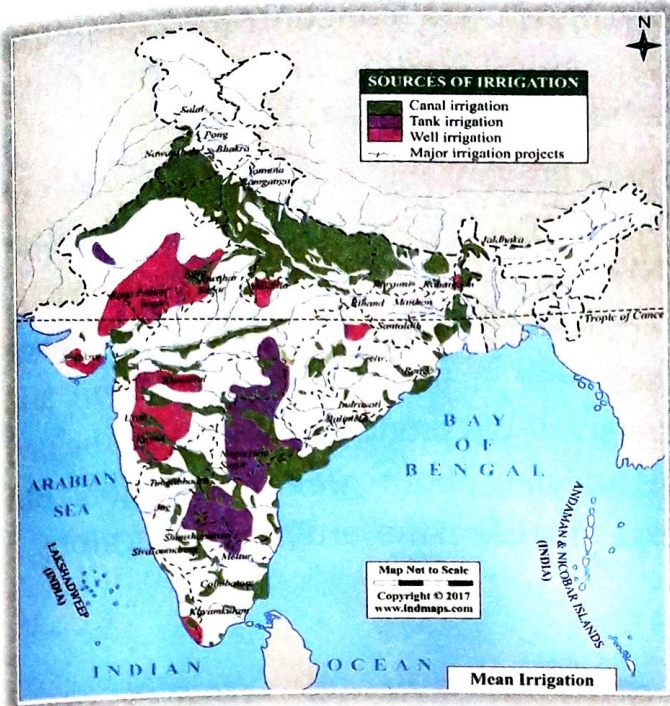
• State whether true or false.

1. Seeds can be sown at any depth. _____
2. Seeds can be sown at any time of the year. _____
3. Overcrowding of seeds should be avoided. _____
4. Wheat and rice seedlings are transplanted to larger fields. _____
5. Only healthy seedlings are selected in transplanting. _____

Irrigation

It refers to supplying of water to the crops. Water is one of the important needs for the growth of a plant. The need for water by different crops is different. Some crops like the paddy (rice) need flooding of the field initially while wheat requires lesser amount of water; and millets (bajra, jowar, barley, etc.) still less. Plants dry up with inadequate irrigation. Excessive irrigation is as bad as deficit irrigation. It causes water logging and **salinisation** of the soil. When the excess water evaporates, the salts dissolved in it are left behind in the soil. Effective irrigation requires that the most appropriate amount of water is provided to the fields at the right time using a source of irrigation that is economical as well as readily available.

Sources of irrigation: Traditionally, majority of Indian farmers have been dependent on rain for irrigation. Gradually, with the construction of dams across major rivers and water reservoirs, the situation has changed. Water is supplied through canals even to dry areas so that agriculture is possible. **For example**, Indira Gandhi Canal in Rajasthan, brings water from Sutlej, Ravi and Beas rivers, and has made agriculture even in desert districts of Rajasthan possible. However in India, many parts are still



rain dependent and failure of monsoon results in drought like conditions. Besides rain water, lakes, ponds, wells and tubewells are also used for irrigating the field.

Quick Facts

Traditional techniques of pulling water from the wells include moat (a pulley to draw water and irrigate the fields), chain pump, **dhekli** and **rahat**.



Chain Pump

Dhekli

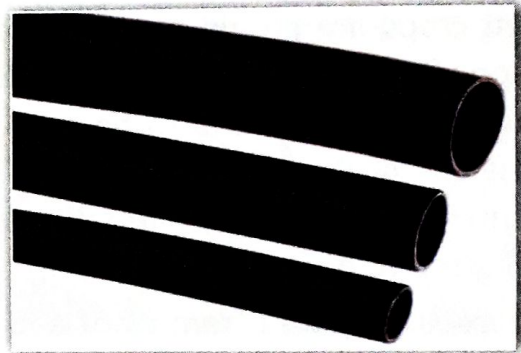
Rahat

Types of Irrigation

With acute water shortage prevailing in many areas, we have to adopt modern methods of using water economically.

- **Surface irrigation:** In some fields, water is allowed to flow over the surface of the field and is called surface irrigation.
- **Furrow irrigation:** Fields are prepared by making furrows and water is allowed to flow through the furrows.

- **Basin Irrigation:** Flooding the whole field with water as in paddy (rice) fields is called basin irrigation.
 - **Drip irrigation:** The water is allowed to flow in drops near the roots of the plant. This saves a lot of water which otherwise evaporates from the field. It is one of the best methods of irrigation in places where water is scarce.
 - **Sprinkler irrigation:** The revolving nozzles sprinkle water over plants. It is a very useful water saving method, especially in uneven areas. It works well on sandy soil.
- Lining canals,** through which water is taken to the fields with **Low Density Polyethylene (LDPE)** pipes, is another way of saving water which is otherwise absorbed by the soil.



Low Density Polyethylene Pipes



Basin Irrigation



Furrow Irrigation



Sprinklers

Get Active

The next time you go on a vacation for a few days, try this. Take a bucket full of water.

Ans P4

Place it over a tall stool. Put in as many strings as the number of pots you have (say 3-5) from one end. Take the other ends and place each one in a pot touching the soil. Pour water in each pot before you leave. Your pots will look well hydrated and fresh when you return after 10-15 days.



Thread Irrigation

Manure and Fertiliser Application

Plants obtain their nutrients from the soil. When crops are grown year after year, or season after season, soil also loses a lot of its nutrients and they have to be replenished. Farmers achieve it either by using organic manure (obtained from natural sources) or fertilisers (factory made).

Manure is prepared from plant and animal wastes by decomposing them in a **compost pit**. (Manure provides **nutrients** to the soil due to large quantity of fibre it holds. So the soil benefits since it becomes more **porous**, and its water holding capacity increases.)

Manuring the field is similar the providing food to animals. Both are done to supply nutrients. Occasionally, our food does not give us all types of nutrients needed in the right quantity. We do find people developing deficiency diseases. Similarly plants will also turn unhealthy, if certain nutrients are not sufficiently available at the right time for their growth. For plants, these nutrients can be supplemented through **fertilisers**.

Fertilisers are concentrated chemical sources of specific plant nutrients like potassium, nitrogen and phosphorus.

These are available as separate nitrogen or phosphorus fertilisers or as mixed fertiliser (NPK).

Fertilisers came as a boon for farmers, since they help in boosting up production and quality of the produce. They greatly helped in bringing about **green revolution**. But excessive use of the fertilisers is dangerous.

Quick Facts



We take vitamins, iron and calcium as food supplement very often.

Can we remain healthy by taking all the nutrients in a pill form and stop eating food?

Depending totally on fertilisers is similar to that.

Ans C5

(It damages the soil, kills soil organisms and destroys the fertility of the land.) It also makes the soil less porous which deprives the roots oxygen and makes it difficult for them to absorb nutrients effectively. Also when used excessively, these fertilisers are washed away into rivers and lakes. They then pose a threat to the aquatic life. The excess absorption of fertilisers by plants also increases the threat of their entering the food chain.

TRADITIONAL METHODS USED FOR SOIL IMPROVEMENT

Ans-D5

(Traditionally farmers had been following soil enrichment practices like **crop rotation**, **field fallow** and **mixed cropping**.)



Get Active

In an old plastic bucket, spread a layer of soil and then start collecting wastes from the kitchen every day like vegetable peels, left over food, rotting fruits, leaves, etc. Spread some soil over the heap intermittently. If possible you can collect some earthworms and introduce them into the bin. When it is full, cover with some soil again and leave it to decompose. In about a month, you can see all the waste converted into manure.



Bucket as Compost Pit



Quick Facts

Farmyard Manure

It is prepared by storing cow dung, cow urine, waste straw and other dairy wastes together in a pit and allowing it to be decomposed naturally by microbes. It is rich in nitrogen, phosphorus and potassium.



Compost

It is prepared by the action of aerobic and anaerobic bacteria on kitchen wastes, plant residue and animal waste, in about 3-6 months.



Crop Rotation

Nitrogen is an essential component of soil required for the growth of plants. Though it is richly supplied by fertilisers, it can also be naturally fixed by free living and symbiotic bacteria called **rhizobium**. These bacteria live in the root nodules of leguminous plants like peas, beans, etc. They convert the atmospheric nitrogen into usable nitrogenous compounds by a process called **nitrogen fixation**.

In the process of crop rotation, two different crops are grown alternately in the same field. This is so because if the same crop is grown over and over again in the same field, the soil will become deficient in that particular nutrient which this crop requires. Generally a non-legume crop and a legume crop are grown alternately.



Nitrogen Fixing Bacteria

Field fallow: It means not to cultivate anything for one or two seasons. It helps the soil by enabling it to replenish whatever nutrients have been lost, by natural decomposition processes.

Mixed cropping: When a main crop is grown along with one or more other crops in the same field, we call it **mixed cropping**. The crops are chosen in such a way that the nutrient demand of one crop is satisfied by the other. A cereal crop like rice can be grown with a legume. Cotton is grown with groundnut. So they balance out the utilisation of nutrients from the soil.

Ans D2



Mixed Cropping

Quick Facts

When plants die, the nitrogenous compounds present in the plant body are converted back to nitrogen and released into the atmosphere by **denitrifying bacteria**. This cycle of fixing of nitrogen by the nitrogen fixing bacteria and the release of nitrogen into the atmosphere by denitrifying bacteria, is a continuous process and is known as the **nitrogen cycle**.

To maintain the health of plants as well as soil, besides practising the above mentioned methods, liberal use of manure with restricted use of fertilisers is very important.

Quick Review

- Define each one of the following.
 1. Mixed cropping
 2. Basin irrigation
 3. Field fallow
 4. Drip irrigation
 5. Manure

Weed and Pest Control

When the seeds germinate, a farmer's task becomes more difficult. The new plants are most likely to be attacked by pests, diseases and weeds. **Weeds** are unwanted



Trowel



Scarecrow



Fenced Field



Pesticide Spray

plants in a field. (They compete with the crops for water and nutrients. When they compete with the main crops for nutrients and grow rapidly, they deprive the crops of essential nutrients.) Removing of weeds is called **weeding**. Weeds are either removed by hand using a trowel or harrow, or by chemical weedicides, that are used for targetting and killing only weeds without affecting the main crop. **Amaranthus** and **chenopodium** are examples of some common weeds.



Hand Harrow

Pests are organisms like rats, weevils, borers, etc., which attack plants. Besides, larger animals like rodents (rats), cattle, birds, etc., eat away the crops. So a farmer has to save his crops from all kinds of pests. Fencing the field, using scarecrows or using chemical pesticides have been practiced by farmers. Chemical pesticides like DDT, though effective, are poisonous and therefore, should be used with caution. They are sources of soil, water and air contamination. They are sprayed over fields either by hand-operated machines or by low flying aircraft. One should however cover oneself properly while spraying.

Just like we fall sick, plants can also fall sick due to diseases caused by microbes, like bacteria, viruses, fungi, etc.

Think Tank

Why do farmers use scarecrows in their fields?

Quick Facts

Chemical weedicides need very careful handling since they are poisonous chemicals. Such grains have to be washed well and used.

Harvesting and Storage

The best reward for a farmer is a good harvest. (The process of cutting and gathering of crops is called **harvesting**.) Harvesting is done when the grains are mature and ready, and in the case of fruits when they begin to ripen. Harvesting needs to be done at the right time too. Manually farmers do it using a sickle. Alternately, a mechanical device called **harvester** is used.



Sickle



Harvest Combines

Once harvested, the grains are **threshed**, i.e., the grains are separated from the cut crop. It is also done either manually or using a machine called **thresher**. In modernised farms, all the processes are completed by a special machine called **Harvesting Combine**. In this threshing is done along with harvesting.

Threshed crop is further removed from chaff by **winning**. In this process, the grains are allowed to fall from a height, the chaff being light in weight, flies away and heavier grains fall to the ground. It is a common sight in villages.



Winnowing

Threshing and winnowing are post harvest processing operations. The next major concern for a farmer is **storage** of harvested grains. They can be attacked by pests or they may rot due to moisture and all the efforts of the farmer are wasted, he will have to face heavy losses. (Freshly harvested grain has to be dried properly as it is most likely to be spoilt due to fungal and microbial growth.) After sun drying, the grains are stored in jute sacks or metal bins. Large scale storage is done in grain **silos** and **granaries** which have hundreds of tonnes of storage capacity. These are first treated with chemicals to avoid damage from pests and microbes. For storage of grains at home, using dried neem leaves are a good option.



Jute Sack

GREEN REVOLUTION

(The green revolution refers to the increase in food production and in the production of non-food items that has steadily taken place since 1966 in India. It changed India's status from a food deficient country to one of the world's

leading agricultural nations. The father of Green Revolution in India is **Dr M S Swaminathan**, a great geneticist. He brought into India, seeds developed by Dr Norman Borlaug, (who is hailed as the 'Father of Green Revolution' globally) and after crossbreeding them with local species created a high yielding wheat plant. Scientists at Indian Rice Research Institute (IRRI) accomplished the same miracle for rice.

Thanks to the efforts of these great men, India today ranks second worldwide in farm output. It is a commendable progress for our country, which faced the world's worst recorded food disaster in 1943, known as **Bengal Famine**, when an estimated four million people died of hunger in Eastern India.)

Quick Facts

Losses during post harvest operations due to improper storage, and handling are enormous and can range from 10-40%. Severe losses occur due to poor facilities, lack of know how, poor management or simply due to carelessness of farmers.

FOOD FROM ANIMALS

Food that we require includes animal products too. Animals are as important as plants since milk and milk products, eggs, fish, meat, etc., are obtained from animals. Cows, buffaloes, goats, camels, etc., are milk yielding animals. From milk, we get ghee, butter, curd and cheese.



Dairy Animals



Fish



Poultry Animals

Rearing of animals on a large scale is called **animal husbandry**.

Dairy farming refers to rearing of milk animals like cows, buffaloes, goat, sheep, etc.

Poultry farming refers to rearing of egg laying birds like the hen, geese and ducks.

Apiculture is rearing of honey bees for honey and beeswax.

Pisciculture is rearing of fish.

A lot of progress has been made in all these areas due to scientific knowledge and technological advancement.

Key Words

Crops

Plants grown on a large scale for food.

Food crops

The crops grown to provide food.

Cash crops

The crops grown for commercial purpose.

Kharif crops

The crops grown during monsoon season.

Rabi crops

The crops grown during October.

Ploughing

Loosening of soil.

Broadcasting

Scattering the seeds by hand.

Transplanting

Transferring healthy seedlings from nursery beds to big fields.

Crop rotation

Growing two different varieties of plants alternately in the same field.

Field fallow	Leaving the field uncultivated for a season to allow it to replenish nutrients naturally.
Threshing	Separating grains from the crops.
Winnowing	Separating grains from the chaff.
Green revolution	The increase in food production in India since 1966.



Points to Remember

- The practice of cultivating plants for human use is called agriculture.
- Plants grown on a large scale are called crops.
- Crops grown from June to October are kharif crops.
- Crops grown from October to March are rabi crops.
- Steps practiced in agriculture are :

✦ Ploughing and loosening of soil	✦ Sowing of seeds
✦ Irrigation	✦ Application of manure and fertilisers
✦ Weed and pest control	✦ Harvesting and storage
- Green revolution transformed the status of India in food production.
- Besides plants, animals are also resources for a variety of foods like milk, eggs, meat, etc.
- Animal rearing for food products is called animal husbandry.

Exercises

A. Tick (✓) the correct option in each case.

1. Rabi crops are sown in the month of _____.

a. April	<input checked="" type="checkbox"/> b. October
c. March	d. December
2. A leveller is used for _____.

a. ploughing	b. tilling
c. weeding	<input checked="" type="checkbox"/> d. levelling
3. The kind of irrigation that is important for rice crop is _____ irrigation.

a. furrow	b. surface
<input checked="" type="checkbox"/> c. basin	d. sprinkler
4. Which of the following is not an advantage of manuring?

a. Soil becomes porous.
b. Nitrogenous compounds are replenished.
c. Water holding capacity of soil increases.
<input checked="" type="checkbox"/> d. Provides body to the soil.



5. Nitrogen fixation is done by _____ .
 - a. denitrifying bacteria
 - b. anaerobic bacteria
 - c. aerobic bacteria
 - d. symbiotic bacteria
6. DDT is a _____ .
 - a. fertiliser
 - b. weedicide
 - c. pesticide
 - d. none of these
7. Silos are used for _____ storage.
 - a. household
 - b. farm
 - c. large scale
 - d. wet
8. An animal reared for poultry farming is _____ .
 - a. cow
 - b. goat
 - c. hen
 - d. fish
9. _____ and _____ include products of apiculture.
 - a. Honey, eggs
 - b. Milk, honey
 - c. Honey, beeswax
 - d. Wax, egg



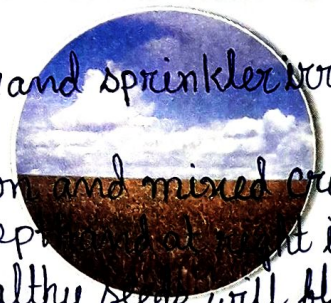
B. Fill in the blanks.

1. Practice of cultivating plants for human use is called agriculture.
2. Weedicides are chemicals, used to kill weeds.
3. Cash crops are also called plantation crops.
4. Kharif crops are harvested in autumn.
5. An instrument with a long funnel used for sowing seeds is called a seed drill.
6. Rice fields need basin irrigation.
7. Pests are organisms which attack plants.
8. The process of separating grains from chaff is called threshing.

C. Very short answer questions.

1. Mention:

- a. 2 advantages of tilling the land Pg.-9
- b. 2 precautions to be taken while sowing seeds Pg-9
- c. 2 ways of saving water during irrigation- Drip irrigation and sprinkler irrigation.
- d. 2 modern irrigation techniques - same as c.
- e. 2 traditional methods to improve soil fertility- Crop rotation and mixed cropping
2. What is the use of a seed drill? It sows seeds at right depth and at right intervals.
3. How will you pick out unhealthy seeds from healthy ones? Unhealthy seeds will float in water and can be picked out.
4. What are the benefits of drip irrigation? It saves water.
5. Why should fertilisers be used sparingly? Pg-12
6. How does manure improve soil quality? Pg-12
7. What are weeds? Weeds are unwanted plants in a field
8. What are the common pests that attack crops? Rats, weevils, borers are the common Pests.



D. Short answer questions.

1. Distinguish between the following.
 - a. Rabi and Kharif Crops Pg-7
 - b. Manure and Fertilisers
 - c. Crop Rotation and Mixed Cropping
2. Why is weeding necessary? Pg-14
3. What are NPK fertilisers? Fertilisers that contain nitrogen, phosphorus and potassium.
4. Why can't harvested grains be stored immediately? Pg-15
5. Enlist any two traditional methods of enhancing the fertility of the fields. Pg-12
6. What is harvesting? Pg-15
7. What is broadcasting? Spreading seeds by hand is called broadcasting.
8. What is a leveller used for? Pg-9
9. What are plantation crops? Pg-7
10. Enlist the different steps in crop production. are:- Pg-8

E. Long answer questions.

1. What do you understand by agricultural practices?
2. Enlist the benefits of loosening and levelling of soil.
3. What do you understand by transplantation? How is it done? Pg-10
4. List the various types of irrigation. Explain any two. are:- Pg-11
5. Describe how you will make manure out of kitchen waste.
6. What is green revolution? What has India achieved through it? Pg-15, 16

F. Complete the crossword following the given clues.

Across

1. Cultivating plants for human use
2. Plants grown on large scale for commercial purposes
3. Plants sown in October
4. Factory made plant nutrient
5. Decomposed organic matter
6. Providing water to plants

Down

1. Growing two crops alternately in the same field
2. Plants grown on large scale
3. Plants sown in monsoon
4. A person engaged in growing crops

