

Crop Production and Management

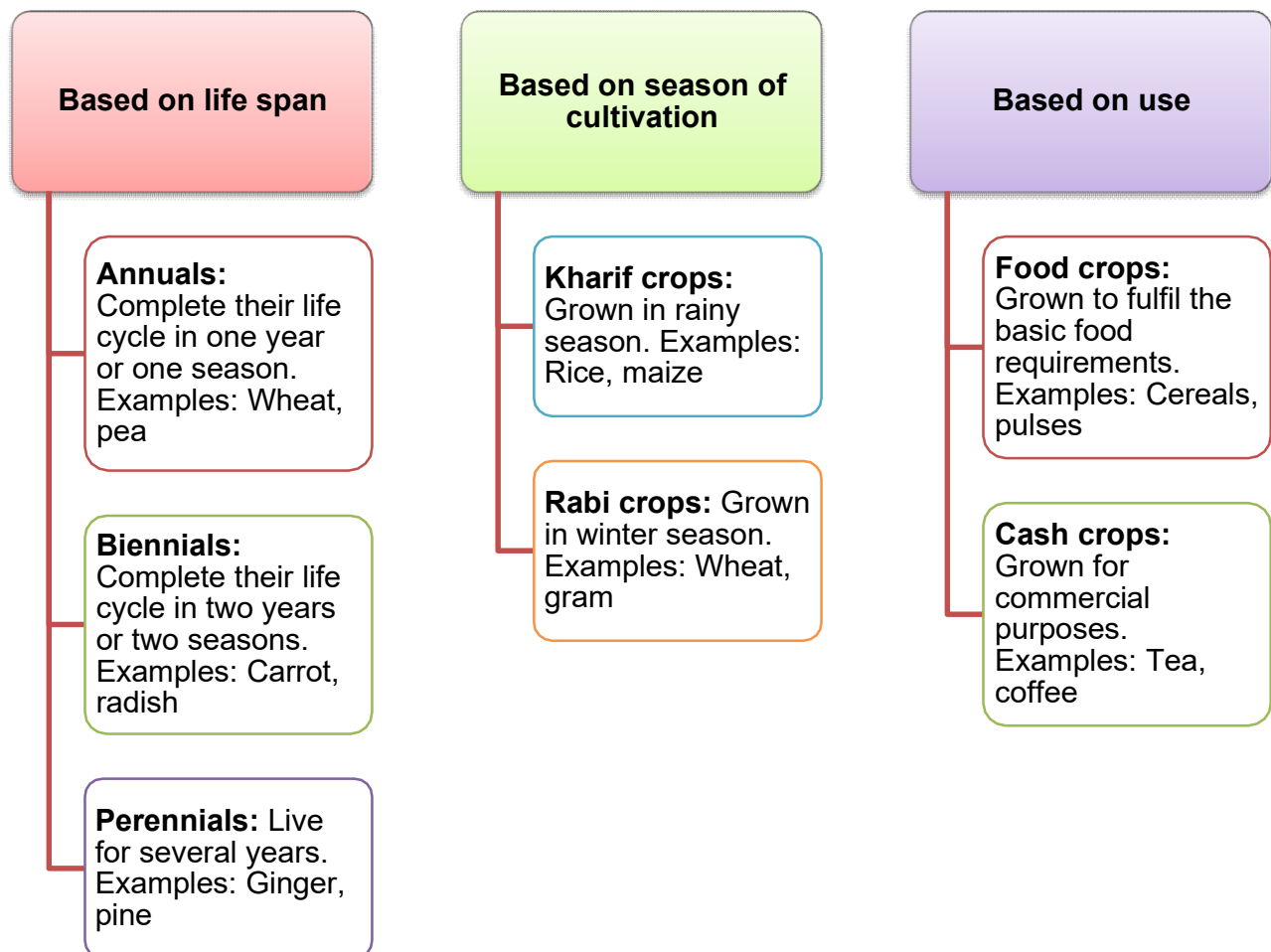
Crops

- Plants grown by man on a large scale to obtain food, clothing and other useful products are called **crops**.

Some examples of crops:

- Cereal crops: Wheat, paddy, maize
- Pulses: Gram, pea, bean
- Oil seeds: Mustard, groundnut, sunflower
- Vegetables: Tomato, cabbage, spinach
- Fruits: Banana, mango, guava

Types of Crops



- Agriculture** is the art and science of cultivating soil, producing crops, rearing animals for food and other useful products.
- Early man collected the edible parts of the plants as food.
- However, when he observed that seeds give rise to new plants, he started farming and began to live a settled life.

- As time passed, he tried to improve the wild varieties of plants to meet his demands. Crop plants grown today have evolved due to this human activity which occurred over 2000 years ago.

Basic Practices of Crop Production



Preparation of Soil

- The soil is prepared for sowing seeds of the crop by ploughing, harrowing, levelling and adding manure.

Ploughing

- It is the process of breaking, loosening and turning the soil over for uprooting weeds and aerating the soil.
- **Benefits of ploughing**
 - Brings fresh nutrients to the surface.
 - Loosens soil so that roots can penetrate easily.
 - Soil is able to hold more moisture.
 - Weeds are removed.

Harrowing

- It is a method to destroy germinating weeds.
- It is done by using a blade harrow or spike tooth harrow.

Levelling

- It involves breaking big lumps of soil and levelling it.
- Levelling is done by using a wooden or iron plank.
- **Advantages of levelling:**
 - Helps in uniform distribution of water during irrigation.
 - Prevents top soil from being carried away.
 - Prevents loss of moisture.

Manuring

- It is the process of adding manure to the soil.
- It is done to increase the fertility of the soil before the seeds are sown into it.

Implements Used for Ploughing

IMPLEMENT	DESCRIPTION
Plough	<ul style="list-style-type: none">• It is a T-shaped instrument made of either wood or metal.• One of the arms of the iron plough which is wedge shaped penetrates the soil.• A plough is generally drawn by a pair of bullocks or horses. The plough is attached to the bullocks by using a yoke. The farmer controls the plough and guides the bullocks.
Hoe	<ul style="list-style-type: none">• A hoe is used to remove weeds as well as loosen the soil.• A strong, broad and bent plate made of iron is fixed at one end of the hoe which acts like a blade.• The hoe is pulled by animals.
Cultivator	<ul style="list-style-type: none">• A cultivator is a tractor-driven agricultural implement used for ploughing.• It has many ploughshares which can dig into a considerable area of soil and at the same time, loosen it and turn it.

Sowing

- The process of scattering seeds in the soil for growing crop plants is called **sowing**.

Precautions for Sowing Seeds

Seeds should be sown at the right depth in the soil suitable for germination.

Seeds should be sown at right intervals or spacings in the field.

Seeds should not be sown in dry soil.

Seeds should not be sown in highly wet soil.

METHODS OF SOWING SEEDS	DESCRIPTION
Broadcasting	<ul style="list-style-type: none"> It is the process of manually scattering seeds in the field. This method results in non-uniform distribution of seeds and hence, affects productivity.
Drilling	<ul style="list-style-type: none"> It is the process of sowing seeds at a uniform distance by using a seed drill. A seed drill is made of iron. Seeds are put into the funnel of the seed drill which is fitted at the back of the plough. As the plough moves, it cuts a hole into the soil, and the seeds move from the funnel into the hole or a furrow is made into the soil. <p><i>Advantages of sowing with a seed drill</i></p> <ul style="list-style-type: none"> Seeds are sown at the correct depth and at correct intervals Seeds cannot be picked up and eaten by birds
Transplantation	<ul style="list-style-type: none"> The process of transferring seedlings from the nursery to the main field by hand is called transplantation. To produce new varieties, seeds are first allowed to germinate in a nursery. When young seedlings are developed, they are planted in the field. <p><i>Advantages of transplantation</i></p> <ul style="list-style-type: none"> Helps farmers to select better and healthy seedlings. Allows better penetration of roots in the soil. Promotes better development of roots and shoots. Enables farmers to plant seedlings at uniform distance.

Adding Manure and Fertilizers

- Plants require minerals for growth and they continuously extract them from the soil
- The deficiency of plant nutrients and organic matter in the soil is made up by adding manure and fertilizers to the soil.

Types of Fertilizers

Natural Fertilisers	
Manure	<ul style="list-style-type: none"> Dead and decaying vegetable matter, waste from farms, household waste, excreta of animals form manure. Manure mainly contains nitrogenous compounds.
Compost	<ul style="list-style-type: none"> It is formed by decomposition of vegetable and animal wastes. Organic substances are decomposed by bacteria and are converted into humus.

Green Manure	<ul style="list-style-type: none"> • Farmers grow leguminous plants such as groundnuts, soya beans and pulses in between two crops. • Leguminous plants help to replenish nitrogen in the soil.
<i>Advantages of natural fertilisers</i> <ul style="list-style-type: none"> • Increase the water-holding capacity of soil. • Make the soil porous. • Improve soil texture. • Increase the number of useful microbes in the soil. 	
<i>Disadvantages of natural fertilisers</i> <ul style="list-style-type: none"> • Inconvenient to store and transport • Not nutrient-specific 	

Artificial/Chemical Fertilisers	
<ul style="list-style-type: none"> • They are used to fertilise a larger area at a time. • They are made of ammonia, urea and phosphates. 	
<i>Advantages of artificial fertilisers</i> <ul style="list-style-type: none"> • Nutrient-specific • Have plant nutrients in concentrated form • Provide quick replenishment of plant nutrients in soil • Highly soluble in water • Easily absorbed by plants • Easy to store, transport and handle 	
<i>Disadvantages of excessive use artificial fertilisers</i> <ul style="list-style-type: none"> • Reduces fertility of the soil • Changes the chemical nature of the soil • May cause water pollution through runoff 	

Differences between Manures and Fertilizers

MANURE	FERTILISER
<ul style="list-style-type: none">• Natural substance obtained owing to the decomposition of plant and animal remains by bacteria	<ul style="list-style-type: none">• Inorganic substances or compounds
<ul style="list-style-type: none">• Less rich in plant nutrients	<ul style="list-style-type: none">• Rich in plant nutrients such as nitrogen, phosphorus and potassium
<ul style="list-style-type: none">• Can be prepared in fields	<ul style="list-style-type: none">• Manufactured in factories
<ul style="list-style-type: none">• Inconvenient to store and transport	<ul style="list-style-type: none">• Easy to store and transport

Crop Rotation

- **Crop rotation** is the practice of growing different crops each season in a particular field.
- For example, when a cereal crop such as maize is grown first, it takes away a lot of nitrogen from the soil for its growth and makes the soil nitrogen deficient. When leguminous crops such as pulses are grown in the same field, the crops with nitrogen-fixing bacteria enrich the soil with nitrogen compounds and increase its fertility.

Advantages of Crop Rotation

- Allows soil to recover its lost nutrients.
- Helps to control pests, weeds and diseases.
- Helps to reduce the use of chemical fertilisers.
- Improves fertility of the soil.

Organic Farming

- **Organic farming** is a kind of farming in which crops are grown without using chemical fertilisers and pesticides.
- Food grown by organic farming is called **organic food**.

Irrigation

- The process of supplying water to crop plants in fields through canals, wells, reservoirs, tube wells etc. is known as **irrigation**.
- Wells, tube wells, ponds, lakes, dams, rivers and canals are some of the sources of irrigation.

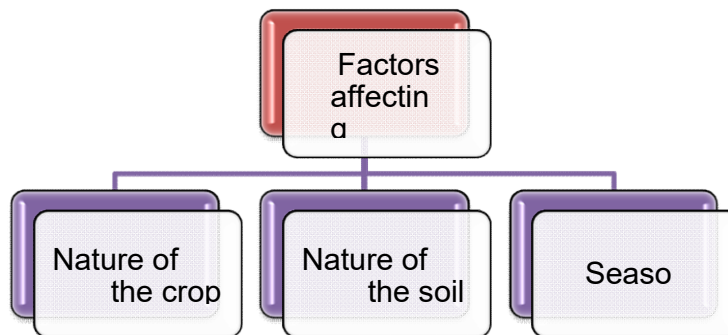
Need for Irrigation

To make the soil soft due to which ploughing of fields can become easier

To provide moisture for germination of seeds

To maintain the moisture of soil for healthy crop growth

Factors affecting Irrigation requirements of crops



Methods of Irrigation

Traditional methods of Irrigation	
Canal irrigation	<ul style="list-style-type: none"> In India, irrigation of extensive areas is carried out by canals. The main canal receives water from different sources such as reservoirs or rivers and branches further for irrigation.
Moat/Pulley system	<ul style="list-style-type: none"> The pulley system along with a rope and a bucket is known as a moat. Water is lifted out from the well by using a bucket attached to a rope which passes over the pulley. The rope is either pulled by man or by animals.
Persian wheel (Rahat system)	<ul style="list-style-type: none"> A Persian wheel consists of a large wooden wheel with several buckets arranged on its outer rim. The whole arrangement is submerged in an open well.
Swing basket method	<ul style="list-style-type: none"> The swing basket is an ancient water lifting device. Two people stand facing each other and swing the basket to fill in water. The basket is raised and water is discharged in the crop field.
Dhekli	<ul style="list-style-type: none"> Dhekli is generally used to lift water from an unlined well, stream or pond.
Chain pump	<ul style="list-style-type: none"> The chain pump is used to lift water from a shallow well. It is useful to lift water from a depth of about 6 metres.

Modern methods of irrigation	
Basin irrigation	<ul style="list-style-type: none"> • It is a kind of surface irrigation. • The land is surrounded with embankments in the form of a basin. • Basins are flooded with water. • It is used for crops which require a large amount of water to grow.
Furrow irrigation	<ul style="list-style-type: none"> • It is a kind of surface irrigation. • Small channels or furrows are created along the field length between crop rows. • It is used for crops which do not require much water.
Drip irrigation	<ul style="list-style-type: none"> • Water is supplied through perforated pipes. • Pipes are placed in rows between the plants close to the roots. • It is used in fruit orchards, gardens and trees.
Sprinkle irrigation	<ul style="list-style-type: none"> • Sprinklers or spray guns are attached to a large hosepipe at regular intervals to spray water. • It is suitable for all types of crops.

Advantages and Disadvantages of Irrigation

Advantages of irrigation

- Provides moisture to germinating seeds.
- Facilitates absorption of nutrients by minerals.

Disadvantages of irrigation

- Excess of water in soil leads to water logging
- Sometimes, it inhibits the process of germination.

Removal of Weeds

- Wild and undesirable plants which grow in crop fields and compete with crops for space, soil, nutrients, water and sunlight are called weeds.
- *Amaranthus (Chaulai)*, *Chenopodium (Bathua)*, wild oat (*Javi*) and grass are examples of weeds.

Disadvantages of Weeds

- Compete with crops for available resources.
- Can be responsible for spreading diseases.
- Provide hideouts for rats and snakes.

Methods of Weeding

Weeding is the process of removal of weeds.		
By hand <ul style="list-style-type: none"> Weeds can be removed from crop fields by pulling them out with hands. 	Using implements <ul style="list-style-type: none"> Weeds can be removed by digging or cutting them from close to the ground from time to time with implements such as a trowel, harrow and hoe. 	Spraying weedicides <ul style="list-style-type: none"> A solution of weedicides such as 2,4-D, MCPA and Butachlor is sprayed on the standing crops.

Harvesting

- A combine harvester is used in commercial farming where the processes of harvesting, threshing and winnowing all occur in a sequence.
- Harvesting** is the cutting and gathering of mature crops.
- Threshing** is the process of beating grains from stems.
- Winnowing** is the process of separating grains from the chaff.
- In India, the period of harvest is celebrated as harvest festivals.
- Pongal, Baisakhi, Holi, Nabanya and Bihu are some of the harvest festivals celebrated in India.

Storage of Food Grains

- Harvested grains contain a lot of moisture. Hence, they are first dried.
- Harvested crops are stored until they are sold in the market.

Methods of storage of Food Grains

Granaries	Gunny bags	In silos
<ul style="list-style-type: none"> Dried grains are stored in granaries. 	<ul style="list-style-type: none"> Grains are also stored in gunny bags made of jute. 	<ul style="list-style-type: none"> Government stores grains in large containers or tall cylindrical structures called silos.
<ul style="list-style-type: none"> Granaries are large metal or earthen pots. 	<ul style="list-style-type: none"> The mouths of the bags are stitched tightly, and the bags are placed one above the other in big godowns. 	<ul style="list-style-type: none"> Buffer stocks are stored in godowns to meet emergency needs in natural calamities etc.

Food from Animals

Milk	Meat and Eggs	Honey	Fish
<ul style="list-style-type: none">• Source animals: Cow, buffalo and goat	<ul style="list-style-type: none">• Source animals: Goat, sheep, fish, hen and duck	<ul style="list-style-type: none">• Source animal: Honeybee	<ul style="list-style-type: none">• Source animal: Fish
<ul style="list-style-type: none">• Milk and milk products are highly nutritious foods	<ul style="list-style-type: none">• Rich in proteins	<ul style="list-style-type: none">• Highly nutritious food rich in proteins	<ul style="list-style-type: none">• Highly nutritious and easily digestible food

Animal Husbandry

- Animal husbandry is the branch of agriculture which deals with feeding, shelter, caring and breeding of domesticated animals.

Important Practices of Animal Husbandry

- Proper feeding of animals
- Proper shelter of animals
- Prevention and cure of diseases in animals
- Proper breeding of animals