

Crop Production and Management

“Agriculture is an applied biological science which deals with the production of plants (agronomy) and raising of live stock (animal husbandry) for human use.”



Father of Green Revolution (India)
M. S. Swaminathan



Father of Green Revolution (World)
Norman Borlaug

CROP

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

Types of Crop

Kharif Crops

- ✓ These are autumn or monsoon crops. The sowing starts in rainy season.
- ✓ They are sown in June-July.
- ✓ They are harvested in Sept.-Oct.
- ✓ They require warm and wet weather.
- ✓ They need a lot of water.
- ✓ E.g. Rice, Cotton, Bajra, Jowar, Groundnut, Maize, Mango, Spinach, Soyabean etc.

- ✓ They are winter crops. The sowing starts in winter season.
- ✓ They are sown in October- November.
- ✓ They are harvested in March-April.
- ✓ They require dry and cold weather.
- ✓ They do not need a lot of water.
- ✓ E.g. Wheat, Barley, Gram, Pea, Mustard, Linseed, Potato, Orange, Apple etc.

Rabi Crops



Cereal crops

They are rich in carbohydrate and thus provide energy. e.g. Rice, Wheat, Maize, Sorghum, Barley, Millets. Paddy can not be grown in the winter season as it requires a lot of water. Therefore, it is grown only in rainy season.



Rice

Pulses

They are rich in protein and thus helpful for body building. e.g. Gram, Moong, Pea, Lentil (masoor), Urad, Pigeon pea (Arhar). Pulses and vegetables are grown during summer at many places.



Moong

Oil seed crops

They are rich in oil and fatty acids and thus provide energy. e.g. Groundnut, Sunflower, Soyabean, Mustard, Sesame (til).



Sunflower

Vegetable crops

They provide vitamins and minerals along with small quantities of carbohydrate, protein and oils. e.g. Spinach, Cabbage, Potatoes and Carrot.

Fodder crops

They provide green fodder to the cattle. e.g. Berseem, Sorghum, Maize, Oat, Sudan Grass, Alfalfa.

Zayed crops

They are sown in March/April and harvested before rainy season e.g. Gourd, Melons etc.

Horticulture is the science & art of growing fruits, flowers, vegetables and any other cultivar.

Agricultural practices

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

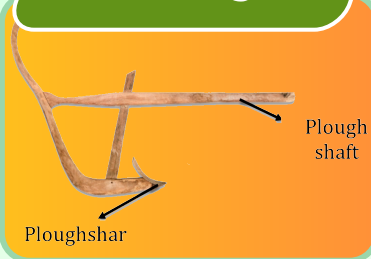
1. Soil preparation

(a) Ploughing or Tilling

Process of loosening and turning of the soil.

Agriculture implements

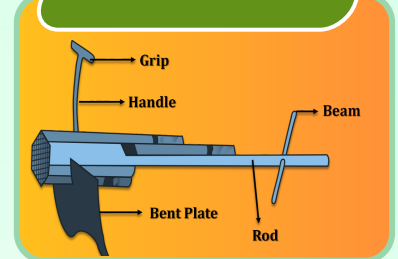
A Plough



Cultivator



Hoe



Advantages of ploughing

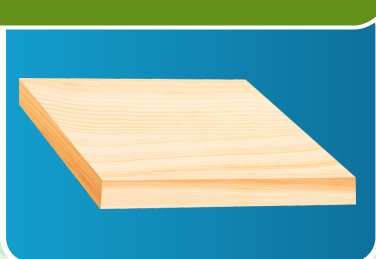
- (i) It allows mixing of manure and fertilizer more uniformly.
- (ii) Seeds are also able to germinate more easily.
- (iii) It allows good root penetration so that the plant is held firmly to the soil. Roots are able to breathe more easily.
- (iv) Loosened soil promotes growth of worms and microbes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

(b) Levelling

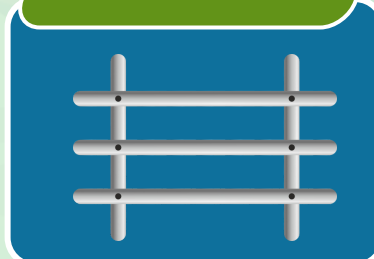
Tilled soil may have big blocks of soil (crumbs).

It helps in uniform distribution of water and manure and prevents the loose soil from being eroded by water or air.

Wooden Leveller



Iron Leveller



2. Sowing

The process of putting the seeds in the soil is known as sowing. Sowing can be done by Broadcasting, Traditional tool, Seed drill.

Sowing can be done by-

Broadcasting



Traditional tool



Seed drill



Precautions during sowing seeds

- » The seeds should be sown at a particular depth under the soil. Seeds left on the surface of the soil may be carried or destroyed by the insects and the birds.
- » Seeds placed deep into the soil may either fail to germinate or may fail to come out into the air on germination.
- » Distance should be proper to avoid overcrowding.

Transplantation

It is the process in which seeds are sown in nursery and then the seedlings are shifted to the main field. E.g. Rice, Onion, Tomato, Chilli, Brinjal.

3. Manuring

Farmers have to add manure to the field to replenish the soil with nutrients, this process is known as manuring. Manures and fertilizers (NPK) are added to this soil to increase its fertility.

Methods for maintaining soil fertility without use of fertilizers

- (1) **Field fallow:** Leaving the field uncultivated for a season.
- (2) **Crop rotation:** Growing different crops alternately in the same field.
- (3) **Biofertilizers:** Organisms which enrich the soil nutrients due to their biological activities are called biofertilizers. e.g. Rhizobium (bacteria), Nostoc and Anabaena (BCA-Blue Green Algae).

Differences between Manures and Fertilizers

Manures

These are organic substances obtained by the decomposition of plant and animal wastes.

They are rich in organic nutrients, not rich in (NPK).

They are not nutrient specific.

They are not soluble in water so absorbed slowly by plants.

They are not harmful to the environment.

They have nutrients in small quantity so needed in large quantity.

They are bulky substances so difficult to store and transport.

They are prepared in field.

Fertilizers

These are artificial inorganic salts.

They are rich in Nitrogen, Phosphorus and Potassium (NPK).

They are nutrient specific.

They are soluble in water and absorbed quickly.

They are harmful to the environment.

They have higher amount of nutrients so required in very small quantity.

They are in concentrated form and easy to transport and store.

They are prepared in factories.

4. Irrigation

The process of artificial supplying of water to the crop at different intervals is called irrigation.

Methods of irrigation

(A)
Traditional
methods of
irrigation



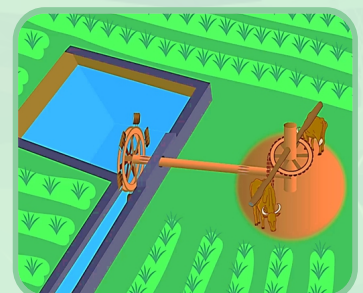
Moat (pulley system)



Chain pump



Dhekli



Rahat (lever system)

(B)
**Modern
methods of
irrigation**



Sprinkle system



**Drip system
or Trickle system**

Other irrigation systems in India



Canal system



Tanks



Wells



River valley system

Advantages of irrigation

- (i) It maintains the moisture of soil and helps in germination of seeds.
- (ii) It helps in supply of essential nutrients.
- (iii) Nutrients dissolved in water get transported to each part of plant.
- (iv) Water also protects the crop from both frost and hot air currents.

Crop Protection Management

5. Weeding

Removal of weeds or undesirable plants is called weeding.

Methods of weed control

- (i) **Mechanical control:**
Khurpi and seed drill is also used in uprooting of weeds.
- (ii) **Chemical control:**
Done by spraying weedicides or herbicides (chemical which are used to kill the weeds). e.g. 2, 4-D (2, 4 – dichlorophenoxyacetic acid), 2, 4, 5-T (2, 4, 5 – trichlorophenoxyacetic acid), MCPA (methyl, chlorophenoxyacetic acid), Butachlor & Atrazine.
- (iii) **Biological control:** In this living organisms are used to destroy weeds. e.g. Cassia plant prevents the growth of Parthenium weed.

Pesticides or biocides

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

Types of pesticides

Pesticides	Affected organisms	Example
Insecticides	Insects	DDT (Dichloro diphenyl trichloro ethane), Aldrin, Malathion
Fungicides	Fungal pathogens	Bordeaux mixture, Burgandy mixture, HgCl_2 (Mercuric chloride)

6. Harvesting

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



Harvester



Cotton Strippers



Corn Huskers

7. Threshing

In the harvested crop, the grain seeds need to be separated from the chaff. This process of beating out the grain from the crop is called threshing. It can be done by threshers.

Combine:

A combine machine can harvest and thresh at the same time.



Threshing

8. Winnowing

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

Chaff : Chaff is the material consisting of seed covering and small pieces of stem & leaves.



Winnowing

9. Storage

Food regularly throughout the year. Freshly harvested grains have more moisture. If freshly harvested grains are stored without drying, then they may get spoil and lose their germination capacity. Hence, before storing them the precautions must be undertaken.



Silose

Buffer Stock

Surplus stock of grains which is preserved for emergencies like drought and floods is called buffer stock. Food grains are stored in large godowns by agencies like Food Corporation of India (FCI) and state warehousing corporations.

Summer ploughing

It is ploughing of field all around during hot summer with specialized tools. It helps to kill weeds, hibernating insects and disease causing organisms by exposing them to the summer heat.

Organic farming

It is a kind of farming in which the harmful chemicals are not used. In place of chemicals the use of organic manures, bio-fertilizers and biopesticides are recommended.

Vermicompost

It is the type of manure which is produced by the degradation of organic wastes through consumption by the earthworms.

Animal husbandry

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

The main elements of animal husbandry are :

- (i) Proper feeding (ii) Providing good shelter
- (iii) Proper health (iv) Proper breeding

1. Cattle Farming

Cattle husbandry is done for two purposes, milk production and draught labour for agricultural work like tilling and irrigation.

Cattle feed consists of two components:

- (I) **Roughage:** Contains large amount of fibre which includes, fodder and legumes.
- (ii) **Concentrate :** It is a mixture of cereals like maize, oat, barley, jowar, grams, rice polish, cotton seeds, gram bran, molasses and oilseed cake moistened in water.
Rich in proteins, highly palatable and easily digestible.

2. Poultry

The rearing and caring of birds for obtaining eggs and meat for the commercial purpose is known as poultry farming.

- (i) It includes chickens (fowls), ducks, geese, turkeys, guinea-fowls, peafowls, pigeons and quails.
- (ii) The egg laying poultry birds are called **egger or layer**, while the one reared for obtaining meat is called **chicken or broiler**.

3. Fisheries

The rearing of fish on a large scale is called pisciculture.

Fish is a rich source of proteins and oils. These are a good source of vitamin A and vitamin D.

Fresh water fishes : Catla, Rohu and Mrigal.

Marine fishes : Tuna, Cod and Pomfret.

The fish eggs are introduced into small ponds called hatcheries.

4. Apiculture

- » The rearing of honey bees for a large scale production of honey and bee wax, is known as apiculture.
- » Bees are reared in wooden boxes for commercial production of honey called apiaries.

Honey bee colony and social organization

In a colony, there are three types of bees which are structurally and functionally different from one another, so polymorphism is associated with division of labour. These types are :

- (i) **Queen bee** : Queen bee lays eggs which hatch into larvae, which grows into pupae.
- (ii) **Drone bee** : Drones are smaller in size than the queen, and their function is to fertilize the queen.
- (iii) **Worker bee** : Worker bees look after young ones, collect nectar and pollen from flowers and make honey.



Worker



Queen



Drone

Animal diseases

Disease	Causal organism	Organisms affected
Foot and mouth disease	Virus	Cattle
Anthrax	Bacteria	Cattle, Humans
Ranikhet	Virus	Poultry birds
Fowl cholera and fowl typhoid	Bacteria	Poultry birds