Crop Production and Management Preparation of the Soil & Sowing

(1) **Preparation of soil:** Preparation of the soil involves loosening and turning the soil. This process is known as ploughing, is done by using a wooden or iron plough which pulls the soil. The pulled soil is then levelled by using a wooden or iron leveler.

(a) Ploughing or Tilling – Process of loosening and turning of the soil is called ploughing or tilling.

Advantages of ploughing:

- It allows mixing of manure and fertilizer more uniformly.
- Seeds are also able to germinate more easily.
- It allows good root penetration so the plant is held firmly to the soil.
- Roots are able to breathe more easily.

• Loosened soil promotes growth of worms and microbes which help to maintain the fertility of soil.

✤ Agriculture implements : The tools required for carrying out the activities involved in the cultivation of plants are known as agriculture implements.

Plough : It contains triangular iron strip called ploughshare and main part of the plough is a long log of wood called ploughshaft. One end of the shaft is handle and other end is attached to a beam which is placed on the bulls necks. One pair of bulls and a man can easily operate the plough.

Hoe : This is used for removing weeds and for loosening the soil. It has a long rod of wood or iron. A strong, broad and bent plate of iron is fixed to one of its ends and works like a blade. It is pulled by animals.

• Cultivator : Ploughing can also be done by tractor driven cultivator.



The use of cultivator saves labour and time.

Cultivator driven by a tractor

(b) Levelling : Tilled soil may have big blocks of soil (crumbs). Crumbs are broken down and soil is levelled with wooden planks or iron leveller, the process called levelling. Levelling is done for better sowing and irrigation.



Soil levelers

Advantages of levelling :

• It helps in uniform distribution of water and manure.

• It prevents the loose soil from being eroded by water or air.

(c) Manuring : Farmers have to add manure to the field to replenish the soil with nutrients, the process known as manuring.

✤ Manure : These are organic substances, obtained from the decomposition of plant and animal wastes.

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Advantages of manure :

- It increases the number of friendly microbes.
- It improves the texture of soil by adding organic matter (humus).
- It increases soil fertility, water holding capacity and aeration.
- It reduces soil erosion.
- It is cheap.

Disadvantage of manure :

• They have less amount of nutrients as compared to fertilizers.

COMPETITION WINDOW

Type of manures :

Compost : It is a type of manure which is produced from the plant and animal wastes by the action of microbes.

Green Manure : It is a type of manure which is produced by the sowing and back ploughing of fast growing crops. E.g. Mustard, alfalfa.

Farm yard manure : It consists of cattle dong. Farm refuse, fallen leaves and twings.

V ermicompost : It is the type of manure which is produced by the degradation of organic wastes through the consumption by the earthworms. This process is known as vermicomposting.

Earth wormsare called as farmer's friends because the burrowing action of earthworm help to loosen the soil particules and then improves the physical structure of soil by adding humens.

V ermiculture : cultivating worms and earthworms.

O rganic farming : it is a kind of farming system in which the harmful chemicals (fertilizers and pesticides) are not used. In place of chemicals (fertilizers and pesticides) the use of organic manures, biofertilizers and biopesticides are recommended.

• Manures are bulky and not easy to store and transport.

✤ Fertilizers : These are commercially manufactured inorganic salts containing one or more essential plant nutrients like NPK, which are used to increase soil fertility.

Advantages of fertilizers :

- They are nutrient specific and required in small amounts.
- They are water soluble and absorbed by the plant easily.
- They are easy to store and transport.
- Disadvantages of fertilizers :
 - Fertilizers can change the soil structure by killing the soil microbes.
 - Fertilizers can change the chemical composition of soil.
 - Accumulation of fertilizers in water bodies causes eutrophication.

COMPETITON WINDOW

Eutrophication : the excessive growth of plants on the surface of water bodies due to excessive use of fertilizers in the field which flows into the water bodies with rainy water is called eutrophication.

Type of fertilizer : Nitrogenous : Sodium, nitrate, U rea **Phosphatic :** A monium sulphate **Mixed :** N PK, CAN

Only urea is an organic compound fertilizer.

Methods for maintaining soil fertility without use of fertilizers

- Field fallow : The practice of leaving the field uncultivated for a season is called field fallow.
- Crop rotation : The practice of growing different crops in succession in the same field is called crop rotation.
- Biofertilizers : Organisms which enrich the soil nutrients due to their biological activities are called biofertilizers. e.g. Rhizobium bacteria, Nostoc and Anabaena (BGA).
- Body of the living organisms is made of proteins. Proteins are the compounds of nitrogen, carbon, oxygen and hydrogen. Air nitrogen is fixed into compounds of nitrogen (Nitrogen oxides solution in water) by certain microorganisms. Microorganisms such as Rhizobium (=

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Bacillus) bacterium is present in the root nodules of Leguminous plants Bacterium Rhizobium radicicola is capable of fixing air nitrogen. Fixation of nitrogen enriches soil in a natural way.

• Nitrogen fixation is the process of combining oxygen with nitrogen to form nitrogen compounds such as nitrites (NO₂) and nitrates (NO₃).

• Blue green algae are common along drains, wet places and flooded paddy fields. Anabena, Oscillatoria, Nostoc and Gleocapsa are common examples of blue green algae.

• Root nodules : Roots of leguminous plants bear root nodules. Root nodules house Rhizobium, a nitrogen fixing bacteria. Nitrogen fixed by the bacterium is supplied as additional nitrogenous nutrition to the leguminous plant (host). In turn, the host plant provides shelter and carbohydrate food to the bacterium. Thus, the bacterium and the leguminous root nodules are living together for mutual benefit. This process in which two organisms live together for mutual benefit is called symbiosis.

S. No.	Manures	Fertilizers	
1	These are organic substances obtained by the decomposition of plant and animal wastes.	These are artificial inorganic salts.	
2	They are rich in organic nutrients, not rich in (NPK).	They are rich in Nitrogen, Phosphorus and Potassium (NPK).	
3	They are not nutrient specific.	They are nutrient specific.	
4	They are not soluble in water so absorbed slowly by plants.	They are soluble in water and absorbed quickly.	

Differences between manures and fertilizers :

Class-V	III	Biol
5	They are not harmful to the environment.	They are harmful to the environment.
6	They have nutrients in small quantity so needed in large quantity.	They have higher amount of nutrients so required in very small
7	They are bulky substances so difficult to store and transport.	They are in concentrated form and easy to transport and store.

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They are prepared in

factories.

Classification of plant nutrients:

They are prepared in field.

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• There are 16 essential elements for growth and development of plants. They are classify into two gropes

• Macro nutrients : These are required in large quantity. e.g - Carbon, oxygen, hydrogen, nitrogen, phosphorus, potassium, sulphur, calcium, magnesium.

• Micro nutrients: These are required in trace amount. e.g - Iron, manganese, boron, zinc, copper, molybdenum, chlorine.

S.No.	Sources	Nutrients	Types
1.	Air	Carbon, Oxygen.	Macro nutrients.
2.	Water	Hydrogen.	Macro nutrients.
3.	Soil	Nitrogen, Phosphorus, Potassium, Sulphur, Calcium, Magnesium.	Macro nutrients.
		Iron, Manganese, Boron, Zinc, Copper, Molybdenum, Chlorine.	Micro nutrients.

(2) SOWING

The process of putting the seeds in the soil is known as sowing. Before sowing good quality (healthy and good variety) seeds are selected.

✤ Selection of seeds :

For separating healthier seeds from a mixture of healthy and weak seeds, the seeds are placed in water. Healthy seeds sink and weak or insect eaten seeds float on water. Healthy seeds are separated and dried before sowing.

Sowing can be done by :

(i) Broadcasting : Seeds are sown by hand or manually.

(ii) **Traditional tool :** The tool used traditionally for sowing seeds has shape like a funnel. The seeds are filled into the funnel, passed down through two or three pipes having sharp ends. These ends pierce into the soil and place seeds there.

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Traditional method of sowing

(iii) Seed drill:

Seeds are sown by the seed drill with the help of tractor. It saves time and labour.

Precautions during sowing seeds.

- Use good quality, healthy and disease-free seeds.
- The seeds are 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.
- Enough water should be there in the soil.

COMPETITION WINDOW

Planters: Planters are farm machines used for planting crops that grow in rows. Planter can sow the seeds and add fertilizers simultaneously. cotton, maize and soyabean are all row crops.

Transplantation: Firstly, seeds are sown in nursery and then seedlings are shifted to the main field. This process is known as transplantation. It enables the farmers to select the healthier seedlings.

eg.- Rice, Onion, Tomato, Brinjal and Chilli.



Transplantation