



SNS COLLEGE OF TECHNOLOGY

**An Autonomous Institution
Coimbatore – 35**

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DEPARTMENT OF AGRICULTURE ENGINEERING

19AGB205 – CROP PRODUCTION TECHNOLOGY

II – YEAR IV SEMESTER

UNIT 1 – -PRINCIPLES OF AGRONOMY

TOPIC 1 – Tillage and its Implements





Tillage



It is a mechanical manipulation of soil to provide favorable condition for crop production.

Soil tillage consists of breaking the compact surface of earth to a certain depth and to loosen the soil mass, so as to enable the roots of the crops to penetrate and spread into the soil.





Objectives of Tillage

- To obtain deep seed bed, suitable for different type of crops.
- To add more humus and fertility to soil by covering the vegetation.
- To destroy and prevent weeds.
- To aerate the soil for proper growth of crops.
- To increase water-absorbing capacity of the soil.
- To destroy the insects, pests and their breeding places and
- To reduce the soil erosion.



Primary Tillage

It constitutes the initial major soil working operation. It is normally designed to reduce soil strength, cover plant materials and rearrange aggregates.

The operations performed to open up any cultivable land with a view to prepare a seed bed for growing crops is known as primary tillage.

Animal drawn implements mostly include indigenous plough and mould-board plough.

Tractor drawn implements include mould-board plough, disc plough, subsoil plough, chisel plough and other similar implements.





Secondary tillage

Tillage operations following primary tillage those are performed to create proper soil tilth for seeding and planting are secondary tillage.

These are lighter and finer operations, performed on the soil after primary tillage operations.

Secondary tillage consists of conditioning the soil to meet the different tillage objectives of the farm.

The implements include different types of harrow, cultivators, levellers, clod crushers etc.





Types of Tillage

Minimum Tillage - It is the minimum soil manipulation necessary to meet tillage requirements for crop production.

Strip Tillage - It is a tillage system in which only isolated bands of soil are tilled.

Rotary Tillage -It is the tillage operations employing rotary action to cut, break and mix the soil.

Mulch Tillage -It is the preparations of soil in such a way that plant residues or other mulching materials are specially left on or near the surface.

Combined Tillage -Operations simultaneously utilizing two or more different types of tillage tools or implements to simplify, control or reduce the number of operations over a field are called combined tillage.



Difference between tools/Implements/Machines



Tool - It is an individual working element such as disc or shovel.



Implement - It is equipment generally having no driven moving parts, such as harrow or having only simple mechanism such as plough.

Top 10 Implements in India



Machine -It is a combination of rigid or resistant bodies having definite motions and capable of performing useful work.





Implements for Primary Tillage

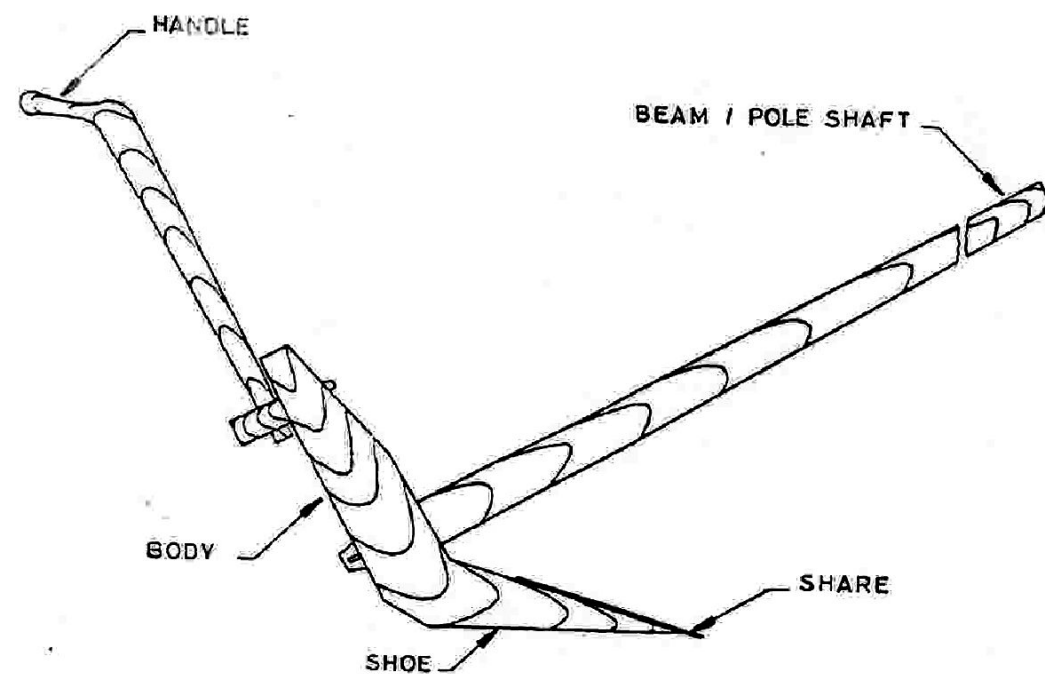
Plough

Ploughing is the primary tillage operations, which are performed to cut, break and invert the soil partially or completely.

Ploughing essentially means opening the upper crust of the soil, breaking the clods and making the soil suitable for sowing seeds.



Country or Indigenous plough



Share - It is the working part of the plough attached to the shoe with which it penetrates into the soil and breaks it open.

Shoe - It supports and stabilizes the plough at the required depth.

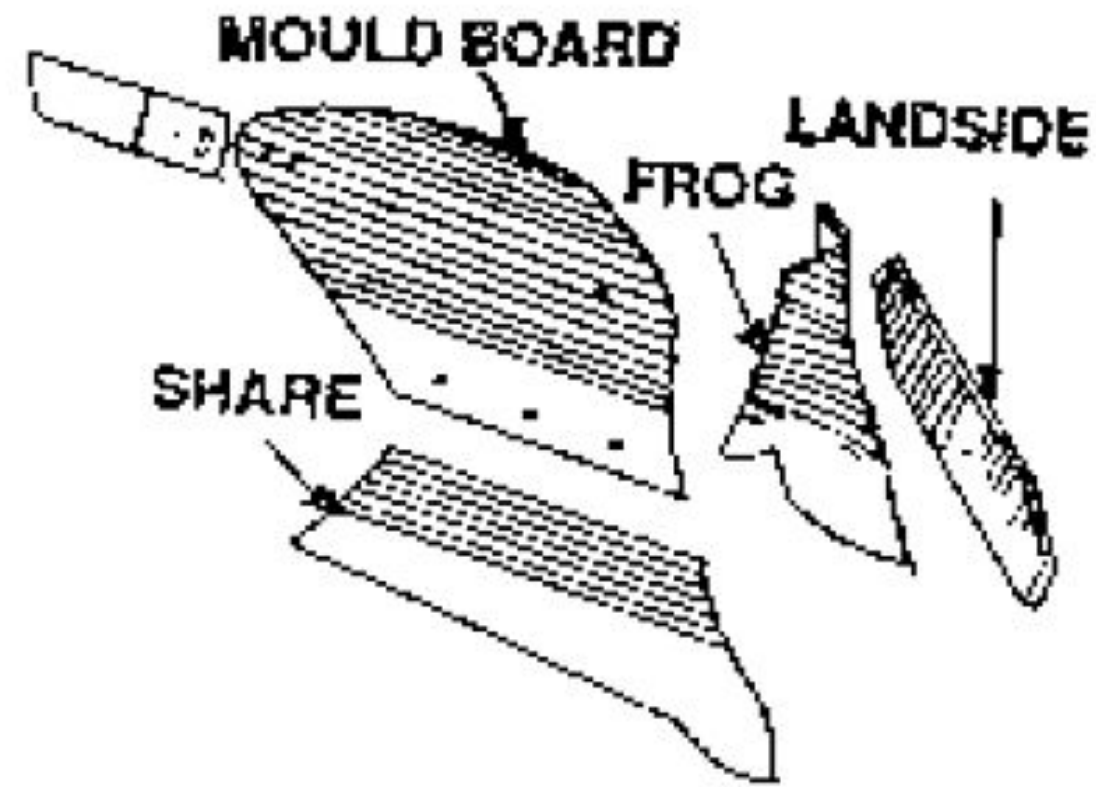
Body - It is main part of the plough to which the shoe, beam and handle are generally attached. In country plough body and shoe are integral part.

Beam - It is generally a long wooden piece, which connects the main body of the plough to the yoke.

Handle - A wooden piece vertically attached to the body to enable the operator to control the plough.



Mould board plough



Function: 1) cutting the furrow slice 2) lifting the soil 3) turning the furrow slice and 4) pulverizing the soil.

Components

M.B. plough consists of Share, Mould board, Land side, Frog and Tail piece.



Disc Plough

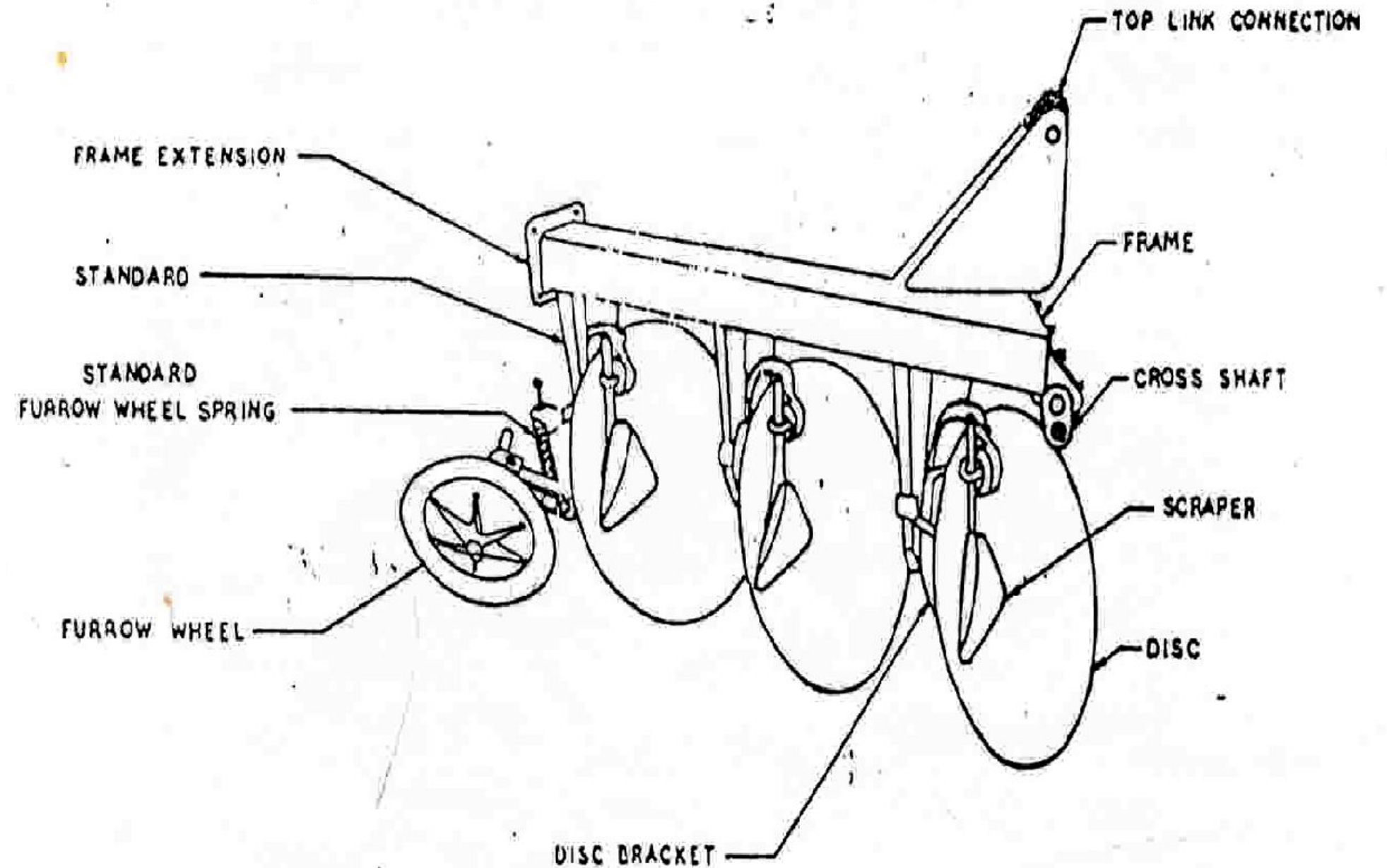
Types of Disc Plough

Disc ploughs are of two types

- (i) Standard disc plough and
- (ii) Vertical disc plough.

Disc - It is a circular, concave revolving steel plate used for cutting and inverting the soil.

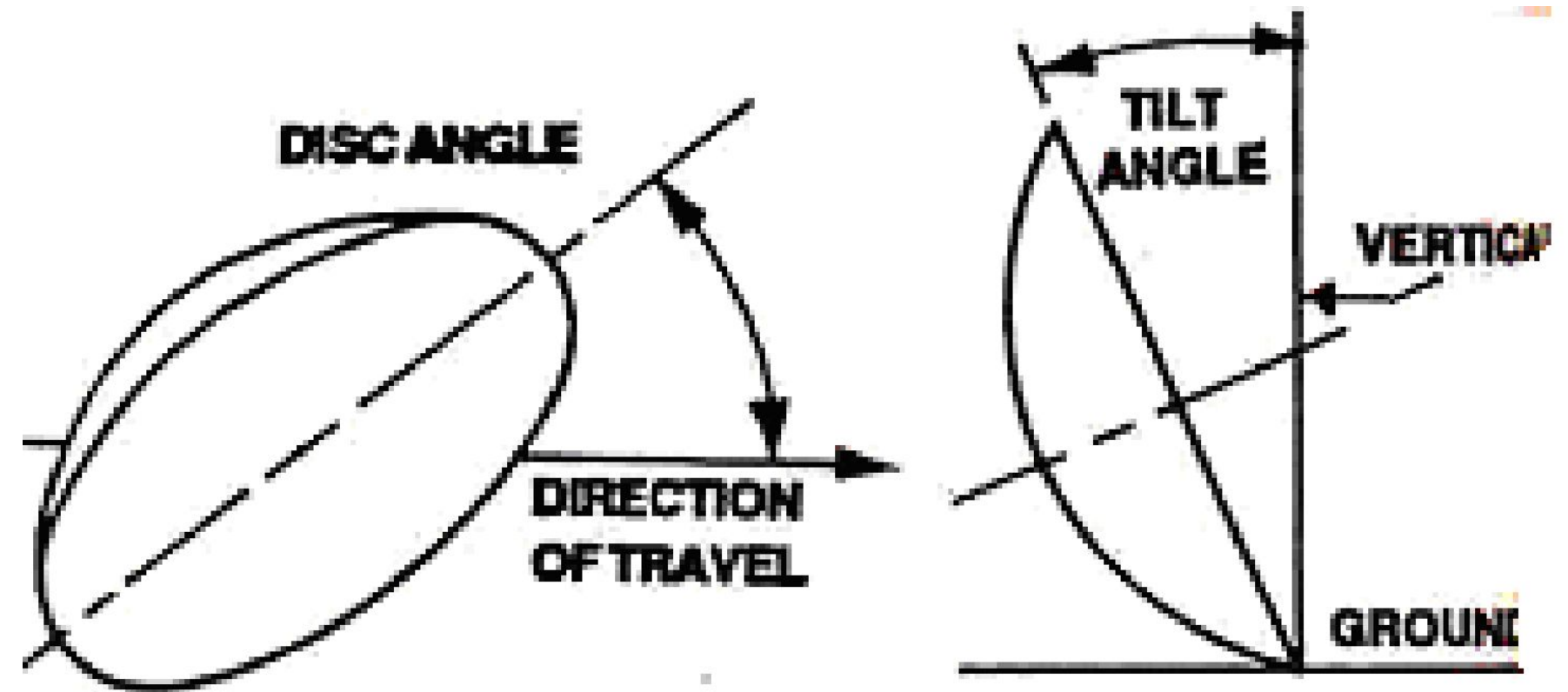
Scraper - It is a device to remove soil that tend to stick to the working surface of a disc.





Disc angle - It is the angle at which the plane of the cutting edge of the disc is inclined to the direction of travel. Usually the disc angle of good plough varies between 42° to 45° .

Tilt angle - It is the angle at which the plane of the cutting edge of the disc is inclined to a vertical line. The tilt angle varies from 15° to 25° for a good plough.





Ploughing System

Normal Ploughing: It is the ploughing up to a depth of about 15 cm.

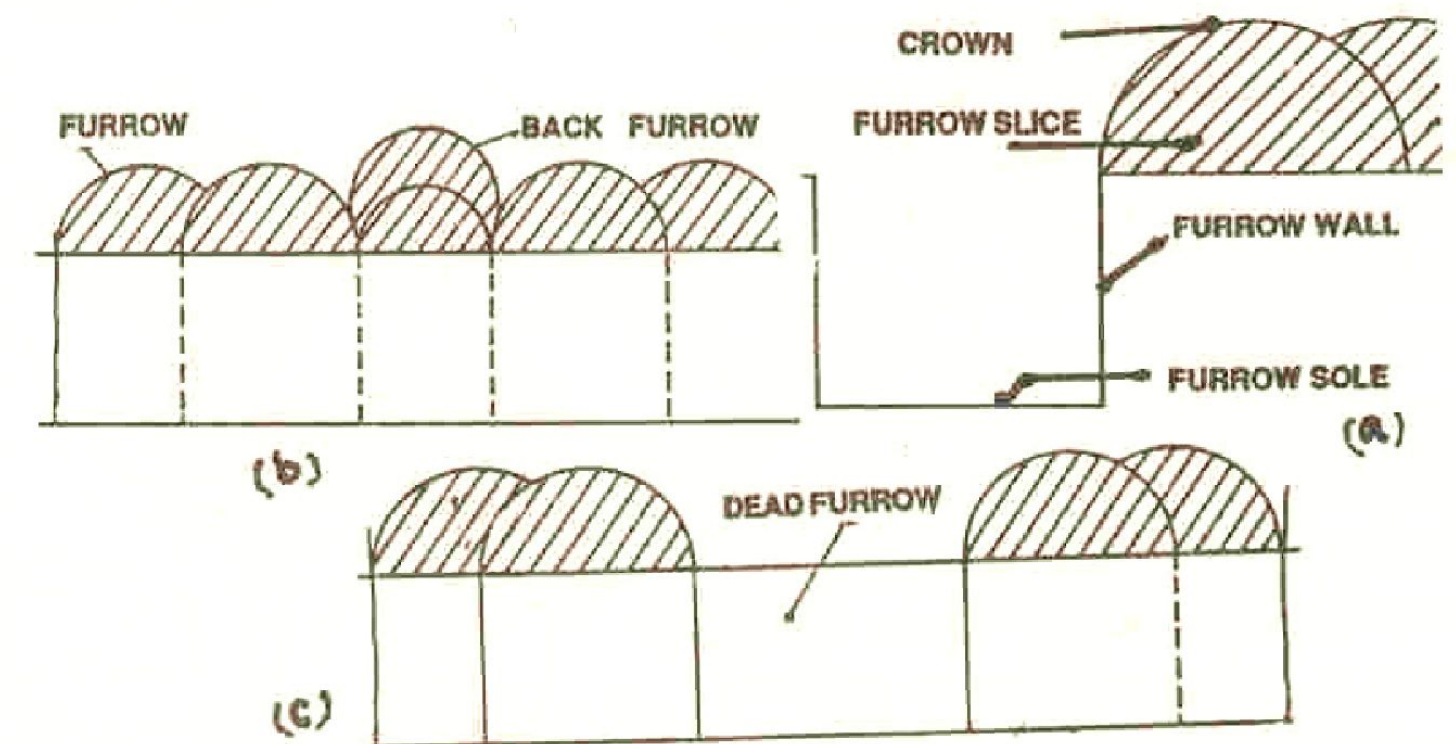
Contour Ploughing: It is the method of ploughing in which the soil broken and turned along the contours.

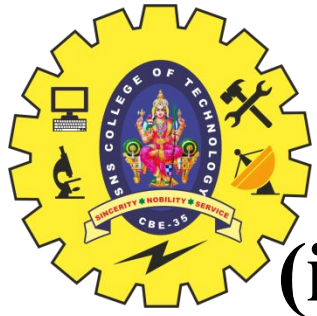
Ploughing of Land

The ploughing of land separates the top layer of soil into furrow slices. The furrows are turned sideways and inverted to a varying degree, depending upon the type of plough being used.

It is a primary tillage operation, which is performed to shatter soil uniformly with partial or complete soil inversion.

There are a few important terms frequently used in connection with ploughing of land.





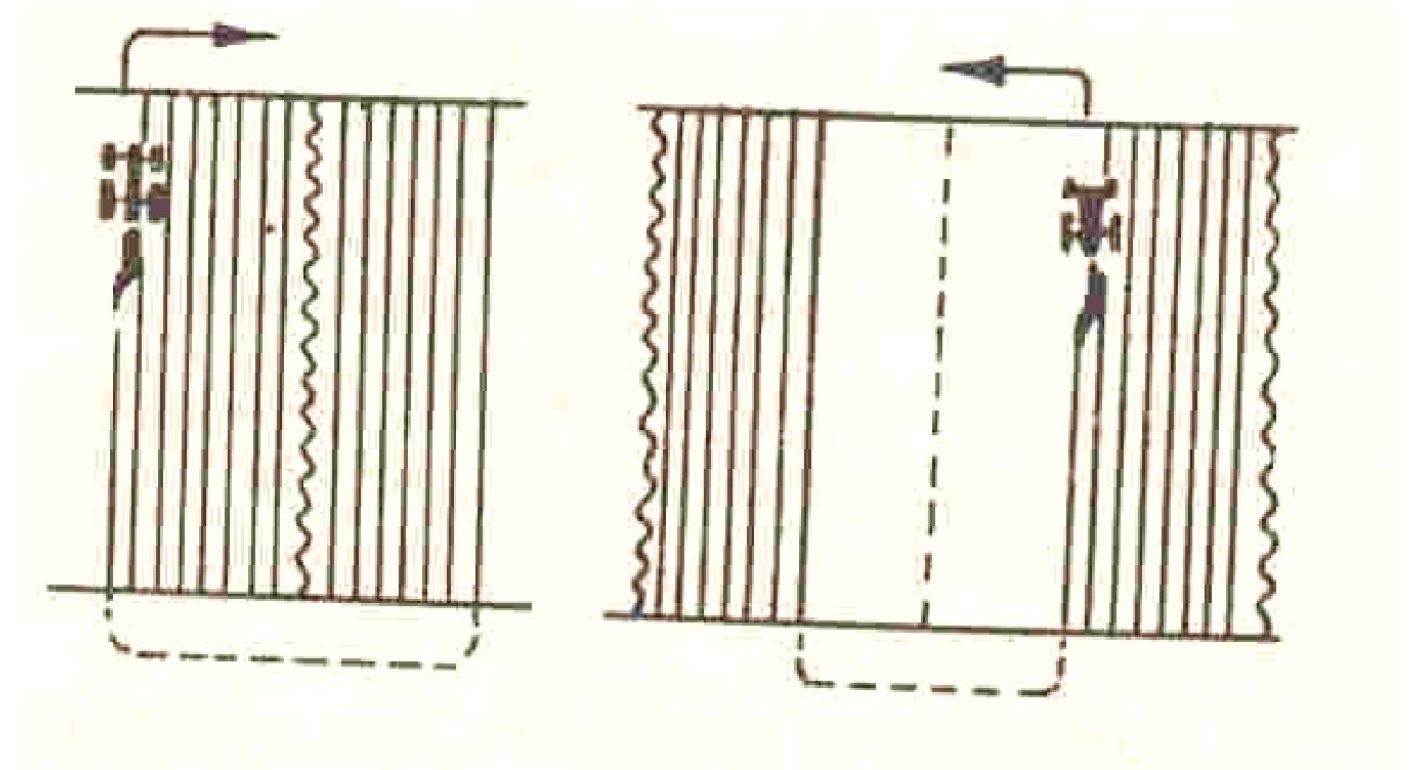
- (i) Furrow** -It is a trench formed by an implement in the soil during the field operation (Fig. a).
- (ii) Furrow slice** - The mass of soil cut, lifted and thrown to one side is called furrow slice.
- (iii) Furrow wall** - It is an undisturbed soil surface by the side of a furrow.
- (iv) Crown** - The top portion of the turned furrow slice is called crown.
- (v) Back furrow** - A raised ridge left at the centre of the strip of land when ploughing is started from centre to side is called back furrow. When the ploughing is started in the middle of a field, furrow is collected across the field and while returning trip another furrow slice is lapped over the first furrow. This is the raised ridge which is named as back furrow (Fig.b).
- (vi) Dead furrow** - An open trench left in between two adjacent strips of land after finishing the ploughing is called dead furrow (Fig.c).
- (vii) Head land** - While ploughing with a tractor to turn, a strip of un ploughed land is left at each end of the field for the tractor to turn, that is called head land. At the end of each trip, the plough is lifted until the tractor and the plough have turned and are in position to start the return trip. The head land is about 6 metres for two or three bottom tractor plough and one metre more for each additional furrow.



Methods of ploughing

In order to provide furrows at all times on the right hand side of the plough two method of working are used a) Gathering b) Casting.

- a) **Gathering** - Whenever a plough works round a strip of ploughed land, it is said to be gathering.
- b) **Casting** - Whenever a plough works round a strip of unploughed land, it is said to be casting.





THANK YOU