TILLAGE AND TILLAGE PRACTICES

TILLAGE

Tillage is defined as the mechanical manipulation of the soil aimed at improving its physical condition or TILTH.

Practice of modifying the state of soil in order to provide conditions favorable to growth.

Physical manipulation of soil and it is intended to destroy weeds, incorporate crop residues and amendments into soil, increase infiltration and reduce evaporation, prepare seedbed and break hard layers to facilitate root penetration (Prihar, 1990).

Primary Aims

a. Production of suitable Tilth, or Soil structure
b. Control of weeds
c. Control of Soil moisture
d. Incorporation of organic matter and agro-chemicals for weed and pest control

Objective of tillage

- Improve soil tilth and prepare a seedbed
- Manipulate plant residues and farm wastes.
- Manage water and air in the soil
- Control weeds and soil-borne insects pests and diseases.
- Establish a surface layer which prevents wind and soil erosion

Preparation of seedbed

The desirable characteristics of a seedbed are:

- Weed-free soil, which prevents the loss of precious water and plant nutrients to weeds.
- Granular soil structure, which allows close contact of the seed and the plant roots with soil practice.
- Soil free of compacted layers, which reduce air and water penetration and inhibit root development.
- Generally level soil surface which facilitates planting seeds at a uniform depth and is especially important for proper water management in irrigated areas.

Manipulation of plant residues and farm wastes

Incorporation of organic matter into soil results in:

- Increased soil fertility.
- Increased water penetration and water holding capacity.
- Enhanced soil microbial activities.

Managing water in the soil

- Tillage practices vary widely depending on the soil type, climate region and crops.
- In low rain fall areas the main need is to conserve soil moisture.
- In semiarid of Pakistan water management is critical.
- Farmers of barani areas normally do 8-10 shallow ploughings with a cultivator for moisture conservation of rain water.
- These excessive tillage may cause compaction.
- In dryland farming involve large areas of open land, in these areas large machines are most efficiently used.

Effect of tillage on soil

- **Effect on soil moisture**
  - **a) Soil water retention**
  - **b) Infiltration**
- **Effect on Soil structure**
- **Effect on Soil temperature**
- **Effect on Soil microorganism**
- **Effect on evaporation**
- **Effect on Soil nutrient uptake**

TILLAGE IMPLEMENTS

A variety of tillage implements are used to weaken soil strength, reduce compaction and allow the free movement of water and air in order to promote plant growth.

A wide range of primary tillage and seed-bed preparation and for crops.

These are used depending on the kind of soil, type of cropping and agro-climatic conditions.

Desi or local plough

This plough has been used for centuries and still being used in many areas of the country.

Main uses are:

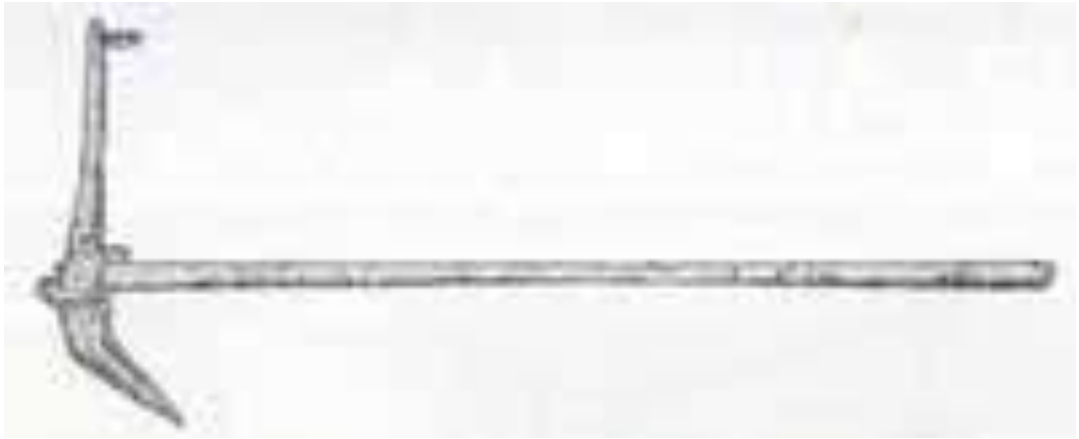
Dry ploughing ; for turning crop residues

Wet ploughing ; after soaking irrigation

Drilling; for drilling and seeding

Interculturing in cotton, maize, sugarcane….

Puddling

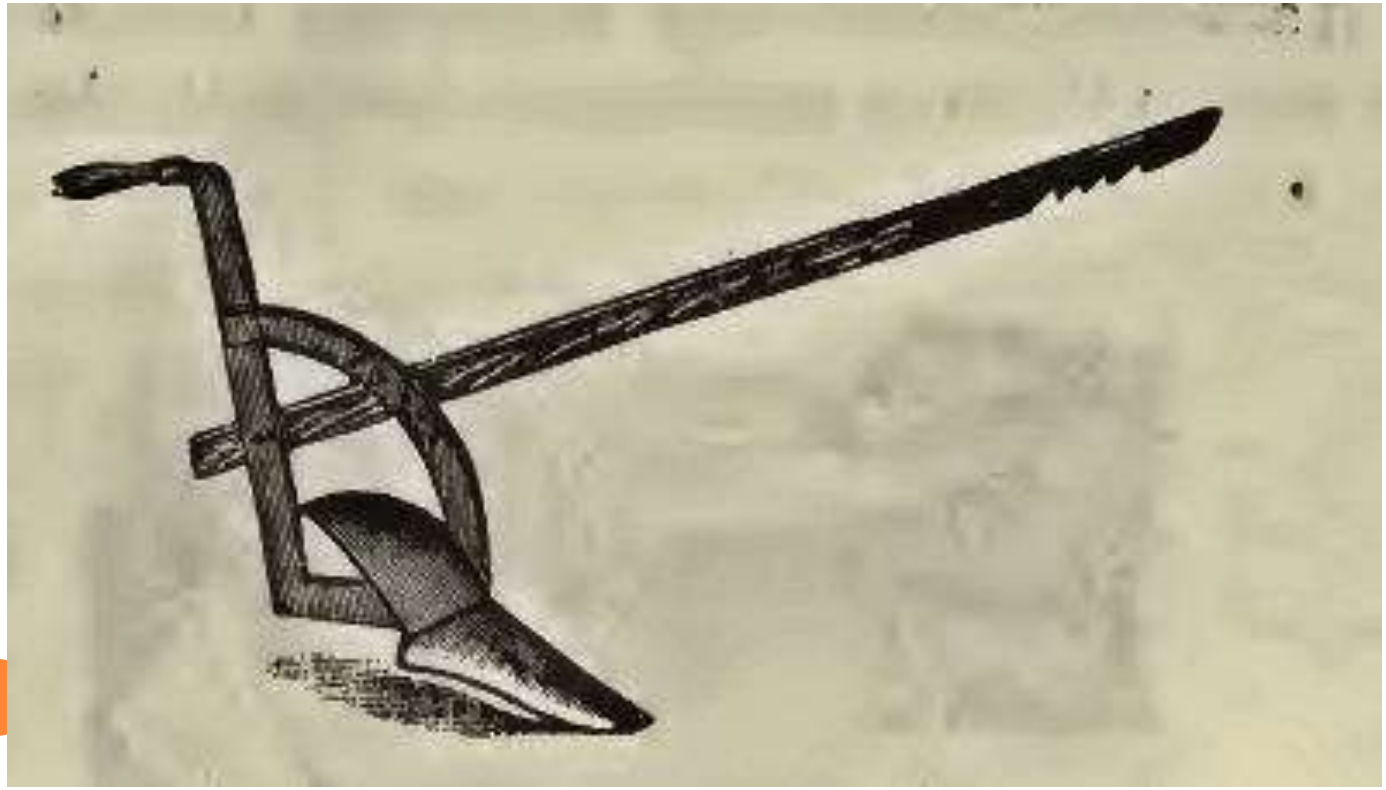


ADVANTAGES

- It cuts a rectangular furrow and leaves no uncut land between the contiguous furrows.
- It uproots weeds and burry them into the ground completely.
- The lower soil is brought up to the surface and exposed to the action of sun and air

MESTON PLOUGH

- Meston plough is similar to the heavy type in construction but its parts are smaller and lighter.
- It is also a lighter draft
- The plough has wooden handle and a long wooden beam with an iron body.
- Commonly used for both dry and wet ploughing.



PRIMARY TILLAGE IMPLEMENTS

Primary tillage is mainly an operation of cutting and pulverizing the soil to a described depth and inverting it to burry crop stubble and weeds deep in the soil

Mouldboard plough

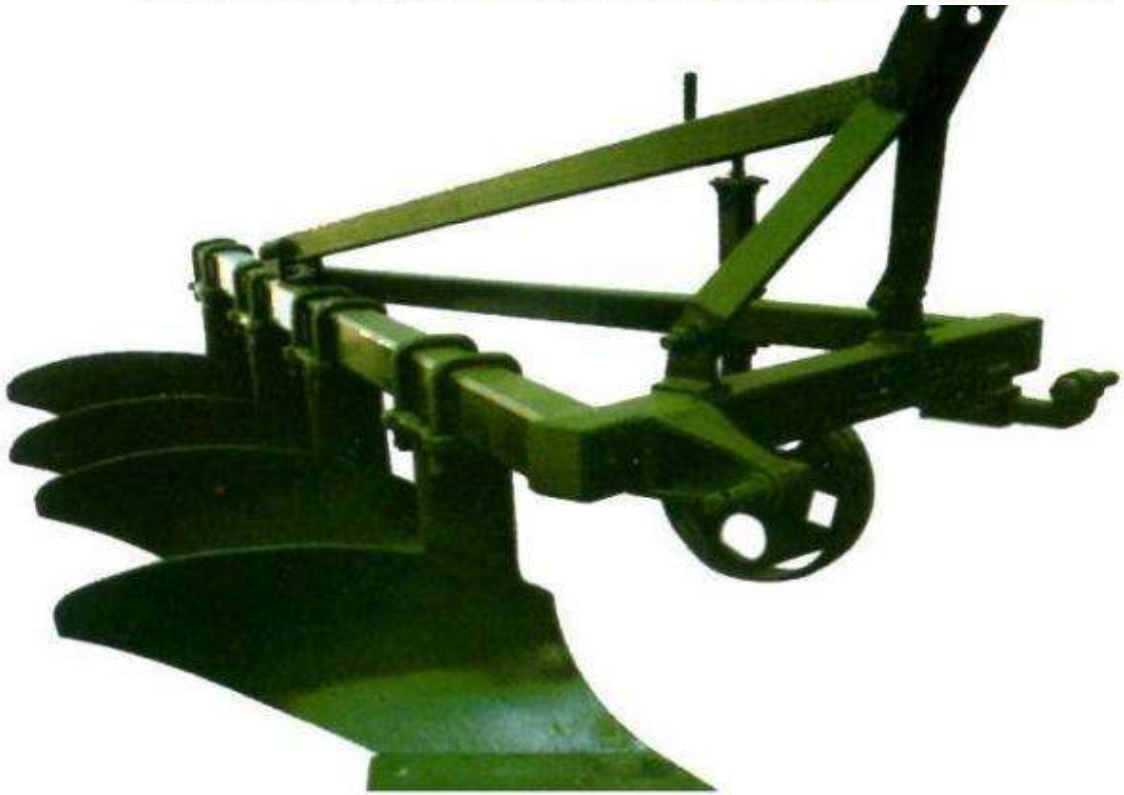
This is most common primary tillage implement.

Can effectively break many type of soils.

Its basic function is to cut, invert and pulverize the soil up to the depth of 20-30cm.

The width of ploughshare varies from 25-30cm.

It is made up of the blade, share beam, furrow wheel, jointer and three point hitch to mount on a tractor.



Disc plough

It is also an other primary tillage implement.

Because of its inclined disc blades it does not cut, invert or pulverize the soil as deeply as the mouldboard plough.

It is less effective for those tasks than the mouldboard plough.

It is more effective in breaking clods in heavy soils.

It consists of concave, round discs of hard steel, 50-75cm in diameter.

It is used for partial burial of crop residues and for soils with rocks, stumps and trees.

Recommended for dry ploughing conditions.

Chisel plough

These implements are used to open the soil deeply without turning it over.

Chisel ploughs are similar to rippers and have a working depth more or less equal to conventional ploughing depth.

These ploughs are used for special purposes.

Chisel plough is usually recommended after three years to break the established hardpan.

SUBSOILER

A subsoiler is a form of chisel plough designed to penetrate to a greater depth.

This implement can penetrate to a depth of 50cm to loosen deep soil layers and promote water movement and root growth.

A lot of power (40-60 hp) is needed to pull one shank of a subsoiler at a depth of 50cm in heavy soil.


HOOPER
HOOPER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ROTAVATOR

Rotavator or rotary plough can be used both as primary and secondary tillage implement.

It consist of a set of ‘L’ shaped blades which are normally mounted with three right handed and three left-handed blades per flange.

It can also be used for fine seed-bed preparation for vegetable production.

Although the depth does not exceed 20cm its power requirement is quite high.


nonghaha.en.alibaba.com


http://disc.net.cn

Secondary tillage implements

Secondary tillage operations are usually performed after tillage operation.

Secondary tillage operation is done to improve seedbed preparation, increase soil pulverization, conserve moisture, destroy weeds and crop residues and perform final field leveling.

Harrows

Harrows are used for a great variety of purposes, such as preparing seedbeds, covering seeds and aerating grasses.

Disc harrow

It pulverizes the soil, breaks clods, kills weeds, chops and incorporate organic matter into the soil and mixes soil amendments.

Tillage depth is limited to 15-20cm and soil is compacted below 20cm under the action of disc.

SPRING-TINED HARROWS

A light cultivator which can be adjusted to produce variable effects.

Spring-Tined/Tooth harrows are satisfactory for light tillage with little surface penetration.

No soil compaction.

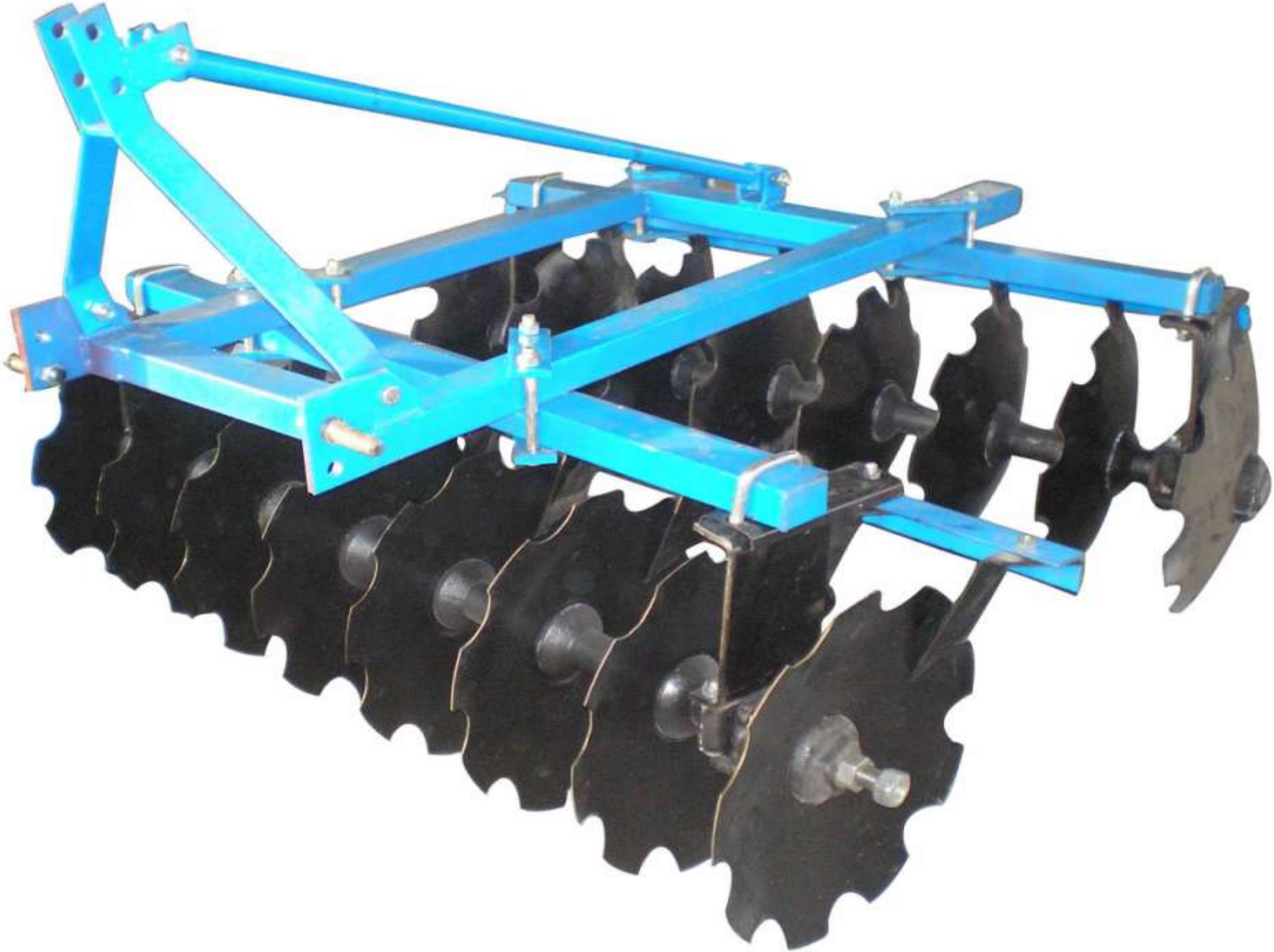
Effective for light soils i.e. sandy and sandy loam.

Spike-toothed harrows

Useful secondary tillage implements for pulverizing cloddy soils in a friable state.

Break soil crust.

They can also be used together with a plough or harrow foe one –pass primary and secondary tillage combinations.



Roller

Main objective of rollers are to consolidate the soil, crust clods, and smooth the surface.