STUDY ON AGRICULTURAL IMPLEMENTS

Mirza Hasanuzzaman, PhD
Professor
Department of Agronomy
Sher-e-Bangla Agricultural University
mhzsauag@yahoo.com

Introduction

The implements used for various agricultural operations on a farm to raise crops are called agricultural implements. The different agricultural operations include all the work done in the field from plowing to harvesting, threshing, winnowing, cleaning and storing of the agricultural produce.

IMPLEMENTS FOR PLOUGHING

The implements which are used in the plowing operation are known as plowing implements.

Functions of plowing:

1. It cuts the soil
2. It inverts the soil partially or completely
3. It sometimes pulverizes the soil
4. It controls weeds and insects
5. It helps in mixing manures and fertilizers.

Types of plows:

A. Country plow
B. Mouldboard plow
    i. Standard plow
    ii. Sub-cum plow
    iii. Kishan plow
    iv. Chashi plow
C. Disc plow
D. Rotary plough/Rotavator

A. Country plow

A country plow is a commonly used plowing implement in our country and is also used for tillage operations. It is made of wood except for the share. The share is used for making furrows. Its grooves are used to connect the plow to the yoke and to maintain plow depth.

Grip

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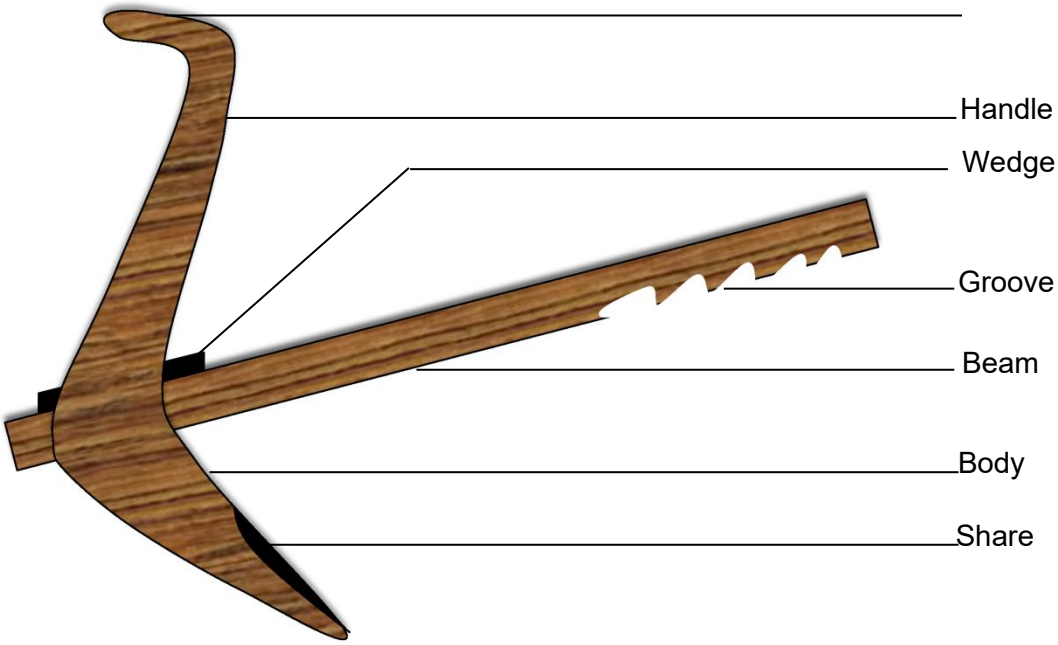


Fig. Country plow and its different parts

Characteristics of plowing by country plow:

1. The depth of plowing is about 0−15 cm.
2. It has no mouldboard; hence, there is no inversion of soil.
3. A 'V'-shaped furrow is made, leaving the unplowed land between the two furrows.
4. When the length of the beam is increased, the depth of the furrow is increased and vice versa.

Efficiency: 0.135 ha /working day (8 hours).

Merits:

1. Low cost of making.
2. It can be made easily.
3. It is easy to operate.
4. It can be transferred easily from one location to another.
5. It is light in weight. So, our country bullocks can draw it easily.

Demerits:

1. Depth of plowing is low.
2. It can not invert and pulverize the soil properly.
3. It makes a plow pan.
4. Unplowed land remains between two furrows.

B. Mouldboard plow

In the Indian subcontinent, a more advanced plow with a mouldboard was developed. This special type of plow is known as a mouldboard plow.

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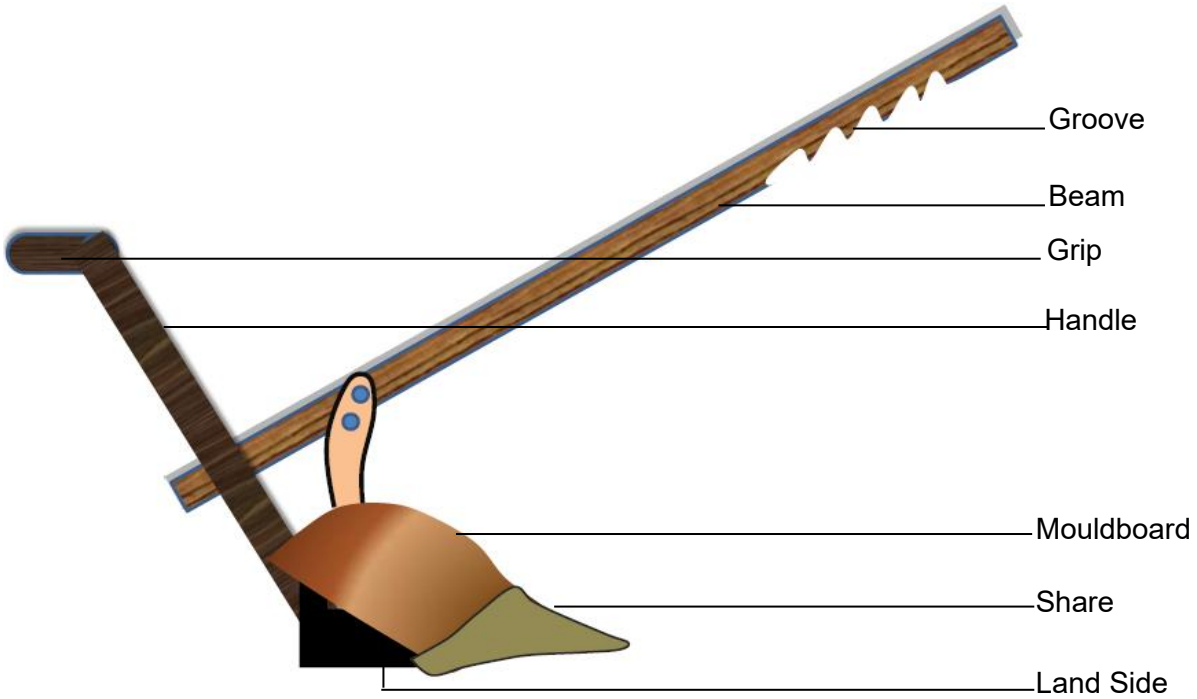


Fig. Mouldboard plow and its different parts

Characteristics of plowing by mouldboard plow:

1. It can invert the soil completely due to the presence of the mouldboard.
2. Depth of plowing is more than a country plow (0- 25 cm).
3. A 'U' shaped or 'L' shaped furrow is made, so there is no unplowed land between two furrows.
4. It can pulverize the soil properly.

Efficiency: 0.404 ha/ working day.

Merits:

1. Deep plowing is possible.
2. Complete inversion of soil.
3. Absence of unplowed land between two furrows.
4. It can be suitably used in weed-infested and hard land.

Demerits:

1. It is more costly than a country plow.
2. Sometimes difficult to be drawn by our country bullock.
3. It is heavier than a country plow.
4. Repairing is difficult.
5. Requires experienced laborers to operate.

C. Disc plow

Disc plow does not bear any resemblance to the other plow. The plow bottom consists of one to eight large concave discs set at an angle to the line of draught. The discs are mounted on a frame, which is supported on the wheels. The discs enter the soil under the heavy weight of the frame, aided by the scarping action of the discs.

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Fig. Disc plow

Efficiency:

Tractor drawn: 2.8-3.2 ha/ working day.
Power tiller drawn: 1.0- 1.25 ha/ working day.

D. Rotary plough/Rotavator

It is a power-operated plow. It consists of a rotating shaft having several tines.



Fig. Rotary plough/Rotavator

IMPLEMENTS OF LADDERING

The implements used to level the land, break the clods after plowing, and collect weeds are known as laddering implements.

Functions of a ladder:

1. It is used to break the clods after plowing.
2. It is used to level the surface of the field.
3. It is used to collect weeds.

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Side bar

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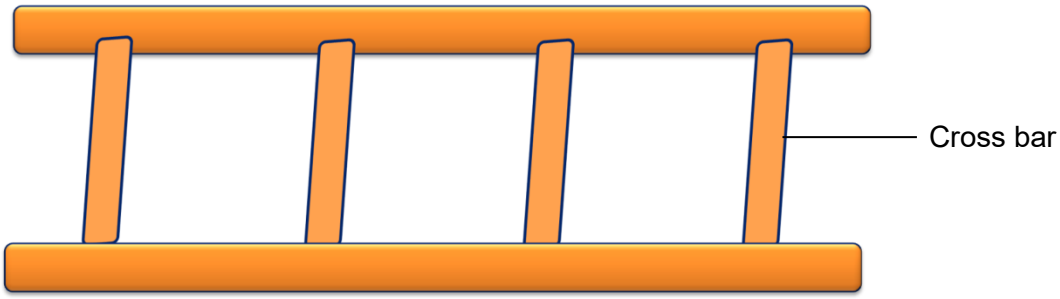


Fig. Double Bar Ladder

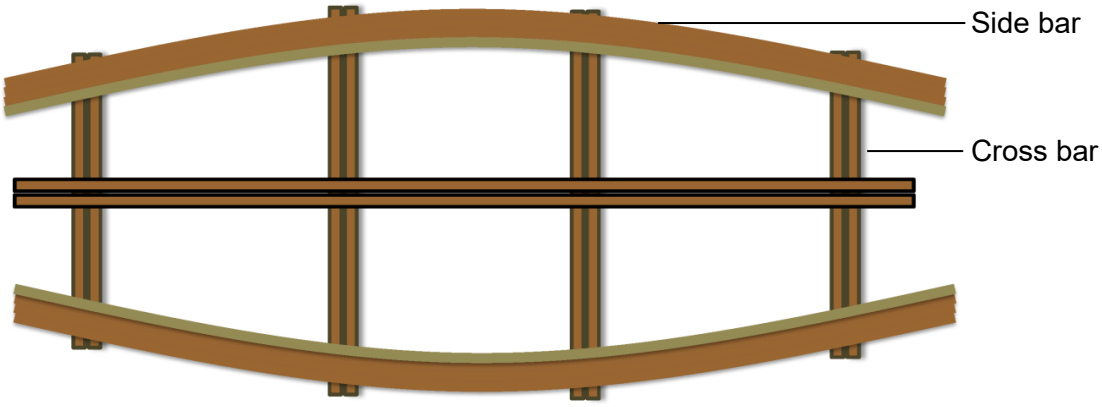


Fig. Triple Bar Ladder



Fig. Wooden Ladder

IMPLEMENTS OF INTERCULTURAL OPERATIONS

The operations performed from seed sowing/seedling transplanting until crop harvest in the field for successful crop production are known as intercultural operations. The implements, which are used in different intercultural operations, are grouped into the following classes:

a. Raking implements

The operation by which the upper crust of the soil is broken is known as raking. The implements, which are used in the raking operation, are known as raking implements.

Functions of a rake:

1. The main function of a rake is to break the upper crust of the soil.
2. It is used to loosen the soil.
3. It maintains plant population in the field.
4. It controls weeds.

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There are different types of ladders, such as:

i) Field rake ii) Hand rake iii) Garden rake

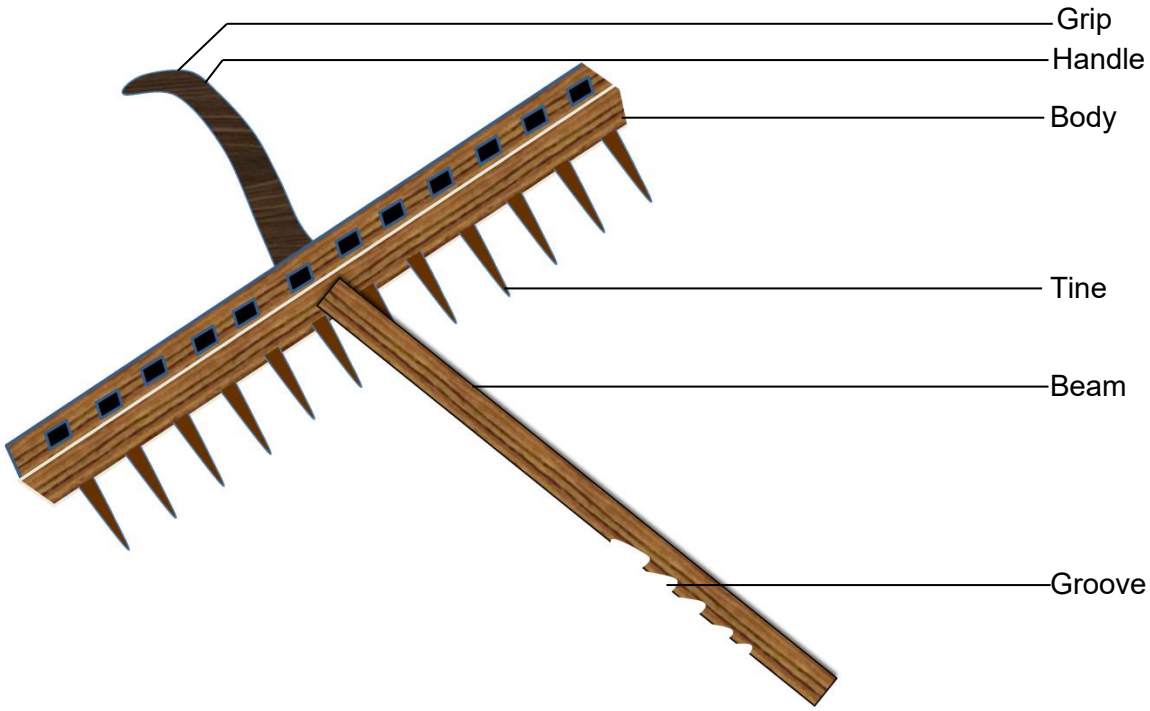


Fig. Field rake and its different part



Fig. Hand rake

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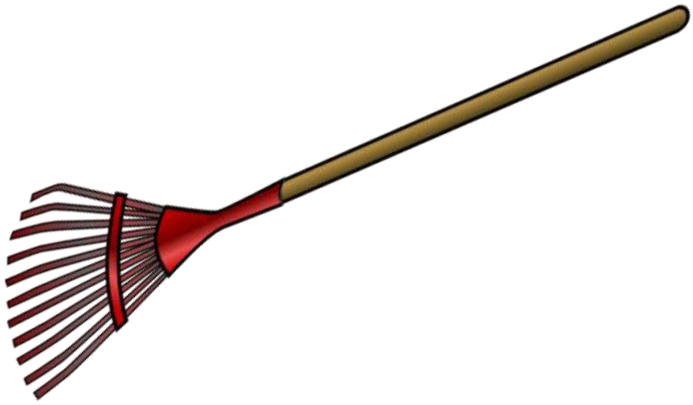


Fig. Garden rake

Difference between field rake and hand rake:

Field rake	Hand rake
1. It has a beam.	1. It has no beam.
2. It has a groove on the beam.	2. It has no groove.
3. It has a grip on the handle.	3. It has no grip on the handle.
4. It is used in a large area.	4. It is used in a small area.

SEEDING IMPLEMENTS

The implements which are used for sowing seeds or transplanting seedlings are known as seeding or transplanting implements. These are:

i. Seed drill
ii. Furrower
iii. Rice transplanter
iv. Drum seeder

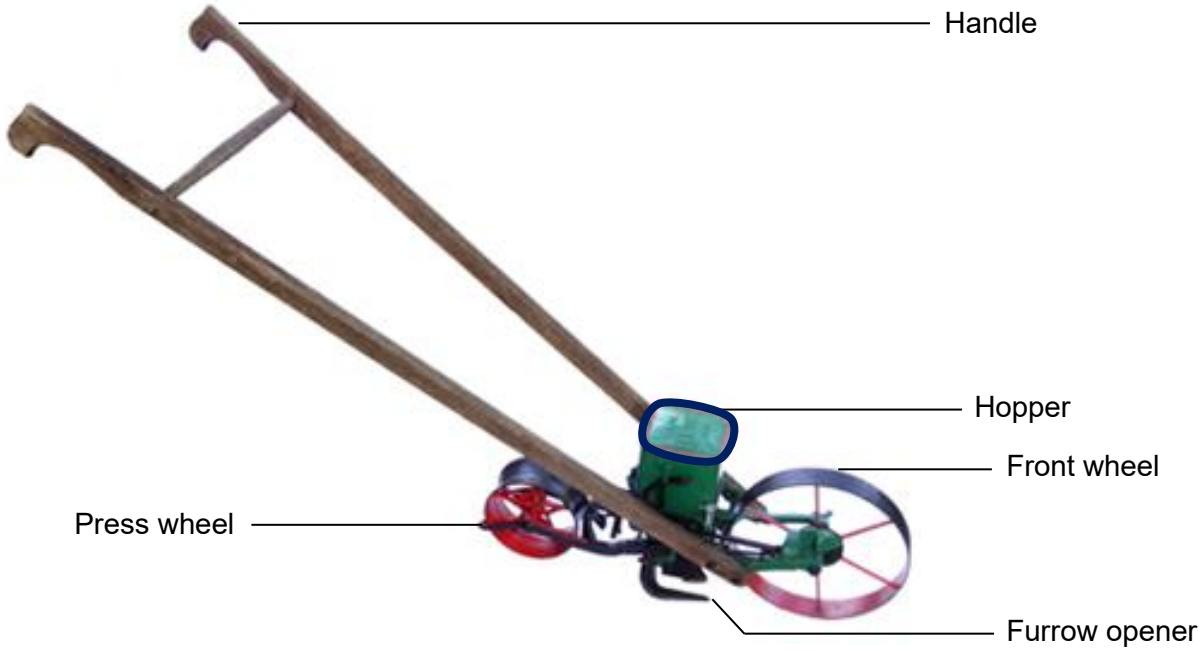
Seed Drill

The equipment is used to drill seeds in line at the optimum depth of soil to ensure proper germination of seeds with optimum moisture for optimum growth, development and yield of the crop. The equipment contains the following parts.

Handle: To hold the equipment firmly and make it functional
Hopper: To receive seeds and let the seeds be canalized
Metering device: To keep line-to-line distance fixed as required
Line marker: To facilitate seeds to be drilled with required plant spacing
Furrow opener: To open the furrows to be drilled with seeds
Furrow closer: To close the furrows with loose soil
Press wheel: To ensure light compaction of soil of closed sown furrows
Front Wheel: To keep the equipment moveable

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DRUM SEEDER:
The equipment is used to sow rice seeds in line on the puddle soil as direct seeding. The length of the drum seeder is 2 meters. The seeder's seed loading capacity is 12 kg. The equipment contains the following parts:



Fig. Drum seeder

Efficiency: 35-58 kg seed sown /ha

IMPLEMENTS OF INTERCULTURAL OPERATIONS

Weeding and mulching implements:

Weeding is the removal of unwanted plants from the land, and mulching is the making of an artificial layer on the soil surface to conserve soil moisture. The implements used to carry out these operations are known as weeding and mulching implements. The implements are as follows:

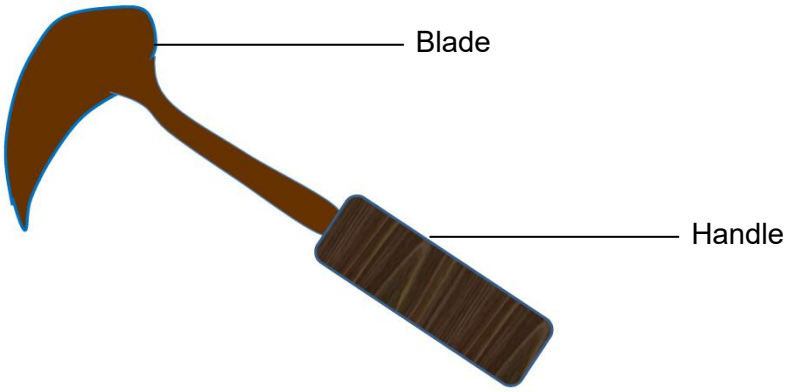
i. Nirani
ii. Khurpi
iii. Hand hoe or wheel hoe
iv. Japanese rice weeder

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Nirani:

It is small sized weeding and mulching implements and consists of iron blade & wooden handle.



Khurpi

It is a small sized implement used for weeding and mulching. It consists of iron blade and wooden or bamboo handle.



Fig. Khurpi

Hand hoe/ Wheel hoe:

It is an implement used for weeding and mulching row crops in dry conditions. It is made of iron & wood and consists of different parts, which are shown in the figure.

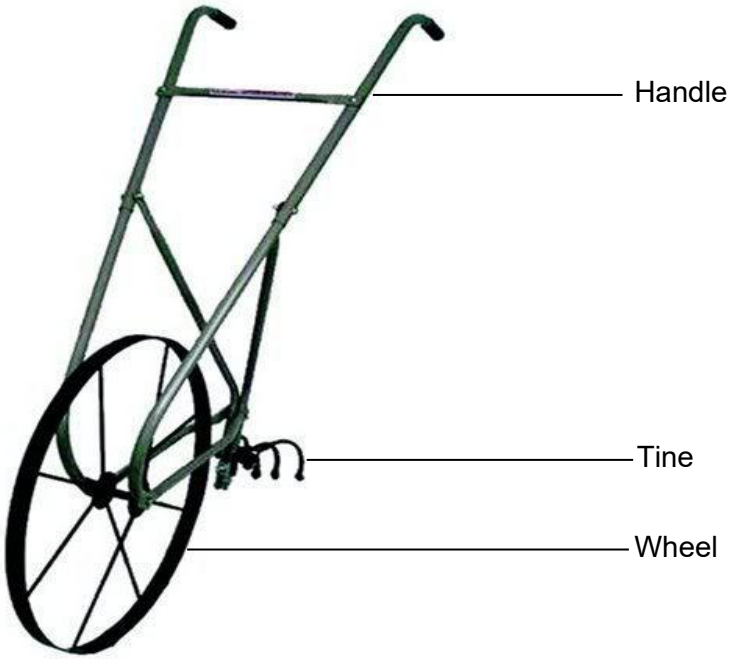


Fig. Hand hoe/ Wheel hoe

Efficiency: 0.4-0.8 ha/ working day

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Japanese rice weeder:

It is an important weeding implement in rice fields with 10-12 cm of water. The different parts of a Japanese rice weeder are shown in the figure.

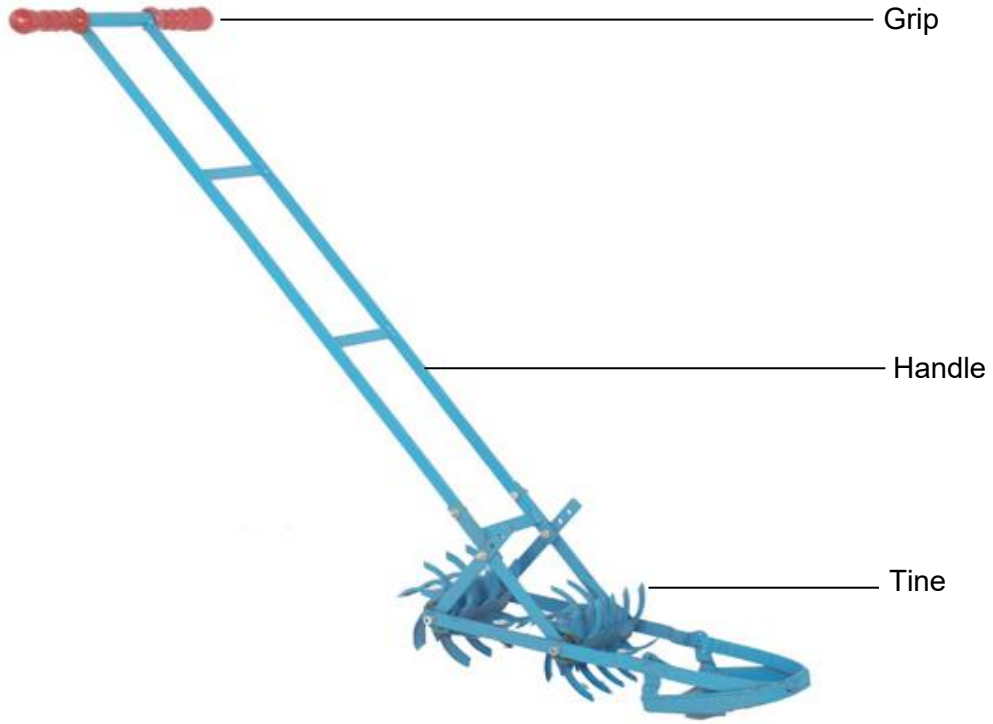


Fig. Japanese Rice Weeder

Efficiency:
0.4-0.5 ha/ working day.

IMPLEMENTS FOR IRRIGATION AND DRAINAGE:

Irrigation is the artificial application of water to the crop field for successful crop production. Drainage is the provision of a system for the removal of excess irrigation or rainwater from the land surface to provide suitable soil conditions for better plant growth.

The implements used for irrigation and drainage are known as irrigation and drainage implements. These implements are as follows:

i. Swing basket
ii. Swing shovel
iii. Watering can
iv. Shallow tube-well
v. Deep tube-well
vi. Persian wheel
vii. BRRI pump
viii. Paddle Pump

Swing Basket:

It is a conical like basket of 4-14 liter capacity, which is made of tin or bamboo and has two ropes of about 1.8 m long in each side.

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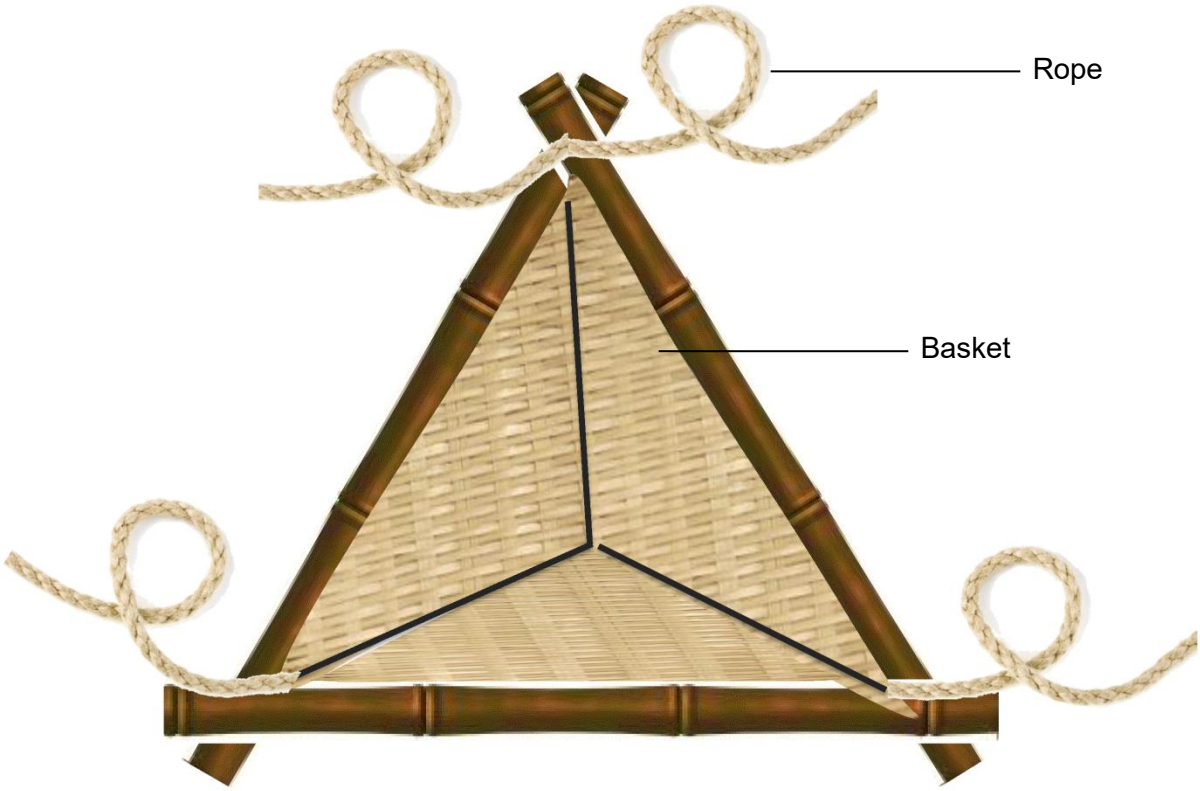


Fig. Swing Basket

Functions of a swing basket:

It is generally used for irrigation purposes. Sometimes it is also used to drain out the excess water from the land.

Merits:

i. It can be made locally
ii. Low cost of making
iii. Maintenance is easy

Limitations:

i. Efficiency is lower than swing shovel
ii. It is impossible to lift water where the water surface is so below the land.

Surface efficiency:

This implement can lift 1300-1800 liters of water per hour, and 0.3 ha of land can be irrigated within a working day.

SWING SHOVEL:

It is a boat-shaped implement having 40 cm width, 18 cm depth and 3.5-6.0 m length. It is made of tin, iron sheet or wood.

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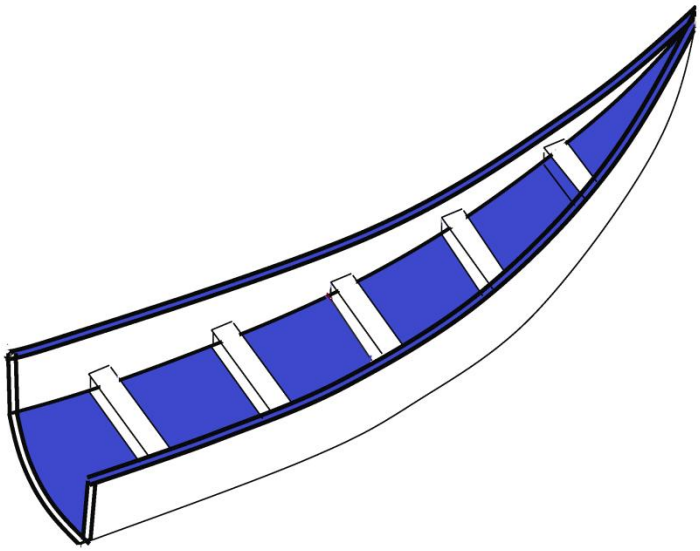


Fig. Swing Shovel

Function: It is needed for irrigation purposes

Merits:

i. It is possible to lift water from a depth of 1.2- 1.5 m by this implement.
ii. Irrigation efficiency is higher than swing basket
iii. Only one laborer can easily operate it

Limitations:

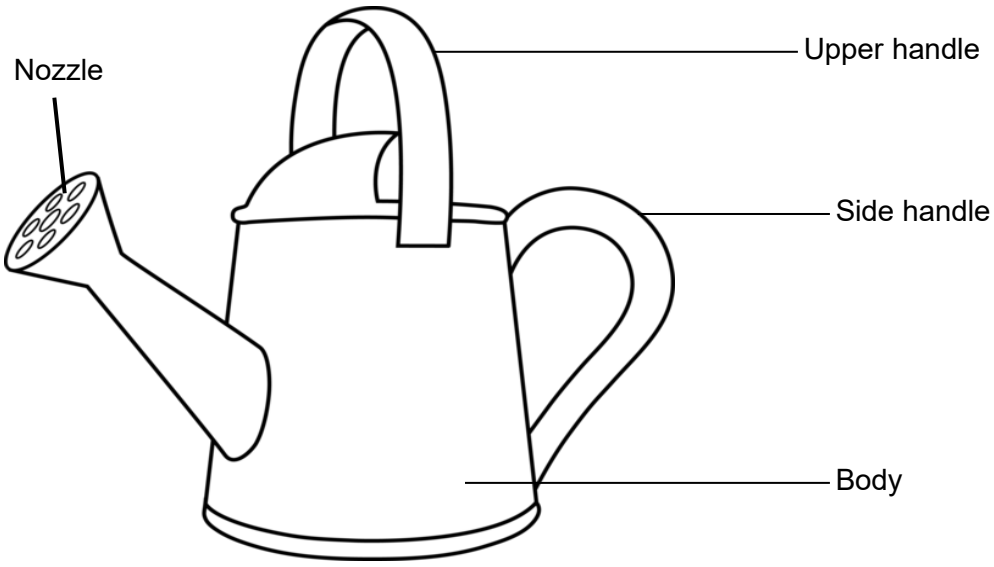
i. It is more difficult to carry
ii. More labor is required for setting the implement

Efficiency:

It can lift 4500-6700 liters of water per hour, and 0.808 ha of land can be irrigated per working day by this implement.

Watering can:

It is generally used for irrigation in gardens and mostly in limited areas. It consists of a body, a supply tube, a nozzle, an upper handle and a side handle.



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IMPLEMENTS FOR APPLYING PESTICIDES

The chemicals used to kill or control pests (insects, pathogens, weeds, etc.) are known as pesticides, and the implements used to apply these pesticides are known as pesticide-applying implements. These are as follows:

1. Sprayer
    a) Hand sprayer
    b) Knapsack sprayer
        i. Semi-automatic
        ii. Automatic
        iii. Motor or Power sprayer
2. Duster
3. Basket pump

Hand sprayer:

During operation, the liquid container remains in the hand. The hand sprayer is of two types: i. Hand sprayer (single action) ii. Hand sprayer (double action).



Fig. Hand Sprayer

Knapsack sprayer:

There are two types of knapsack sprayer. These are as follows. Semi-automatic ii. Automatic

An automatic knapsack sprayer consists of the following parts:

a) Handle
b) Lock
c) Body or barrel
d) Position
e) Hose pipe
f) Filling can or lid
g) Pressure gauge
h) Trigger
i) Spray gun
j) Nozzle

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Fig. Knapsack Sprayer

IMPLEMENTS FOR HARVESTING, THRESHING AND WINNOWING

Harvesting implements

i. Sickle
ii. Spade
iii. Hashua
iv. Corn picker
v. Boll picker
vi. Rice cutter
vii. Combined harvester

Threshing implements

i. Paddle thresher
ii. Cane thresher
iii. Wheat thresher
iv. Corn thresher

Winnowing implements

i. Seed cleaner
ii. Kula or winnowing fan
iii. Sieve

MISCELLANEOUS IMPLEMENTS

i. Yoke
ii. Seed dresser
iii. Dibbler
iv. Moisture meter
v. Shovel
vi. Belcha
vii. Rope
viii. Spade
ix. Hammer

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