PRACTICING WEEDING, THINNING AND MULCHING OPERATIONS

Mirza Hasanuzzaman, PhD
Professor
Department of Agronomy
Sher-e-Bangla Agricultural University

Weed

- A plant growing in a place where it is not desired is a weed (Shaw, 1956).
- A plant out of place is referred as Weed (Rao, 1983).
- Weeds are unwanted and undesirable plants which interfere with the utilization of land and resources (nutrient, light and water) and thus adversely affect human welfare (Gupta, 1884).

Weeding

The process by which unexpected plants are removed from the desired crop is known as weeding.

Methods of weeding

a) Mechanical methods
b) Physical approaches
c) Cultural methods
d) Biological methods
e) Chemical or herbicidal methods

Mechanical control

A. Mechanical Method

This method involves the use of physical energy directly or through implements, either manual, bullock drawn or power operator.

i) **Hand weeding:** Hand weeding involves the physical removal or pulling out of weeds by hand or removal by implements (khurpi).

ii) **Hoeing:** It involves the removal of weeds by using hand hoe.

iii) **Tilling:** In this process ploughing, harrowing, levelling etc pre-planting tillage operations injured or destroy both top and underground parts of the perennial weeds.

iv) **Mowing:** This method is consisted with the removal of above ground portion of weeds by using different types of mows.

v) **Flooding:** Flooding is successful against weed species sensitive to longer period of submergence under water. In this process 15-30 cm depth water level maintained 3 to 8 weeks. Due to shortage of oxygen supply underground part of the flood sensitive weed species reduced or destroyed. e.g. Mutha (*Cyperus rotundus*).

vi) **Smoothing/Shading:** Smoothing is the completely exclusive of light by artificial mulch or by using crop plants to prevent all top growth or underground part (rhizome, tuber of Mutha) of perennial weeds.

Advantages of mechanical control

- It is the widely practiced methods and more effective.
- It can control all kinds of weed.
- Soil loosening and thinning are also performed as well.
- No technical know-how is needed.
- It facilitates aeration of soil.

This hand-out is not an alternative of Class Lectures or Books:: FOR STUDENTS' USE ONLY

Limitations of mechanical control

- It is more costly.
- It needed more time and labor.
- Crop plant (especially root) may be injured.
- Various implements are needed.
- It causes soil erosion (especially in high topographic areas).
- Risky at the places adjacent to crop roots.

Biological Control

Biological weed control is the use of natural enemies (Animal, insect, mite, pathogen etc.) to reduce weed population to an economically acceptable limit.

The organisms which are used as natural enemies to control the weeds are called Bio agent.

The important bio agents which are engages in controlling weeds are as follows –

1. Insects
2. Mites
3. Pathogens
4. Animals
    a. Grazing animals
    b. Fishes
    c. Tadpole shrimp
    d. Snail

Advantages of Biological Weed Control

- Non toxic
- Non laborious
- Does not hamper the soil properties, environment and soil micro-organism
- No mechanical injury to plant
- Economic
- No pollution or degradation to the environment

Limitations of Biological Weed Control

- Slow process (even years after years)
- Host specificity
- BCA is sensitive to environment and weather conditions
- Not suitable for diverse and complex weed problem
- Total control is not possible.

Chemical Control

In this method chemical substance named weedicides or herbicides are applied to remove weeds. The chemicals which are used to control weeds are called *Herbicide.*

Some common herbicides: Ronstar®, Dalapon®, Propanil®, Diquat®, Balasta®, Sunrice®, Paraquat®, EPTC, Alachlor® etc.

Some common herbicides for rice field: Butachlor®, Amchlor®, Clear®, Rifir®, Ronstar®, Oxstar®, Corostar® etc.

Advantages of chemical control

- It needed less time and labor as well as money.
- No possibility of soil erosion.
- Incorporation of weeds causes the addition of organic matter.
- Can control selected weeds.

This hand-out is not an alternative of Class Lectures or Books:: FOR STUDENTS' USE ONLY

- Can also control weeds adjacent to crop roots.
- Applicable both in wet and dry land.
- Crops are not injured.

Limitations of chemical control

- Technical knowledge is needed.
- If herbicide application is not appropriate, it can cause damage to the crop.
- Causes adverse effect on physical, chemical and biological properties of soil as well as environment.
- Improper selection of herbicide may cause serious effect.
- It may cause resistance to weeds.
- Herbicides may not be available in the market.
- Special machineries are needed for herbicide application.
- Create unemployment problem.

Calculation of weeding efficiency

Length of the land: 15 m
Breadth of the land: 8 m
Area of the land = 15 × 8 m = 120 m^2
Time of weeding: 20 min

We know,

$$\text{Efficiency} = \frac{\text{Area}}{\text{Time}} = \frac{120\ m^2}{20\ min} \times \frac{1\ ha}{10000\ m^2} \times \frac{60\ min}{1\ h} \times \frac{8\ h}{1\ working\ day}$$

$$= \frac{120 \times 60 \times 8}{20 \times 10000} \frac{ha}{working\ day}$$

= 0.288 ha working day^{-1}

Thinning

Thinning is the process by which crop plants are removed from the field to obtain a desired plant population with desired spacing.

Objective of thinning

- To maintain a desirable spacing
- To maintain a desirable plant population
- To ensure the optimum requirement of nutrient, light, moisture and aeration for plants
- To keep the crop plants free from insects and diseases
- To maintain the quality and quantity of the produce

Methods of thinning

A. Physical method
It includes the removal of crop plants by hand pulling

Advantages of physical method of thinning

- It is suitable for small area
- Desired plants are not injured

Limitations of physical method of thinning

- More costly
- Time consuming

This hand-out is not an alternative of Class Lectures or Books:: FOR STUDENTS' USE ONLY

- Not suitable for large area
- Uniform spacing may not be obtained

B. Mechanical methods

It includes the thinning operation performed by using implements either manually or operated.

Mechanical method includes

i) Thinning by using *nirani* in rice, jute or wheat field
ii) Sickling in jute
iii) Raking in rice, wheat, jute etc.

Advantages of mechanical method of thinning

- Less time consuming
- Suitable for large area
- Uniform spacing may be obtained specially by raking

Limitations of mechanical method of thinning

- Sometimes desired plant species may be injured by implements
- Heavy implements like field rake can't be used in small area

Mulching

It refers to cover the vacant space of the crop field or breakdown the topsoil surface with artificial or natural (soil) mulch to conserve soil moisture.

Objectives of mulching

- To protect the soil from erosion
- To reduces compaction from the impact of heavy rains
- To conserves moisture, reducing the need for frequent watering
- To maintains a more even soil temperature
- To prevents weed growth
- To keeps fruits and vegetables clean

Mulch

The materials used for mulching are called mulch.
Mulches are of two types –

a. **Organic mulches:** Water hyacinth, rice straw, rice husk, saw dust, leaf etc.
b. **Inorganic mulches:** paper, polythene, plastic etc.

Types of mulching

1. Natural mulching: It refers to the mulching operation done in the field to break down surface crust of the crop field. No artificial mulch materials are use in this case.

2. Artificial mulching: It refers to the operation done in the field to cover the gap space of the crop field with external or artificial mulching materials. Different mulching materials like opaque polythene, water hyacinth, saw dust, unfilled grain, paper etc. are use in this case.

This hand-out is not an alternative of Class Lectures or Books:: FOR STUDENTS' USE ONLY