UNIT-3

METHOD OF IRRIGATION

3.1. Introduction

There are various methods of irrigation for different types of crops. These methods depend upon the water requirement of crops.

In general, methods of irrigation depend on the following criteria:

- Water supply available at the source
- Topography of the area
- Climate of the area
- Type and nature of soil
- Type of crops
- Local traditional skills

The various methods adopted for irrigation are:

i. Surface Irrigation
ii. Sub-surface Irrigation
iii. Sprinkler Irrigation
iv. Drip Irrigation

3.2. Surface Irrigation

In this method, water is distributed over the soil surface by gravity flow of water.

Advantages

- Widely used method
- Easily understood by local users
- Can be developed with minimum cost
- Less affected by environmental agents
- Highly flexible and can be modified

Disadvantages

- Less efficient
- Labour intensive
- Takes more time for construction
- Chance of soil erosion
- May affect nearby soil

Types of Surface Irrigation

1. Uncontrolled Flooding
2. Controlled Flooding
3. Check Flooding
4. Basin Flooding
5. Furrow Irrigation
6. Zigzag Method
7. Contour Farming
8. Contour Laterals

1. Uncontrolled Flooding

- It is also called wild flooding.
- It is suitable for for crops that are cultivated closely.
- Contour ditches are spaced at 20 to 30m.
- The water from main supply ditch is collected in contour ditch or subsidiary ditch or lateral ditch.
- The water from contour ditch is allowed to flow freely without control.
- It has less initial cost
- It demands high labour.
- It has less efficiency
- It is suitable for slopy or irregular land.

2. Controlled Flooding (Free Flooding)

- This method involves dividing the irrigation land into several strips having width of about 10-20m and length of 100 to 400 m.
- It is the controlled overflow of water over the land without any disturbance.
- It is done for land preparation
- It is performed on relatively slopy and irregular lands

3. Check Flooding

- In this method water is supplied to a relatively levelled plot or checks which are surrounded by borders or levees.

- The check area is 0.2 to 0.8 hectares.
- This method is useful in very permeable soils.
- It is less costly and require less labor.
- It's efficiency of irrigation is low and is not suitable for all crops.
- It is less feasible for slopy ground.

4. Basin Flooding

- It is special type of check flooding.
- Water flows from main supply ditch passes to subsidiary ditches.
- Water from subsidiary ditches is transferred to basin that has one or more trees.
- This method is suitable for orchard trees

5. Furrow Irrigation

- This method of irrigation is widely used for row crops.
- Small furrow (called corrugation) is used for row irrigation.
- Furrows are narrow field ditches that can carry water.
- It's length is 400 metres and depth is 8 to 30 cm.

6. Zigzag Method

- In this method, the agricultural land is sub-divided into small plots in a zigzag manner.
- The water is supplied to the plots from the field channel through opening.
- Water flows in a zig zag way.
- Its efficiency is higher and labour cost is less.
- It is possible to apply water uniformly.
- Fertilizers can be uniformly applied by mixing with water.
- It is only suitable for row crops.
- Irrigation cost is higher.
- More time is required for irrigation.

7. Contour Farming

- Contour Farming is sustainable way of farming where farmers plant crops across or perpendicular to slopes by following slope of a field.
- Contour farming reduces soil erosion.
- It is effective in slopes having gradient 2 to 10%
- It requires a certain amount of rainfall in a given period for growth of crops.

8. Contour Laterals

- It is special type of flooding in which field channel or laterals are in aligned approximately along the contour.
- Irrigation is only possible on one side.

3.3. Sub-surface Irrigation

- It is also called sub irrigation method or underground irrigation.
- It is the practice of applying water to soils directly under the surface of soil.
- Moisture reaches the plant root through capillary action of water.
- Either trenches are constructed or underground porous pipelines are installed for sub-surface irrigation.
- Water is discharged into trenches or porous pipes.
- Water moves laterally and upward to moisten the root zones.

Advantages of sub-surface irrigation:

- Soil can be maintained at suitable moisture condition.
- Evaporation loss from soil surface is minimized
- Can be used for soil with low water holding capacity

Disadvantages of sub-surface irrigation:

- High risk of clogging
- Salt may accumulate especially if saline water is used
- Emitters can be damaged or blocked by root hairs
- Growth of algae may occur.
- Suspended organic matter and clay may damage the system.
- Rodents and mice may chew the pipes which results in lot of repair work

- Heavy materials and equipments may damage the pipeline.

3.4. Drip Irrigation

- In drip irrigation, water is applied to each plant separately in small, frequent, precise quantities through drippers / emitters.
- It is most advanced irrigation method.
- It has highest application efficiency.
- It is also called TRICKLE IRRIGATION.
- It consists of head control unit, main/submain pipelines, feeder pipelines, hydrants, laterals lines with drippers/emitters.

Advantages

- High efficiency
- Low water consumption
- Less chance of weed growth
- High crop yield
- Fertilizers efficiently used
- Level ground not required

Disadvantages

- High initial and operational cost
- Clogging risk
- Highly skilled person is required for installation and operation
- Salinity problems may arise

3.5. Sprinkler Irrigation

In this method, the water is distributed in the field by spraying water over the field by using sprinklers or nozzles in pipelines.
A high speed pump is used for individual fields.
Sprinkler irrigation method saves water by 16 to 70% and yield increase by about 3 - 57%.
It is of two types. They are:

i. Rotating head or revolving sprinkler system
ii. Perforated pipe system.

Components of sprinkler irrigation

i. A pump unit
ii. Main/sub main pipeline
iii. Lateral pipelines
iv. Sprinkler head / perforated pipes
v. fitting and accessories

Advantages of sprinkler irrigation

- Affordable
- Easy to install
- Easy measurement of water
- Easy operation
- Equal and uniform distribution of water.

Disadvantages of sprinkler irrigation

- High initial cost
- Water loss due to evaporation
- Diverting of water due to saline water
- Clogging due to saline water