JOB ROLE – FLORICULTURIST (OPEN CULTIVATION)

Sector – Agriculture

(Qualification Pack Code: AGR/Q0701)

PPT's for Class XI

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UNIT 5: PLANT NUTRITION AND IRRIGATION

Session 3: Irrigation and Drainage

Content

Session Objectives

The student will be able to :

- Demonstrate irrigation methods and drainage.

Introduction

Water near the root zone is more important for plants as it creates a favourable ecosystem around the root zone. Water is a good conductor of minerals and nutrients. It maintains turbidity of cell and helps in various biochemical changes within the cell. The deficiency of water near the root zone of a plant can be corrected by irrigation.

Irrigation water may be taken from surface water as rivers, canals, lakes, ponds, etc., or may be pulled out of the soil (wells and tube wells).

Methods of Irrigation

The artificial supply of water to support plant growth and production in the absence of adequate supply of water through rainfall is known as irrigation.

There are three methods of irrigation, viz. surface, sub-surface and aerial (overhead or sprinkler) irrigation.

Surface irrigation

There are four ways of applying surface irrigation.

1. Flood irrigation
2. Furrow method
3. Basin method
4. Ring method

Methods of Irrigation

Flood irrigation method

It is a traditional practice of irrigation. Water is delivered through pipe or open water channel in a field so that the irrigated water can move freely in all directions and cover the surface of the land in a continuous sheet as in case of flood.

Features

- It is followed in densely planted crops.
- It is practiced in areas with ample and easily available water.
- It is applied in soils not eroding easily.
- It is given to soils, which are permeable.
- It is given in land, which is well-levelled having systematic gradual slopes.

Methods of Irrigation

Flood irrigation method

Advantages

- It is useful for shallow soil.
- Operation costs are very low.

Disadvantages

- The water requirement is more.
- Loss of water is very high due to runoff and percolation.
- There is excessive soil erosion on steep land.
- Loss of manure and fertiliser are eroded from the soil.
- It is not recommended in highly spacious crops.
- It enables more weed population in the field.

Methods of Irrigation

Border irrigation method

This system is appropriate for broadcast or crop plant sown lines. Apart from sandy soil, this method is the most suitable of the soil textures. The land is levelled and divided into different strips by making soil bunds of 30 cm height in between each strip. Strips of 3–10 m width and 30–90 m length with 0.5% slope are formed.

Advantages

- Suitable to irrigate crops on steep slopes up to 7 per cent.

Disadvantages

- Larger flows are required for irrigating border strip.
- It is suited only for soils that do not readily disperse.

Methods of Irrigation

Furrow (ridges) irrigation method

In this method, water is applied to the field in furrows between two ridges. These furrows are lined among rows of the crop according to the slope of the land. Furrows, 3–6 meters in length, are spread in such a way that water reaches to every nook and corner of the cultivated land.

Irrigation furrows may run straight according to the slope of land, so there is great economy in the use of water.

Methods of Irrigation

Furrow (ridges) irrigation method

Advantages

- High water efficiency.
- Can be used in any row crop.
- Alternate furrow irrigation may be adopted to save water.
- Relatively easy in stalling.
- Not expensive to maintain.

Disadvantages

- More skilled persons are required.
- It is essential to provide drainage system.
- Excess water penetrates at the opening and at the end.
- It is not applicable on uneven land.

Methods of Irrigation

Basin method

This method is widely used in orchards. A basin is a small patch of land bunded around a tree. The soil, gradually, slopes down from the base of the tree to the edge of the basin.

Methods of Irrigation

Sub-surface method

In this system, the water is led into underground perforated pipes. By the upward capillary movement, the water slowly reaches the root regions of the plant. This method of irrigation is not commonly practised in orchards and plantations.

Sprinkler or overhead irrigation

Water is sprinkled over the crop, as well as, on soil in a circular fashion as rain does. Water with pressure is forced with revolving sprinkler nozzles through pipes fitted with stand. Water can be applied at controlled rate and distributed uniformly. It is an ideal system for hilly and undulating regions, where other systems cannot be used.

Methods of Irrigation

Sprinkler or overhead irrigation

Advantages

- It ensures uniform distribution of water up to a depth of 10-15 mm.
- It is adaptable to most kinds of soil and useful in plains, as well as, in undulated land.
- This method saves water up to 30–35 per cent
- An increase in yield up to 20–25 per cent has been reported.
- Fertilisers and pesticides can also be applied by this method.
- Fertilisers may be applied uniformly through sprinklers.
- More area of land can be covered for irrigation.

Methods of Irrigation

Disadvantages

- The installation cost is very high.
- High wind velocity influences the distribution pattern of water
- Regular maintenance of system is required to avoid clogging of nozzles.
- It requires regular supply of water
- It is not useful in case of tall growing crops with more spacing.

Methods of Irrigation

Drip or trickle irrigation

In this system, water is led through plastic pipes, and finally, let out through mechanical devices called 'emitters'. There is a direct and continuous wetting of the root region. This system ensures highest efficiency in the use of water.

Advantages

- There is minimum loss of irrigation water by percolation and evaporation.
- It saves water up to 40–60 per cent.
- An increase in yield by 10–25 per cent has been reported in several crops.
- Problem of weed and cost of labour are minimised.

Methods of Irrigation

Drip or trickle irrigation

Advantages

- Low humidity in the field coupled with weed-free environment minimises pest attack.
- It is ideal for slopes or undulated land, especially hills.

Disadvantages

- The initial cost for the installation of the unit is very high.
- Skilled human resources are required for frequent maintenance.
- It is not suitable where water or sub-soil contain an appreciable amount of salt.

Drainage

Removing excess water by artificial means from the soil is known as drainage.

Drainage advantages

- Regular drainage avoids accumulation of water around plants.
- It eases tillage and other intercultural operations.
- Proper drainage improves the structure of the soil.
- It improves root development and absorption of nutrients by plants.
- Favourable conditions facilitate seeds to germinate faster.
- Healthy and fast growth crop plants escapes many diseases and pest attack.

Summary

In this session you have learnt about the irrigation methods and drainage.

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