Practical - 4

LAYING OUT DIFFERENT SYSTEMS OF IRRIGATION FOR YOUNG AND ADULT FRUIT TREES

Exercise

Laying out of different systems of irrigation for young and adult fruit trees.

Objectives

- To know about irrigation systems in fruit trees.
- To know about use of micro-irrigation systems in fruit trees.

Delivery schedule: 02 periods

Student expectations/learning objectives

- To learn about laying out of irrigation systems in fruit trees.
- To learn about advantages and disadvantages of irrigation systems in fruit trees.

Handouts/material/equipment's & tools required: Practical note book, pen and pencil to note down the important points on laying out irrigation systems.

Pre-learning required: Pre-requisite knowledge about planting systems of fruit trees and irrigation requirement of young and adult fruit trees.

Introduction

Success in fruit culture largely depends upon availability of supplemental irrigation, particularly during critical period of tree growth and development. Irrigation is done to supplement the deficit in soil water. While doing so, the major aspects to be considered relate to the time, quantum and methods of irrigation. The installation of irrigation system is a pre-requisite to plantation of fruit trees. The main source of irrigation should be either dug-well or deep tube well and those should be installed at the highest elevation. Different methods of irrigation have been used in fruit orchards depending on water availability, topography, fruit species, age of tree, intercrops etc. On sloppy lands and in the hills, contour basin, furrows, sprinkler and drip irrigation methods are suitable whereas in the plains, rectangular or square check basins, circular basins (rings), furrows, sprinkler and drip irrigation systems can be used. Selection of irrigation system is mainly dependent on availability of water in the locality. In the areas where water is scare, sprinkler or drip irrigation is better for fruit crops. All these systems of irrigation have their merits and demerits.

Irrigation in young fruit trees

The purpose of irrigation of young fruit trees in the orchards is to boost fast and vigorous growth of the tree. In initial stage the root spread of the tree is limited. Light irrigation at frequent intervals is required to wet the soil. The non-bearing trees 4-5 years of age are irrigated at weekly interval. The interval of irrigation depends upon tree age, soil and climate. For the first six months after planting, interval should be 2 to 6 days, for 6 to 12

months old plant at weekly interval and 7 to 20 days till the plants attain bearing age. In light soil, irrigation frequency is more than in heavy soils. During winter, the irrigation is specially required for protection against frost. In heavy soils, frequent irrigation causes damage to root system and stem so it should be avoided. But the interval should not be too long so that plant faces moisture stress and the growth and spread is checked.

Irrigation in adult fruit trees

The irrigation of orchards having adult trees should be done at regular intervals (10 to 15 days). Sufficient moisture in the soil is of prime necessity during fruit set and for full fruit development. It is helpful in attaining full fruit size and reducing fruit drop. But to obtain good flowering, the irrigation during flower bud differentiation should be stopped. Irrigation during this period promotes vegetative growth, which will be detrimental to flowering. In light soils, the interval of irrigation would be high during hot, dry and windy weather than in cold and calm atmosphere.

For teachers…

- Explain advantages and disadvantages of different irrigation systems.
- Practically show micro sprinkler and drip irrigation system installed in fruit orchards.
- Ask students to note down important parts of sprinkler and drip systems of irrigation.

Important points in selection of irrigation system

- Source of water supply
- Availability of water
- Quality of irrigation water
- Topography of land to be irrigated
- Soil type
- Climate of the area
- Fruit species grown
- Age of the fruit trees
- Critical period of plant growth
- Cultural practices in the orchard
- Economics

Systems of irrigation

In fruit orchards mainly following systems of irrigation is practiced in India.

1. **Surface irrigation:** In surface irrigation systems water is moving over the land by simple gravity flow in order to wet it and to infiltrate into the soil. They can be subdivided into furrow, border strip or basin irrigation.

2. **Localized irrigation:** Localized irrigation is a system where water is distributed under low pressure through a piped network, in a pre-determined pattern, and applied as a small discharge to each plant or adjacent to it. Drip irrigation, spray or micro-sprinkler irrigation and bubbler irrigation belong to this category of irrigation methods.

3. **Sprinkler irrigation:** In sprinkler or overhead irrigation, water is piped to one or more central locations within the field and distributed by overhead high-pressure sprinklers or guns. A system utilizing sprinklers, sprays, or guns mounted overhead on permanently installed risers is often referred to as a solid-set irrigation system. Higher pressure sprinklers that rotate are called rotors and are driven by a ball drive, gear drive, or impact mechanism.

4. **Manual irrigation by buckets or watering canes:** This system is not suitable for adult trees as their water requirement is very high. Manual irrigation is generally practiced for newly planted fruit trees in the backyard.

Common irrigation methods in fruit orchards

A number of irrigation methods like basin, ring, furrow, flood, sprinkler and drip are employed. Each method has advantages and disadvantages as one method may be suitable for one set of conditions but unsuitable for another. Therefore, proper selection of the irrigation method is important for better orchard management practices.

Flood irrigation: This system is adopted in such orchards where sufficient water is available. Here entire area of orchard is wetted and meets the water requirement of tree and suited best to the extensive root system of fruit tree. It is not a desirable method of irrigation as water loss is very high, introduction of weeds and diseases is possible and health of plant is adversely affected in the event of stagnation of water for some period.

Flood irrigation in fruit orchards

Furrow method of irrigation: In this method 2-3 furrows are made along the row on both sides. This system is suitable for the places where the flow of water is so regulated that it moves with slow speed. Here the plants are irrigated through lateral movement of water. Although this system is good but not adopted at large scale.

Strip irrigation: In this method of irrigation, entire orchard is divided in small and manageable strips having one or two fruit tree rows. These strips are attached to the main water channel and water movement is free along the slope in the strip. The slope should be minimum which helps in slow movement of water and allows every part of the strip to be wetted equally by irrigation water.

Basin system: In this system of irrigation, small circular basins are made around the tree trunks. These

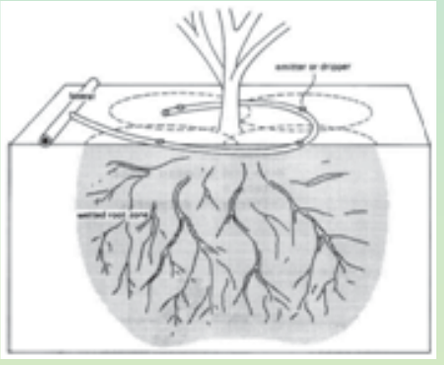
basins are connected with each other through a straight channel. The water passing through these channels touch the tree trunk directly. Such type of flow from plant to plant may cause damage and manures and fertilizers may be washed away with water and deposited at the end of the channel. The disease present in one plant may spread to other plants. The effective root zone is not properly irrigated.

Ring system: This system is an improvement over previous systems. The irrigation channel is made between two rows of trees. Here the basins are kept small having circular shape. The individual basin is connected by sub-channel to the channel formed between two rows. Due to small size of basin, adequate amount of water is not accommodated which is sufficient for plant.

Sprinkler system: The sprinkler system is ideal in areas where water is scarce. A Sprinkler system conveys water through pipes and applies it with a minimum amount of losses. Water is applied in form of sprays sometimes simulating natural rainfall. The difference is that this rainfall can be controlled in duration and intensity. If well planned, designed and operated, it can be used in sloping land to reduce erosion where other systems are not possible. Sprinkler irrigation system consists of "head" and a distribution network. A pump, filter, flow meter (optional), pressure gauge, fertilizer injector (optional), pressure regulator, and controller (optional for manual systems) generally make up a system head.

Sprinkler irrigation in fruit orchards

Drip irrigation: In this system water is directly applied to the root zone. Drip irrigation system delivers water to the crop using a network of mainlines, sub–mains and lateral lines with emission points spaced along their lengths. Each dripper/emitter, orifice supplies a measured, precisely controlled uniform application of water and nutrients, directly into the root zone of the plant. Water and nutrients enter the soil from the emitters, moving into the root zone of the plants through the combined forces of gravity and capillary. In this way, the plant's withdrawal of moisture and nutrients are replenished almost immediately, ensuring that the plant never suffers from water stress,thus quality, growth and yield is improved.



Drip irrigation

Students Activities

1. Visit fruit orchards in your locality and note down the irrigation systems adopted in fruit orchards.
2. Visit fruit orchard having drip irrigation system.
3. Practically see different parts of drip irrigation system and enquire about role of different parts in regulating irrigation.

Study Material

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