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Drip Irrigation

Precision Farming Development Centre
N.C.P.A.H., D.A.C., Ministry of Agriculture
(Government of India)

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Water is most essential requisite to sustain life for plants, animals and humans. In fact, land and water are the two basic important natural resources, which play an important role in agriculture production. India is endowed with vast water resources, which are not distributed uniformly. Besides, many regions of the country have been passing through periodic droughts, erratic rainfall and depleting water resources. This envisages the need for the efficient use of available water to meet the requirement of ever increasing population. Agriculture continues and will continue to be the engine of the country's growth and development. Irrigation is the life line for agriculture production. If we fail in irrigation, we will fail in agriculture. Drip, microsprinkler, minisprinkler and sprinkler irrigation are classified as microirrigation system for all practical purposes in Indian agriculture. Microirrigation, commonly referred as drip irrigation is based on the fundamental concept of irrigating root zone rather than entire land surface, which results in higher water-use-efficiency and enhanced crop yield.

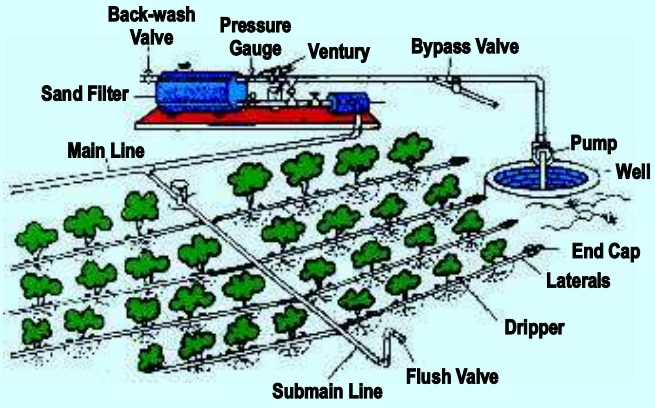
Why Drip Irrigation?

Drip irrigation is a method of irrigation wherein we are able to give water to plants as per their real need. Since we don't flood the fields in drip irrigation, naturally we save on water.

How does Drip Work?

Water is lifted from the source (canal/well/pond) by means of a pump. This water may not be very clean. Hence, it is made to pass through a filter. After the water is cleaned, it goes through a main line and it gets distributed in the field through sub-main line and lateral lines. Main line, sub-main line and lateral pipes are all made up of plastic. We can refer to the following diagram to understand the system.

As we can see, while the water moves through the lateral, it drops through each dripper, drop by drop.



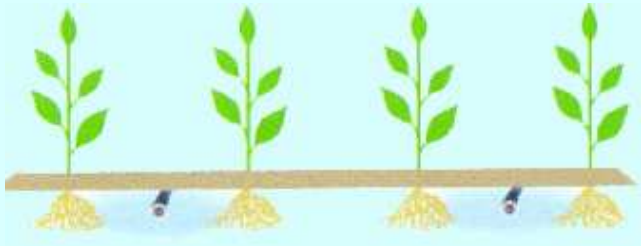
Advantages of Drip

- Water saving to the tune of 30 to 70 per cent.
- Yield increases 30 to 100 per cent depending upon crop to crop.
- Better quality of crop.
- Higher returns per unit area and time.
- It saves labour cost.
- Improved water penetration.
- Eliminates soil erosion.
- Reduced weed growth.
- Saving in fertilizer and chemicals (40-60%).
- Poor quality water can be used more safely.
- Even undulated land can be irrigated.
- Saving in energy (power) by 44-47 per cent.
- Saves land, as no bunds etc. are required.
- Better pest and disease management.
- Eco-friendly technology.

Types of Drip Irrigation System

Subsurface Drip Irrigation System

In subsurface drip irrigation system, the drippers and the lateral lines are laid below the ground level in the plants' root zone.



Subsurface Drip Irrigation

Surface Drip Irrigation System

In surface drip irrigation system, the drippers and the lateral are laid on the soil surface.

Surface Drip Irrigation

Similarly, based on the type of drip laterals and/or the emitting devices used, the drip irrigation systems can be classified as :

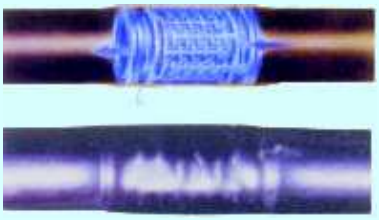
On Line Drip Irrigation System

On line drip irrigation system in which the drippers or emitters are fixed on the lateral pipes by punching suitable holes on the drip lateral pipes at the locations specific to the crop being irrigated.

On Line Drip Irrigation System

In Line Drip Irrigation System

In line drip irrigation system in which the drippers are factory installed within or on the drip lateral at regular intervals and are suitable for closely spaced field crops in order to achieve a continuous strip of wetting along the crop rows.



In Line Drip Irrigation System

Major Components of Drip Irrigation System

1. Main
2. Sub-main
3. Lateral
4. Dripper/Emitters
5. Filters
6. Pumps

- Mainline is generally laid underground and supply water to sub-main pipes.
- Sub-main distribute water evenly to a number of lateral lines.

Main (A), Sub-main (B) and Fittings

- Laterals are the pipes on which drippers are mounted or within which they are inserted.

Laterals

There are various types of filters available for removing the physical impurities from water source. They are :

Different types of Dripers

Filter

- Hydrocyclones or Centrifugal Sand Separators : The best treatment to water containing significant concentration of soil particles is the sedimentation of the particles by means of the sand separators.
- Screen Filters : Most prevalent type and are suitable to remove water with inorganic impurities
- Sand Media Filters: It removes water with organic impurities

Different type filters

- Disc Filters: are more suitable to water having mixed impurities.

Planning, Design and Installation of Drip Irrigation System

The planning, design and installation of drip irrigation system is essential to supply the required amount of irrigation water. The steps needed to be followed for designing the system are given below :

- Collection of general information
- Layout of the field
- Crop water requirement
- Design of the system
- Pump horse power requirement

Installation of Drip Irrigation System

- Laying of main and sub-main pipe

- Laying of laterals and connecting emitters
- Installation of filtration unit
- Installation of fertigation unit
- Installation of pumping unit

Installation of Drip Irrigation System

Routine maintenance operations

Flushing frequency will be according to the water quality.

- An additional flushing must be conducted at the end of the irrigation season.
- Cleaning filters : Frequency according to the water quality and content.
- Checking pressure at each of the system's stations – head, valves, laterals – beginning and end.
- Flushing the manifold and mainline ends Flushing laterals to remove sediments that accumulate at the drip lateral ends. (Frequency according to water quality.)

Cleaning of Sand filters

- Checking the lateral flow in random drippers.
- Maintaining proper working order of the regulating and control accessories.
- Maintaining the completeness of the system and diagnosing problems such as leaks and clogging.

Irrigation cycle: Light soil (sandy)-1-2 days Medium soil–2-3 days

Centrally Sponsored Scheme on Drip Irrigation

The Government of India has launched Centrally Sponsored Scheme on Micro irrigation during the fourth year (Jan., 2006) of the Xth plan making provision for 40% assistance from Central Government, 10% assistance from the State Government and the rest of 50% to be borne by the farmer either through his own resources or soft loan from financial institutions. The maximum assistance is upto five ha per beneficiary. The cost of the system varies as per the crop spacing and its area, for example for one ha with a crop spacing of l2m x l2m, the cost is Rs. 16700 and with 1m x lm spacing, the cost is Rs. 57600.

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