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Micro Irrigation System

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Micro-irrigation system: -

Micro-irrigation system is a modern method of irrigation. In, this method which we deliver water slowly. Usually delivered in the form of discrete droplets, continuous drops, streams, etc. Micro-irrigation system is popular these days for its low cost and water-efficiency.

About Drip Irrigation System: -

Drip irrigation is sometimes called trickle irrigation and involves dripping water onto the soil at very low rates (2-20 litter/hour) from a system of small diameter plastic pipes fitted with outlets called emitters or drippers. Water is applied close to plants so that only part of the soil in which the roots grow is wetted, unlike surface and sprinkler irrigation, which involves wetting the whole soil profile. With drip irrigation water, applications are more frequent than with other methods and this provides a very favourable high moisture level in the soil in which plants can flourish.

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, nutrients, and other required growth substances directly into the root zone of the plant.

Types of drip irrigation system: -

Drip irrigation system can be classified into the following:

- Surface Drip Irrigation
- Sub-Surface Drip Irrigation
- Family Drip
- Online Drip
- In-line Drip

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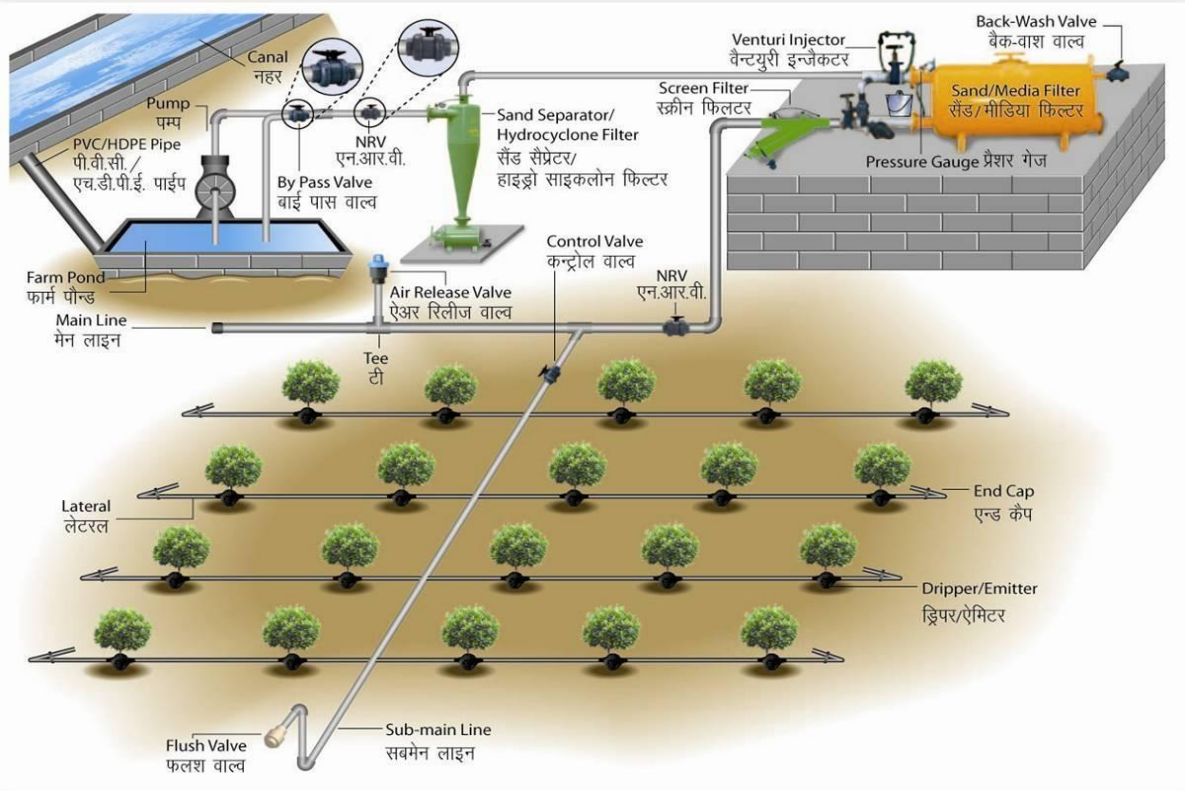
Surface drip irrigation: -

Drip System Layout: -



Layout of Drip Irrigation System (ड्रिप सिंचाई पद्धति का रेखाचित्र)

Major Components of Drip Irrigation System: -

- **Pump station** takes water from the source and provides the right pressure for delivery into the pipe system.
- **Control valves** control the discharge and pressure in the entire system.
- **Filtration system** cleans the water. Common types of filters include screen filters and graded sand filters which remove fine material suspended in the water.
- **Fertilizer tank/venturi** slowly add a measured dose of fertilizer into the water during irrigation. This is one of the major advantages of drip irrigation over other methods.
- **Mainlines, submains and laterals** supply water from the control head into the fields. They are usually made from PVC or polyethylene hose and should be buried below ground because they easily degrade when exposed to direct solar radiation. Lateral pipes are usually 13-32 mm diameter.
- **Emitters or drippers** are devices used to control the discharge of water from the

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lateral to the plants. They are usually spaced more than 1 metre apart with one or more emitters used for a single plant such as a tree. For row crops more closely, spaced emitters may be used to wet a strip of soil. Many different emitter designs have been produced in recent years. The basis of design is to produce an emitter which will provide a specified constant discharge which does not vary much with pressure changes, and does not block easily.

Crops suitable for Drip Irrigation System: -

- **Orchard Crops:** -Grapes, Banana, Pomegranate, Orange, Citrus, Mango, Lemon, Custard Apple, Sapota, Guava, Pineapple, Coconut, Cashew, Papaya, Anole , Litchi, etc.
- **Vegetable Crops:** -Tomato, Chilly, Capsicum, Cabbage, Cauliflower, Okra, Brinjal, Bitter Gourd.
- **Cash Crops:** -Sugarcane, Cotton. Arecanut, Strawberry etc.
- **Flowers:** -Rose, Carnation, Gerbera, Anthurium, Orchids, Jasmine, Dahlia, Marigold etc
- **Plantation:** -Tea, Rubber, Coffee, Coconut etc.

Benefits of drip Irrigation: -

- Increase in yield up to 230%.
- Saves water up to 70% compare to flood irrigation. More land can be irrigated with the water thus saved.
- Crop grows consistently, healthier and matures fast.
- Early maturity results in higher and faster returns on investment.
- Fertilizer use efficiency increases by30%.
- Cost of fertilizers, inter-culturing and labour use gets reduced.
- Fertilizer and Chemical Treatment can be given through Micro Irrigation System itself.
- Undulating terrains, Saline, Water logged, Sandy & Hilly lands can also be brought under productive cultivation.

Water is conserved in the following ways:

- Drip irrigation application uniformity is very high, usually over90%.
- Unlike sprinklers, drip irrigation applies water directly to the soil, eliminating water loss from wind.
- Application rates are low so water may be spooning fed to the crop or plant root

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zone in the exact amounts required (even on a daily or hourly basis). In contrast, other methods entail higher water application quantities and less frequency. If young plants need water frequently, much of the water applied is often wasted to deep percolation or runoff.

- ❖ Low application rates are less likely to run off from heavier soils or sloping terrain.
- ❖ Drip irrigation does not water non-targeted areas such as furrows and roads in agriculture, between beds, blocks or benches in greenhouses, or hardscape, buildings or roads in landscape.
- ❖ Drip irrigation easily adapts to odd-shaped planting areas which are difficult to address with sprinklers or gravity irrigation.

2. Sprinkler Irrigation System: -

Sprinkler irrigation system allows application of water under high pressure with the help of a pump. It releases water similar to rainfall through a small diameter nozzle placed in the pipes. Water is distributed through a system of pipes, sprayed into air and irrigates in most of the soil type due to wide range of discharge capacity.

Major Components of Sprinkler Irrigation System: -

- Pumping station or Header Assembly
- By-pass valve
- Fertilizer tank
- Filtration system
- Pressure gauges
- Control valves
- HDPE / PVC Pipe
- QRC Pump connector
- Sprinkler Nozzles
- Service Saddle

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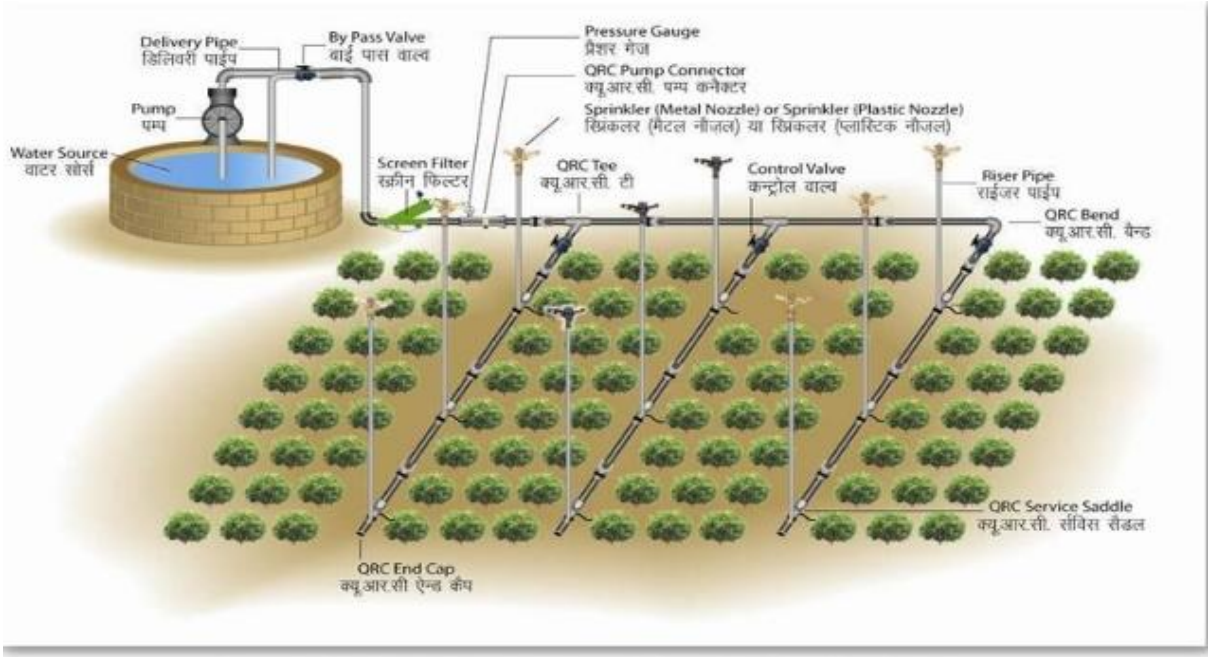

Layout of Sprinkler Irrigation System (छिड़काव सिंचाई प्रणाली का रेखाचित्र)

Types of Sprinklers Based on Precipitation: -

Low Volume Sprinkler - <13 (mm/Hour)

Medium Volume Sprinkler - 13 -25(mm/Hour)

Large Volume Sprinkler (Raingun) - >25(mm/Hour)

- **Application rate:** -This is the average rate of water sprayed over the crops, measured in millimetres per hour. The rate at which sprinklers are applied is determined by the size of the nozzles, the operating pressure, and the distance between sprinklers. When choosing a sprinkler system, be sure that the average application rate is lower than the soil's basic infiltration rate. There should be no runoff because all of the water applied will be immediately absorbed by the soil.

When water sprays from a sprinkler, it breaks up into little drops ranging in size from 0.5 to 4.0 mm. The smaller droplets land near the sprinkler, while the larger one's land at the wetted circle's edge. Large drops can harm delicate crops and soils, thus it's preferable to utilise the smaller sprinklers in these situations.

Sprinkler drop sizes: - The size of the drop is also determined by the pressure and nozzle size. Because the water jet does not break up easily when the pressure is low, the droplets are substantially greater. Use small diameter nozzles operating at or above the average recommended operating pressure to avoid crop and soil damage.

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Advantages: -

- Eliminates water conveyance channels, thereby reducing conveyance loss.
- Suitable in all types of soil except heavy clay.
- Water saving up to 30% - 50 %.
- Suitable for irrigation where the plant population per unit area is very high.
- Helps to increase yield.
- Reduces soil compaction.
- Mobility of system helps system operation easy.
- Suitable for undulating land.
- Saves land as no bunds required.
- Soluble fertilizers and chemicals use are possible.
- Provides frost protection & helps in alteration of microclimate.
- Reduces labour cost