

Micro irrigation

-Dr. Kangjam Sonamani Singh & Dr. Laishram Kanta

a) Drip irrigation

Drip irrigation (also called trickle irrigation) is a technique in which water flows through a filter into special drip pipes, with emitters located at different spacing. Water is distributed through the emitters directly into the soil at very low rates (2-20 litres/hour) near the roots through a special slow-release device. Water is applied close to plants so that only the part of the soil in which the roots grow is wetted (Figure 1), unlike surface and sprinkler irrigation, which involves wetting the whole soil profile. With drip irrigation water, applications are more frequent (usually every 1-3 days) than with other methods and this provides a very favourable high moisture level in the soil in which plants can flourish.

If the drip irrigation system is properly designed, installed, and managed, drip irrigation may help achieve water conservation by reducing evaporation and deep drainage. Compared to other types of irrigation systems such as flood or overhead sprinklers, water can be more precisely applied to the plant roots. Drip irrigation requires little water compared to other irrigation methods. About 40-80 litres per day are needed per 100-200 plants. The small amount of water reduces weed growth and limits the leaching of plant nutrients down in the soil. Drip systems can be used to mix liquid fertilizer with the irrigation water. This is called fertigation and chemigation (application of pesticides and other chemicals to periodically clean out the system). Thus, drip can eliminate many diseases that are spread through irrigation water. Drip irrigation is adaptable to any farmable slope and is suitable for most soils. Drip irrigation can be set up at a low initial investment by small-scale farmers with (Fig. 2) locally available material (for e.g. using buckets or barrels as water reservoir and bamboo or PVC tubes as distribution pipes)

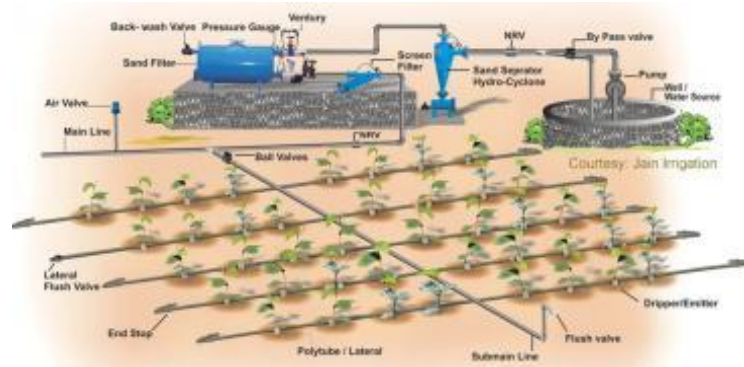


Figure 1: A drip irrigation layout *Source: INFONET-BIOVISION (2010)*

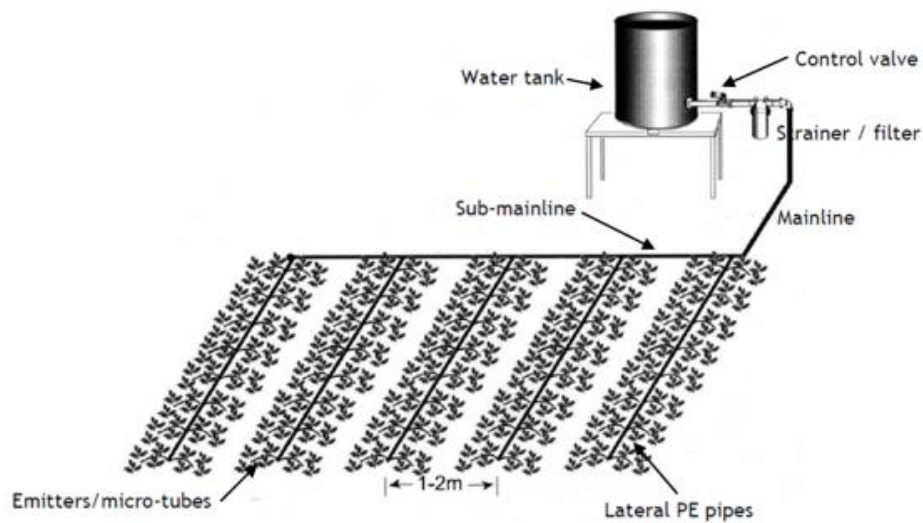


Figure 2: A typical low-cost drip irrigation set up *Source: (RCSD 2008)*

b) Sprinkler Irrigation

Sprinkler irrigation is a method of applying irrigation water which is similar to natural rainfall. Water is distributed through a system of pipes usually by pumping. It is then sprayed into the air through sprinklers so that it breaks up into small water drops which fall to the ground (Figure 3). The pump supply system, sprinklers and operating conditions must be designed to enable a uniform application of water.

Sprinklers are best suited to sandy soils with high infiltration rates although they are adaptable to most soils. The average application rate from the sprinklers (in mm/hour) is always chosen to be less than the basic infiltration rate of the soil.



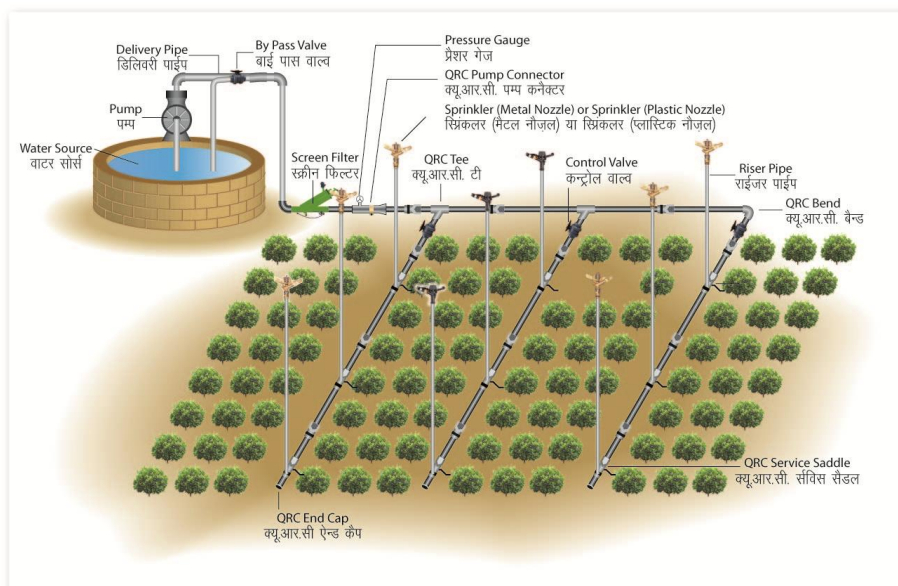
Figure 3: A sprinkler irrigation system in a vegetable field
(Source: www.shutterstock.com)

Sprinkler irrigation is suited for most row, field and tree crops and water can be sprayed over or under the crop canopy (Figure 4). However, large sprinklers are not recommended for irrigation of delicate crops such as lettuce because the large water drops produced by the sprinklers may damage the crop. Sprinkler irrigation is adaptable to any farmable slope, whether uniform or undulating. The lateral pipes supplying water to the sprinklers should always be laid out along the land contour whenever possible. This will minimize the pressure changes at the sprinklers and provide a uniform irrigation.



Figure 4: Sprinkler irrigation system in a cabbage field at Chandel

The most common type of sprinkler system layout is shown in Figure 5. It normally consists of a system of lightweight aluminium or plastic pipes. The rotary sprinklers are usually spaced 9-24 m apart along the lateral which is normally 5-12.5 cm in diameter. The mainline - and submainlines - are pipes which deliver water from the pump to the laterals. In some cases these pipelines are permanent and are laid on the soil surface or buried below ground. In other cases they are temporary, and can be moved from field to field. The main pipe materials used include asbestos cement, plastic or aluminium alloy.



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

Figure 5: Basic layout of a sprinkler irrigation system (Source: www.agrifarming.in)