

**Bachelor of Biosystems Technology  
Faculty of Technology  
South Eastern University of Sri Lanka**

**BSE 11042 Principles of Irrigation**

**Drip Irrigation**

- Water is applied at
  - A point or
  - Over a very limited fraction of total surface area
- Water is applied
  - In the vicinity of root zone
  - Wetting a limited area of surface and depth
- A balance between crop evapotranspiration and applied water is maintained over a limited period of time (24 – 72 h)
- Amount of soil wetted depends on
  - soil characteristics,
  - length of irrigation period,
  - emitter discharge,
  - number and spacing of emitters.
- Number and spacing of emitters are dependent on the spacing and size of plants being irrigated.
- Water supply is inadequate and water cost is high, subsurface micro systems - cost effective for irrigation of high value row crops.

**System components**

**Mainline**

- Pump
- Chemical injector - to inject fertilizer/chemicals
- Primary filter – screen large particles
- Pressure gauges on either side of filter – evaluate pressure drop across filter
- Discharge control valves and flow meters

**Submain**

- Secondary filters – remove finer particles
- Solenoid valves – automate the system
- Pressure regulators –system operating pressure
- Secondary pressure gauges – verify operating pressure
- Flush valves – flush out system

**Laterals**

- Emission devices



## Types of emitters

### Point source emitters

#### a) Online

More headloss due to barbs

Can be replaced easily

Microtubes - Discharge rates adjusted by varying length of tubing.

#### b) Inline

Entire flow required downstream of emitter passes through

Necessary to shutoff flow and cut the pipe to replace malfunctioning one

### Line source emitters

Porous pipes or tapes

Perforated pipes

Discharge water along the entire length of pipe

Made out of polymer compounds with small pores

Water seeps out of the pipe drop by drop

Mono walled

Bi walled

Several exit orifices in the wall of secondary chamber for each single orifice in the primary chamber

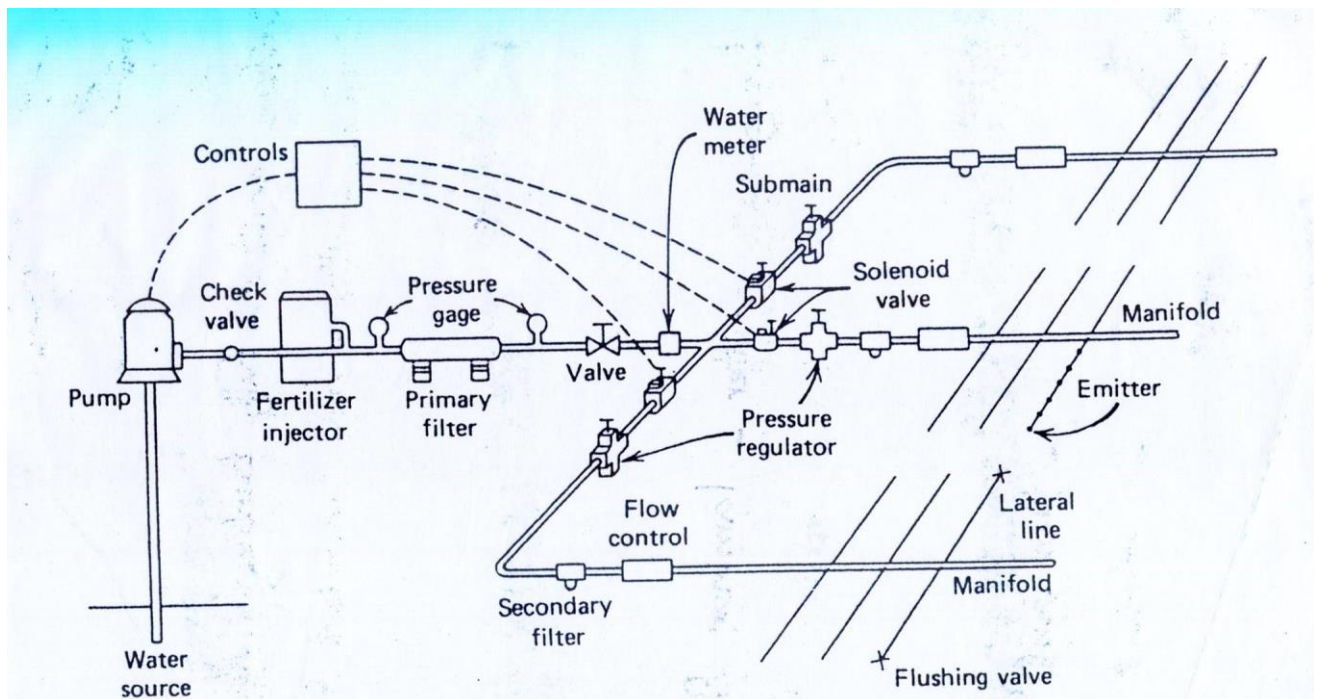
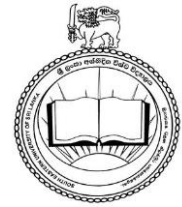


Figure Components of a micro irrigation system



### **Advantages of drip irrigation:**

- Maintains constant soil moisture
- Minimize wastage of irrigation water through over irrigation and direct evaporation
- Minimize energy usage
- Provide adequate water in the root zone and not in the region where no roots exist
- Is suitable for small trees and widely spaced plants
- Suitable for arid regions
- Minimize the wetting of soil surface to reduce insect, disease and fungus problems, weeds
- Minimize the disturbance to soil
- Apply on steeper slopes
- Deliver fertilizers or pesticides
- Highest efficiency
- Eliminate land leveling
- No surface flow so that no tail-water runoff, erosion
- Can use poor quality water as water content in root zone is always close to saturation
- Increased yields
- Increased cropping intensity
- Deep percolation can be controlled with good water management
- Systems easily automated with soil moisture sensors and computer controlled for low labor
- Soil moisture levels can be maintained at predetermined levels for start-stop operations
- Less opportunity for ground water pollution.
- The soil surface remains firm for use by farm workers and equipment.
- Can be used on all terrain and most agricultural crops
- Yield per unit volume of water and unit land area is high

### **Disadvantages of drip irrigation:**

- Relatively higher initial cost
- Good maintenance is required
- Clogging of emitter by soil particles (sand/clay), debris, precipitates, organic matter
- Dissolved salt deposited in the soil surface
- A bad design - limit the growth of roots within a narrow region
- Animals, especially rodents, can damage surface (and shallow subsurface) installed plastic pipe less than 4 inches in diameter
- With low operating pressures, poor distribution uniformity can result because of elevation differences on undulating ground
- Need highest technology and equipment
- Poor root development

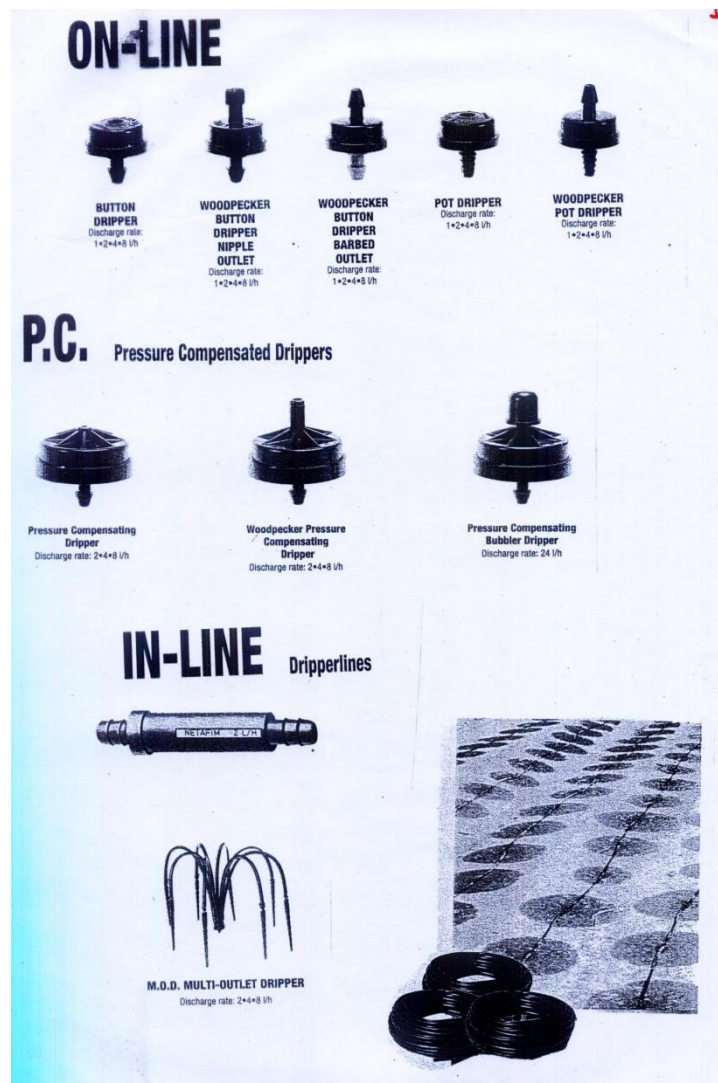


Figure Different types of Drippers (Source: Netafim)