

## Drip Irrigation: Advantages and Effects

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### Introduction

Drip irrigation is a type of controlled irrigation in which water is gradually supplied to the root systems of several plants. A drip irrigation system delivers water straight to the root zone of your plant. At this place, it is let to soak into the soil one drop at a time. As a result, there is low risk of water loss via surface runoff or evaporation. The bulk of the nutrients and water required for plant development are absorbed by the plant, providing it the highest chance of survival. Drip irrigation is a simple solution to so many problems at once that you'll wonder why you didn't think of it sooner. Provide your plants with the care they require while saving time and effort.

### Advantages of drip irrigation

- In comparison to overhead systems (50-80 psi), drip systems require low operating pressure (20-25 psi at the field entry, 10-12 psi at the drip tape). Many existing small pumps and wells may be utilised to irrigate small plots of land with drip systems.
- Drip irrigation applications may be easily monitored and programmed using an AC or battery-powered controller, resulting in lower labour costs.
- Drip irrigation utilises half to a fourth of the water required by identical overhead irrigation systems because it distributes water to the plant root zone rather than the entire field.
- Drip irrigation can improve both water and fertiliser efficiency. Drip irrigation enables exact nutrient application. As a result, drip irrigation may help to reduce fertiliser costs and soluble nutrient losses. Nutrient inputs may also be better timed to meet the plant's needs.
- Drip irrigation does not wet the row middles or leaves of crops as much as overhead watering, weed and disease problems may be reduced.

Drip irrigation improves crop uniformity and earliness when used with raised beds, polyethylene mulch, and transplants.

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The use of polyethylene mulch also improves the cleanliness of harvested goods and lowers the possibility of contamination with soil-borne diseases. Reflective mulches also serve to decrease the spread of viral infections by influencing insect vectors including thrips, whiteflies, and aphids.

### Major components of the drip irrigation

Water pump, filtration unit, mainline, sub-mainline, lateral pipes, dripper, and various accessories like control valves, pressure gauges, fertilizer tanks or vents, end caps, etc. make up a drip irrigation system.

- **Water Pump-**

A pump with the necessary capacity The drip irrigation system's components are supplied with water at a particular amount of pressure using a water pump There is a chance that biological and inorganic foreign things will be present in the water if the source of the supply is a bore well, open well, or a canal. Use the suction filter to obtain somewhat clean water in this situation. The typical primary mover of the pump is either an electric motor or a diesel engine.



Recently, drip irrigation has become more and more popular attributed to the solar pump.

- **Filter**

When installing a drip system, the control head should have a high-quality filter. Before the water from the pump reaches the drippers, the filter is used to remove any suspended contaminants. The effectiveness of the filter has a significant impact on the success of drippers. Impurities suspended in irrigation water are cleaned by a filter device, which also prevents hole obstruction.

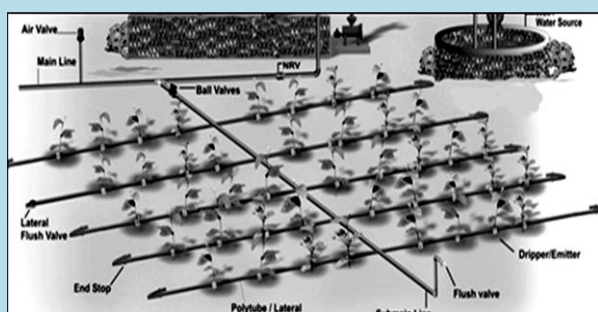


There are several types of filters on the market. Filters come in three different varieties: hydro cyclone filters, media filters, and screen or disc filters.

- **Mainline**

The whole water supply for the irrigation system is transferred via mainline. It links the various water sources to the sub-mains. Commonly, flexible materials like PVC (polyvinyl chloride) or plastics are used to

construct the main pipelines. Water is sent from the filtration unit to the sub-main pipe through the mainline pipe. The diameter of this pipe depends on the flow rate of the drip irrigation system; typically, main-line PVC pipe has a diameter of 2.5 to 4 inches. To avoid damage during cultural operations, mainlines should be buried at least 45 centimetres.



- **Sub-Mainline**

The laterals on one or both sides' sub-main feeds. Either PVC or medium density polyethylene (PE) are used to make it. The diameter of the main and sub-mains have to be balanced. These are established taking into account the rate of discharge, the quantity of sub-mains, and pipe friction losses.

- **Laterals**

Laterals come in three distinct sizes, 12 mm, 16 mm, and 20 mm, and are manufactured of low-density polyethylene (LDP) or linear low-density polyethylene (LLDPE). Install 12 mm to 16 mm laterals according on crop, spacing, and water availability.



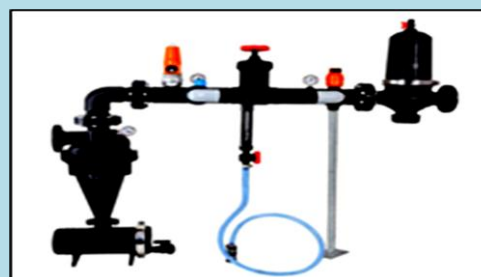
- **Drippers**

Emitters and drippers are synonyms. Water from the lateral pipe is being discharged into the ground via the dripper. Most materials used to make drippers are poly-propylene. There are primarily two types of drippers on the market online and inline.



- **Fertigation unit**

Direct fertilizer delivery via drip irrigation has enhanced fertilizer efficiency while reducing labour and material costs. The plant receives liquid fertilizer from this fertilizing device via a drip irrigation system.



A by-pass pressure tank, a venture pump, or a direct injection method are all used to provide fertilizer to irrigation systems.

There are many more parts that are equally important for the effective operation of drip irrigation equipment, such as the control valve used to regulate water flow through laterals. The sub-Maine pipe that is used to flush out dirt has a flush valve attached to the end of it. Use a non-return valve to prevent water from flowing back towards the water pump.

Air valves aid in releasing air in the drip irrigation system and preventing the drippers from sucking mud. The lateral pipe's one end is closed with an end cap, which is removed for cleaning.

### Demerits of the drip irrigation

- Costly initial investment may surpass overhead systems (commercial system)
- The lifespan of drip irrigation tubes can be shortened by the sun's effects.
- Clogging may occur if the equipment is not adequately maintained and the water is not properly filtered.

**Table 1- Crops suitable for the drip irrigation**

1. Orchard Crops	Grapes, Banana, Pomegranate, Orange, Citrus, Mango, Lemon, Custard Apple, Sapota, Guava, Pineapple, Coconut, Cashewnut, Papaya, Aonla, Litchi, Watermelon, Muskmelon etc.
2. Vegetables	Tomato, Chilly, Capsicum, Cabbage, Cauliflower, Onion, Okra, Brinjal, Bitter Gourd, Ridge Gourd, Cucumber, Peas, Spinach, Pumpkin etc.
3. Cash Crops	Sugarcane, Cotton, Arecanut, Strawberry etc.
4. Flowers	Rose, Carnation, Gerbera, Anthurium, Orchids, Jasmine, Dahilia, Marigold etc.
5. Plantation	Tea, Rubber, Coffee, Coconut etc.
6. Spices	Turmeric, Cloves, Mint etc,
7. Oil Seed	Sunflower, Oil palm, Groundnut etc.
8. Forest Crops	Teakwood, Bamboo etc.

**Table -2- Drip irrigation effect on different crops**

Crops	Water saving (%)	Increase in yield (%)
Banana	45	52
Cauliflower	68	70
Chilly	68	28
Cucumber	56	48
Grapes	48	23
Ground nut	40	152
Pomegranate	45	45
Sugarcane	50	99
Sweet lime	61	50
Tomato	42	60
Watermelon	66	19



- If herbicides or top-dressed fertilizer require sprinkler watering to activate them, drip irrigation may not be sufficient.
  - When installing systems, it is important to carefully consider all essential elements, including the topography of the land, the soil, the water, the crop, and the agro-climate, as well as the compatibility of the drip irrigation system and its components.
  - Salts added to irrigation water may accumulate in the root zone if there is little leaching (the majority of drip systems are built for maximum efficiency, which means little or no leaching fraction).
- efficiency of drip irrigation unpacked. *Agricultural Water Management*, 123, 103-110.
- Wang, H., Wang, N., Quan, H., Zhang, F., Fan, J., Feng, H., ... & Xiang, Y. (2022). Yield and water productivity of crops, vegetables and fruits under subsurface drip irrigation: A global meta-analysis. *Agricultural Water Management*, 269, 107645.

## References

- Camp, C. R., Lamm, F. R., Evans, R. G., & Phene, C. J. (2000, November). Subsurface drip irrigation—Past, present and future. In *Proc. Fourth Decennial Nat'l Irrigation Symp., Nov* (pp. 14-16).
- Jarwar, A. H., Wang, X., Long Wang, L. Z., Zhaoyang, Q., Mangi, N., Pengjia, B., & Shuli, F. (2019). Performance and evaluation of drip irrigation system, and its future advantages. *Journal of Biology, Agriculture and Healthcare*, 9.
- Van der Kooij, S., Zwarteveen, M., Boesveld, H., & Kuper, M. (2013). The