

# “Drip Irrigation: Cultivating Sustainability through Efficient Water Management”

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## **ABSTRACT**

One beneath the surface irrigation practice is drip irrigation, also referred to as trickling irrigation. It involves providing water regularly to crops using micro emitters at the root area, soaking only a fraction of soil's surface area and depth. The idea behind drip irrigation is to provide the crops' roots with enough moisture to prevent water stress. The most effective method for providing water and nutrients to crops is drip irrigation. Each plant gets exactly the amount of water and nutrients it requires at the precise moment for optimum growth by being delivered straight to the root zone of the plant. Water supplies were reduced as the result of the rapid urbanization & population rise. If we consider the current situation, we can see that India's water supply is rapidly reducing as a result of the country's growing water consumption. If severe measures of water preservation and effective usage are taken while also encouraged, the lack of water can be minimized. One third of the world's population would be affected by water scarcity, according to the International Water Management Institute. The growth of farming relies on the effective use of the water supplies that are already accessible, which account for 80% of the total water resources in the nation. Water conservation through drip irrigation is a successful strategy for the nation's long-term growth. The fact that the balance between crop evapotranspiration and applied water is maintained during short periods of between 24 and 72 hours separates the drip irrigation system significantly from the majority of other systems. Drip irrigation may increase production & save water usage by 50% when replacing sprinklers. Reduced disease and pressure from weeds, improved water utilization, & higher fertility are the causes of this. It is a modern approach that reduces water losses such as soil loss & gives water straight to the roots of the crops. Numerous agricultural issues may be resolved using drip irrigation, which also increases the productivity of irrigated farmland. According to the current study, using the current approach on horticulture crops has increased benefits. Farmers have also mentioned advantages including reduced weed growth, improved quality, and savings on labour and water.

**Keywords: Drip irrigation, Agriculture, Irrigation, Sustainable, Farmers, Conservation**

## **INTRODUCTION**

You may use drip irrigation to use water more wisely. Runoff, deep percolation, and evaporation are the three primary sources of water loss in a well-designed drip irrigation system. Water contact with crop leaves, stems, and fruit is reduced via drip irrigation. Thus, the environment might not be as conducive to the development of illnesses. The promise of higher yield and better quality crops is made possible by the correct management of irrigation schedule.

"Subsurface drip irrigation," is a phrase that is frequently employed by farmers & irrigation experts. A drip tape or tube is less likely to be damaged during weeding or cultivating when it is buried under the soil's surface. With SDI, there is even less evaporation or runoff, maximizing water usage efficiency.

The primary source of life for humans is water. Humans utilize water for a variety of activities, including drinking, washing, and farming. The primary need for agriculture is water. Over 80% of the fresh water that's available in India is currently used for agriculture and other uses.

Today, it is exceedingly challenging to supply enough water for the expanding population. Furthermore, huge amounts of water are needed in industrial expansion. The monsoon may grow less efficient as a result of climate change & global warming that might reduce the amount of water available.

## **MODERN IRRIGATION METHODS**

### **Drip Irrigation Method:**

The system for drip irrigation uses a network of mainlines, sub-mains, and lateral lines with emission points distributed along their lengths to supply water to the crop. Each dripper or emitter disperses water, nutrients, and various other vital growth elements uniformly & precisely into the root zone of the plant.

Although large nurseries & farms have employed drip irrigation more frequently, households are starting to take advantage of its advantages. As a homeowner, you may utilize drip irrigation for watering trees, bushes, and perennial & crops.

The farmers must preserve water through using this equipment so as for the country to flourish sustainably. As a result, the drip irrigation technique helps arid regions overcome several issues while also increasing the use of water in farming. Knowing the benefits of drip irrigation and the limitations of the technology can help the system's acceptance develop.



#### **Subsurface Irrigation:**

Water is applied to crops utilizing this irrigation technique from beneath the soil's surface. This micro-irrigation is effective and advantageous. It can function properly with very little water pressure. There is absolutely no water waste in this system since the water supply tube and pipelines are buried beneath the earth.

If the subsurface irrigation system is large enough, water may be applied extremely efficiently and consistently. Through the elimination of surface water stagnation, subsurface irrigation hinders disease & weed development.

#### **Micro-irrigation Method:**

A contemporary irrigation technique is the micro-irrigation system. With this technique, we administer water gradually. Typically, liquid is given in streams, droplets, or other discrete forms. These days, micro-irrigation systems are widely used because to their affordability and water efficiency.



#### **Benefits of Drip Irrigation Method:**

- In terms of water utilization, drip irrigation is quite effective.
- The quantity of runoff is decreased by drip irrigation, which also lessens soil erosion.
- Fertilizers can be applied effectively.
- Germination of seeds is enhanced.
- Fertilizer waste is cut in half.
- It is a cheap procedure that may be carried out with minimal water pressure.

### **Analysis of Drip Irrigation Techniques**

According to analysis, drip irrigation systems reduce the need for fertilizer, spread fewer illnesses, and manage insect issues. Drip irrigation merely moistens a portion of the soil root zone, unlike surface and spray irrigation. This could only moisten 30% as much soil as the other techniques did. Depending on discharge and soil type, wetting patterns that result from water dripping onto the ground might form.

According to component, crop type, application, emitter type, & area, the drip irrigation is split up in the report. In terms of insights, this report has concentrated on a few different types of evaluations, like end-use analysis, competitive landscape & company profiles. These evaluations together comprise and address perceives on the emerging & high-growth segments of the global drip irrigation market, as well as views on high-growth regions, countries, government initiatives, drivers, restraints, opportunities, and challenges.

### **Adoption issues and limitations in India:**

- A substantial initial investment of capital
- Theft problem
- Unsatisfactory post-purchase support
- Emitter clogging as a result of water salinity
- Rodents, pigs, & other animals frequently cause harm to systems
- Problem of maintenance
- Insufficient and late government funding approval

### **CONCLUSION**

In conclusion, Drip irrigation systems have shown to be incredibly flexible and adaptive, working well with a variety of crops, soil types, and landscapes. They may be applied in many different environments, such as vast agricultural fields, little gardens, orchards, vineyards, and even urban landscapes.

By relieving the pressure on supply of freshwater, drip irrigation methods allow sustainable water management techniques. The optimal use of water through drip irrigation can help save this precious resource and contribute to a more sustainable future as water shortage becomes a more urgent worldwide concern.

Through several programs, the government consistently works to promote drip irrigation technology. so that Indian farmers may use this technique. The government wanted to use this technique on as much irrigated land as possible. Without incentives, it is thought that India's use of drip irrigation may not rise.

The most effective, economical, and ecologically responsible way to water plants is via drip irrigation. It is an important technique for water management & sustainable agriculture because of its capacity to promote plant health, decrease weed growth, preserve water, and boost crop output. We can improve food production, protect water resources, and support a more resilient and environmentally friendly agricultural sector by implementing drip irrigation systems.

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