

# Water Conservation Techniques for Sustainable Development: A Study of Drip Irrigation

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## ABSTRACT

The water crisis is a very serious problem in the world. Rapid urban development and population growth in urban areas have led to the depletion of water resources. If we look at the current scenario, the availability of water in India is decreasing very fast due to the increasing demand for water. Water scarcity can be reduced if drastic measures for conservation and efficient use of water are adopted and promoted. According to the International Water Management Institute (IWMI), one third of the world's population will face water scarcity in near future. The development of agriculture depends on the efficient use of available water resources. Agriculture consumed 80% of the water resources available in India. Drip irrigation is an effective way to conserve water for sustainable land development. It is a modern technique that saves water and provides irrigation water directly to the root zone of plants and minimizes water loss and soil erosion. Drip irrigation system is a solution to many problems in agriculture and making irrigated agriculture more efficient. Regarding the implementation of this technique, this study says that this technique has extended benefits in horticultural crops and farmers have expressed benefits such as saving water, saving labor, increasing quality, reducing weed growth, etc. Therefore, the main objective is to conserve available water resources through drip irrigation for sustainable development.

**Keywords:** Drip irrigation, Water Scarcity, Irrigation, Sustainable Development, Conservation.

## INTRODUCTION

Water is the main source of life for humans. Water is used by humans for many purposes such as- for drinking, for washing and in agriculture. In addition, water is used in industrial development in very large quantities. Water is a basic requirement of agriculture. In India, more than 80% of available fresh water has already been used for agriculture. Now it is very difficult to meet the water demand for the growing population.

As climate change and global warming affect the monsoon. If the government does not adopt proper water management, the country will face threats in future especially in summer and winter season. Now water scarcity has become a global problem and it is time to manage and conserve water for the sustainable development of the country. India has the second largest irrigated area in agriculture. The water problem has been increasing rapidly in the last five decades. A large amount of fresh water is needed in agriculture. Irrigation plays an important role in increasing the production of agricultural development.

In ancient times, farmers adopted the traditional method of irrigating fields. But as time went on, new irrigation techniques emerged. Drip irrigation and sprinkler irrigation methods have been adopted by farmers. In this research work, the researcher tries to analyze drip irrigation.

Drip irrigation systems were invented a long time ago. Germany began the first trial of a drip irrigation system in 1860. In this strategy, clay pipes were used for irrigation, and they found that using this method, plants grew most efficiently near to the clay pipes they liked. In 1913, the United States began developing the drip irrigation system. Professor Robey of Michigan State University conducted an experiment in 1920 using clay tubes with microscopic holes placed in the ground. This method led to a revolutionary change. This method of irrigation is known for being extremely economical. In the early 1960s, this method was initially tested in the Israeli desert towns of NEGAR and AREVA. The efficiency and yield of the water utilization experiment was excellent. After that, the method was tried in several countries, including Australia, Israel, Mexico, New Zealand and South Africa. The results were excellent. Drip irrigation or micro irrigation are other names for drip irrigation systems.

The first international drip irrigation conference was held in Israel in 1971. Drip irrigation piping was first offered for sale on a commercial basis outside of Israel in 1969. In the United States, Israel, Mexico, Australia, New Zealand, France,

Greece, and Drip irrigation systems were built in India. In 1975, the use of drip irrigation began to expand. According to the 1991 International Micro-Irrigation Survey, drip irrigation is used in 35 countries.

### **Modern Irrigation Methods:**

#### **1. Sprinkler irrigation System:**

In sprinklers, water is released under pressure into the air by a set of nozzles connected to a network of high-density polyethylene (HDPE) pipes that simulate rainfall. This method is suitable for irrigating crops where the plant density is very high. It is widely used for cereals, pulses, seeds, spices and field crops.

#### **2. Drip Irrigation System:**

Drip irrigation delivers water directly to the roots of crops. The drip irrigation system was introduced in India in the early seventies. This technique is known as a highly economical irrigation technique. This system allows controlling the use of water and fertilizer using valves, pipes, tubes, etc.

It is easy to use the full potential of water and it is the most advanced technology in the world. By using this technology, about 45% of water can be saved compared to traditional irrigation methods. The main purpose of drip irrigation is to increase water efficiency. Therefore, it is important to promote the adoption of drip irrigation methods by providing sufficient incentive to use this technique, which is sponsored by the central and state governments.

Using this technology, it is necessary for farmers to conserve water for the sustainable development of the country. Therefore, the drip irrigation method is a solution to many problems in dry areas and improves water efficiency in agriculture. The growth of drip irrigation adoption could be increased by knowing the benefits of drip irrigation and the limitations of the system.

### **Merits of Drip Irrigation System:**

The drip irrigation systems reduce the use of fertilizers, less disease and also solve the problem of pests. It reduced weed growth due to partial wetting of the soil. It is suitable for different types of soil. Using this water conservation technology also reduces soil erosion. Labor costs are reduced by using this technology. It produces a higher ratio of water yield percentage to area yield percentage than any other irrigation. Increases water efficiency by saving 30% to 70%.

1. Drip Irrigation System produces a higher ratio of water yield percentage to area yield percentage than any other irrigation.
2. Drip Irrigation System increases the efficiency of water use.
3. Drip Irrigation System is suitable for different types of soil.
4. Labor costs are reduced by using Drip Irrigation System.
5. Soil erosion can be reduced by using Drip Irrigation System.
6. Drip Irrigation System reduced weed growth due to partial wetting of the soil.
7. Drip Irrigation System increases water efficiency by saving between 30% and 70%.
8. Drip Irrigation System reduces fertilizer consumption, less diseases and also solves pest problem.

### **Demerits of Drip Irrigation System:**

It has been analyzed that high level equipment and technology with high energy requirements are required in this technique. Chances of damage also increase with these techniques. This technique was found to be very costly and has poor access to subsidy. With this technique, the life of pipes and tubes is very short. People do not have enough awareness about this technology.

### **Problems for adoption of Drip Irrigation System in India:**

1. High investment costs and poor access to subsidy.
2. Short lifetime of the system i.e. pipes and tubes.
3. Lack of awareness.
4. High level equipment and technology is required.
5. High performance requirement.
6. Chance of damage.
7. Salt accumulation.

## **CONCLUSION**

A drip irrigation system is not only a water conservation technique, but it is also a crop intensification technique. Unlike sprinkler systems, drip irrigation delivers water directly to the root zone using pipes and tubes. This technique is mainly used for horticultural crops in India to conserve water for sustainable development. This technique is also useful for wide and narrowly spaced crops. Wide area crops are kinnow, guava, ber etc. while indoor crops are potato, tomato and other vegetables.

The government regularly tries to promote drip irrigation technology through various schemes. So that farmers can adopt this technology in India. The government wished to extend this technology to the maximum irrigated area. It is believed that the introduction of drip irrigation cannot be increased in India without subsidies. Government should make arrangements for supply of fertilizers and equipment by agencies. Technical support should also be provided by agencies for operating drip irrigation systems. By providing training facilities to farmers, this technology can be scaled up for their adoption. Farmers do not have sufficient knowledge about system maintenance. Therefore, the government should promote this water conservation technology to the farmers by publicizing the scheme in various newspapers and advertisements on social media. Some special packages may be introduced for farmers who are willing to adopt this technology. The government can provide free services to farmers regarding the adoption of this water conservation technology along with providing them with an easier subsidy method for sustainable development.

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