

Promoting drip irrigation in India: A review of evidence and recent developments

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Abstract— In the classical model of irrigation efficiency, all water applied to the crop is treated as consumed or lost while the integrated basin view of irrigation efficiency views Only the effective evapo-transpiration as the consumptive use in irrigation. In either Case, increased water efficiency at farm/individual level would not lead to water saving at the system (basin) level unless these higher farm efficiencies are achieved System-wide! Thus, unless the adoption of drip-irrigation is scaled up, it would not make any significant contribution to alleviating the problem of groundwater Depletion and in resolving various related issues. Even after more than three decades of promotion by various government and non-government agencies, the spread of Drip-irrigation in India is miniscule. The limited growth of drip-irrigation Technologies in India can, to a large extent, be explained by the apparent gap between what has been marketed and where the demand lies.

Index Terms— Evapo-transpiration, Drip irrigation, irrigation frequency, net present value, internal rate of return, efficiency of drip irrigation

1.0 Introduction

Drip irrigation (in its various forms – Conventional drip systems, Indigenous pot drips, Subsurface drips, Bucket drip kits, Micro-tubes, Easy Drip, Family drip kits and locally manufactured and assembled kits like *Pepsee*) is amongst the most popular modes of micro irrigation in India. Drip irrigation is a technology through which water is applied directly at the root zone of the plants leading to significant reduction in conveyance and application losses compared to the conventional flood irrigation method. The benefits of drip-irrigation technologies in water scarce regions have been widely studied all over the world. A review of evidences from several studies on drip-irrigation technologies strongly suggests significant financial, economic and social benefits of the technologies. However, the spread of these technologies; their adoption and diffusion have been far below potential and expectations. This paper tries to understand the adoption, spread, impacts, market dynamics and constraints of drip technologies and to derive conclusions and implications for promotion of these technologies, especially among to the poor's.

2.0 History and Present Trends OF Drip Irrigation

Head irrigation has been used since ancient times, when buried clay pots were filled with water, which would gradually seep into the grass.

Modern drip irrigation began its development in Afghanistan in 1866 when researchers began experimenting with irrigation using clay

Pipe to create combination irrigation and drainage systems. Subsurface drip irrigation (SDI) uses permanently or temporarily buried dripper line or drip tape located at or below. It is becoming popular for row crop irrigation, especially in areas where water supplies are limited or recycled water is used for irrigation.

3.0 Literature Review

1) Technical Review rip: D Irrigation System Using Wireless Sensor Network

India is a country, which totally depends on agriculture, so it requires huge amount of water for irrigation water resource is major problem in agriculture, so efficient distribution of available water is expected. So, reduce water wastage a sensor network based irrigation system can be developed so, this paper introduce the drip irrigation system to optimize use of water for the agriculture crops. This system is consisting of nodes, which consist of sensor, and uses radio frequencies for communication using sensors water level of crop field can be determined. Further sensor can part of water level information to computer. On the basis of water level information decision can be taken to supply water or not Entire sensor network can be connected to internet and remote controlling of pumps and irrigation system can be possible.

2) A Comparative Studies between Drip Irrigation and Furrow Irrigation for Sugarcane and Banana in a Region Navsari

This paper deals with the practices of comparative studies between Drip and Furrow irrigation system in Navsari. Drip Irrigation is one of the important areas which affect the livelihood of farmers directly. The drip irrigation helps to save the water and

increase the productivity of crop. Drip and flood irrigation are two controlled system while flood irrigation uses gravity to water use efficiency (kg/ha-mm) in sugarcane and banana, To find out yield increased of improved practice over conventional practice for sugarcane and banana, To find out the economics (Rs/ha) under different treatment combinations and To estimate the electricity saving due drip method of irrigation in different crops.

3) Irrigation and development of Indian agriculture: a systematic study

This paper is an attempt to understand the Water is the most critical input for enhancing agricultural productivity, and therefore Expansion of irrigation has been a key strategy in the development of agriculture in the country. Irrigation in India refers to the supply of water from Indian rivers, tanks, wells, canals and other artificial projects for the purpose of cultivation and agricultural Activities. In country such as India, 64% of cultivated land is dependent on monsoons. Land and Water are the two most important natural resources in the development of Agriculture. The success of the agriculture mainly depends on proper and scientific utilization of these resources. Crop productivity can be best optimized on watershed basis when these resources interact in a synergetic manner. For soil and water conservation on agricultural lands, both agronomic and mechanical measures are deployed, such as contour farming, management of soil fertility, water nutrient interrelationship, balanced IPNS system and micronutrients. The paper gives Details on irrigation water management for major crops in India: rice, wheat, maize, pulses, pigeon pea, gram, mango bean, black gram, field peas, lentil, oil seed crops, sugar cane and cotton. Irrigation is implemented through various methods such as border irrigation, basin irrigation, sprinklers and drip irrigation. Irrigation is the artificial application of water to the soil usually for assisting in growing crops. It is critical, yet a vital input of agriculture production process and pivotal to agricultural, social, and economic growth of nation. Civilizations have been dependent on development of irrigated agriculture to provide agrarian basis of a society and to enhance the security of people.

4) Potentials of Drip Irrigation in India: an Overview

Agricultural sector is the largest consumer of water. The demand of water has been consistently increasing from various sectors like Municipal use; industry etc. and such uses can often be at the cost of agriculture. The dominant method of irrigation practiced in large parts of the country is surface irrigation under which crop utilize only less than one half of the water released and remaining half gets lost in conveyance, application, runoff and evaporation. Recognizing the fast decline of irrigation water potential and increasing demand for water from different sectors, a number of demand management strategies and programs have been introduced to save water and increase the existing water use efficiency in Indian agriculture. Drip-irrigation is proved to be an efficient method in saving water and increasing water use efficiency as compared to the conventional surface method of irrigation, where water use efficiency is only about 35-40 percent.

5) Research Paper on Drip Irrigation Management using wireless sensors

In this paper we are giving brief outline of improving Throughput and Average end to end delay of information gathered from the agriculture field for Precision Agriculture. This algorithm provides the Throughput of 180 bits/seconds. Besides delivery of water level information packets/signals to base station as it also computes a threshold as well as does calculates values based on transmission range. This over all computational mechanism helps us to build a robust mechanism for delivery of information to base station thus reducing the packet loss. A WSN is a system consisting of radio frequency (RF) transceivers, sensors, microcontrollers and power sources. Recent advances in wireless sensor networking technology have led to the development of low cost, low power, multifunctional sensor nodes. Sensor nodes enable environment sensing together with data processing. Sensors are able to network with other sensor systems and exchange data with external users. Sensor networks are used for a variety of applications, including wireless data acquisition, environmental monitoring, irrigation management, safety management, and in much other areas.

4.0 Conclusion in Literature

In this study an attempt is made to study the potential and prospects of drip irrigation in India using the available information. The study shows that that Drip irrigation increases water saving and productivity of crops and that too with reduced cost of cultivation. While water saving due to adoption of drip irrigation is found in the range of 12-84 percent in different crops, the same is found to be in the range of 8-60 percent in sprinkler irrigation method. Water saving is found to be relatively higher among the water-intensive crops like sugarcane, banana and vegetable crops. Similarly, productivity gain is found in almost all the crops cultivated under drip irrigation as compared to the same cultivated under conventional irrigation method. Besides these benefits, it also indicates that micro irrigation can also reduce weed problems, electricity consumption (required for lifting water from well and other sources), over-exploitation of groundwater, etc. Therefore, there is a need to find out the ways and means to convince the farmers about the economic and social feasibility of micro-irrigation. Thus, efforts are needed to convince the farmers through quality extension network, as India's highly successful green revolution was also the result of extension innovations as much as technology. Considering the fast decline of irrigation potential and competing demand for water from different sectors, all possible efforts are needed to increase the adoption of water saving technologies so as to avoid water scarcity in the future.

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