Sensor Based Drip Irrigation

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***Abstract*- Agriculture has always been the backbone of Indian economy. But in the recent years there has been a considerable drop in the farmer's population. One of the most important factor to contribute to this problem is no transparency in agricultural marketing. Thus, by automating the activities involved in agricultural marketing (sending, exchange, forwarding, etc.), we thrive to give farmers a sense of security about their productions as well as the profit they deserve. The main aim of the research paper is to tell that Sensor based irrigation is very conventional, easy to use, cost saving, less amount of labor required. With the automated technology of irrigation the human intervention can be minimized. 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 many other areas.**

Keywords*- *Drip Irrigation, Farmers, Problems of Farmers, water level monitoring, wireless sensor Networks, drip irrigation, Precision Agriculture.

I . INTRODUCTION

For continuously increasing demand of food necessities, it's important to rapid improvement in production of food technology. Agriculture is only the source to provide this. This is the important factor in human societies to growing and dynamic demand in food production. Agriculture plays an important role in economy and development. Agriculture plays the important role in the economy and development, like India. Due to lack of water and scarcity of land water result the decreasing volume of water on earth, the Farmer use irrigation. Irrigation may be defined as the science of artificial application of water to the land or soil that means depending on the soil type, plant are to be provided with water. In agriculture, there is two things is very important, first to get information of about fertility of soil and second is to measure moisture content in soil. Nowadays for irrigation different Techniques are available which is used to reduce the dependency of rain.
Drip Irrigation is one of the type that is used for providing water. Drip irrigation is a type of micro-irrigation that has the potential to save water and nutrients by allowing water to drip slowly to the roots of plants, either from above the soil surface or buried below the surface. The goal is to place water directly into the root zone and minimize evaporation. Drip irrigation systems distribute water through a network of valves, pipes, tubing, and emitters. Depending on how well designed, installed, maintained, and operated it is, a drip irrigation system can be more efficient than other types of irrigation systems, such as surface irrigation or sprinkler irrigation.
Dry land and irrigated agriculture depend on the management of two basic natural resources; soil and water. Soil is the supporting structure of plant life and water is essential to sustain plant life. The wise use of these resources requires a basic understanding of soil and water as well as the crop itself. Moisture is critical for seed germination and uptake of nutrients by the plant. Excess water may stop gaseous exchange between soil and the atmosphere which reduces root respiration and root growth. Optimum level of moisture ensures healthy growth of the root and overall development of the plant

II. AIMS AND OBJECTIVES

- Understand the problems currently present in the farming.
- To find the root cause behind it
- Try and give a better and feasible solution to overcome that problem.
- Understand various reasons for wastage coming up with new technology being used.

III. LITERATURE REVIEW

A considerable amount of research has been done on the working and performance of drip irrigation in India, by the academicians and researchers. The literature obtained by the investigator, in the form of reports and research studies, is briefly reviewed in this part.
Considerable amount of work has been carried on Sensor based irrigation. Researchers have proven various methods and techniques by which sensor based irrigation is possible. It will be very useful for bringing in the new technology rather than using traditional method.
Precision agriculture is an agricultural system that can contribute to the sustainable agriculture concepts. If installed and programmed properly, automatic agricultural systems can even save us money and help in water conservation. Automatic agricultural systems can be programmed to discharge more precise amounts of water in the field, which promotes water conservation. At present, labor-saving and water-saving technology is a key issue in agriculture. Basic concept of this paper was Water level controller, soil moisture sensor, electrochemical sensor, GSM Model. [1]
Due to unplanned use of water the ground water level is decreasing
day by day lack of rains and scarcity of land water also results in decrement in volume of water on earth. In

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present drip irrigation system water is provided to root zone of plants drop by drop which results in saving of huge amount of water. The objective of the system is to a) conserve energy & water resources b) handles the system manually and automatically c) detects the level of water d) builds such system which enhances crop productivity e) learns selection methods of irrigation based on different parameter. [2]

The automatic system was tested for 136 days and save 90% compared with traditional irrigation system. Three replicas of the automated system have been used successfully in other places for 18 months. Because of its energy autonomy and low cost, the system has the potential to be useful in water limited geographically isolated area[3]

The system provides with several benefits and can operate with less manpower. The system supplies water only when the humidity in the soil goes below the reference. Due to the direct transfer of water to the roots water conservation takes place and also helps to maintain the moisture to soil ra- tio at the root zone constant to some extent. Thus the system is efficient and compatible to changing environment.

Advantage of the system are its saves water, improves the growth, stops the growth of weeds, saves too much time, helps control fungal diseases, Adaptable, simple and easy to use.[4]

IV. IRRIGATION METHODS AND PROBLEMS

A. Traditional Irrigation Methods:

1. Level Basin Method: In this technique the top end of the field is applied with water where it will flow over the whole field. After the water reaches the end of field it starts run of to pond. Water wastage is not good for dry area. The whole field is divided into basins according to the capacity of water.

2. Furrow irrigation method: This irrigation basin is used in the production of vegetables. The whole field is not filled with water rather than water is applied in furrows. This saves water at the same time and on the other hand the plant is not in direct contact with water as some plants like production of vegetables are very sensitive to pounded water. Furrows are sloping channels which are formed in the soil.

3. Basin Irrigation Method: This method is generally known as Border Strip Irrigation Basin. Here land is formed into strips which is levelled across the Narrow dimension i.e. width and the sloping is done in long dimensions i.e. length, is Formed. During irrigation, water is poured at the upper end of the border strip, and it is advanced down the strip. It is suitable to irrigate all growing crops like wheat, barley, fodder. This irrigation method is more suited for horticulture development.

Disadvantages of using traditional irrigation methods: Large amount of water is used in above irrigation techniques. Efficient and welfare use of fertilizers is not possible. Requires large man work. Net yield or productivity is also not high. Problems related to soil erosion are major problem. Substantial amount of ground water goes waste. Problem of water logging in fields.

B. Modern Irrigation Methods:

1. Sprinkler Irrigation Method: Sprinkler irrigation is a method of applying irrigation water which is similar to natural rainfall. Water is distributed through a system of pipes usually by pumping. It is then spread into the air through sprinklers so that it breaks up into small water drops which fall into the ground. The pump supply system and operating condition must be design to enable a uniform application of water.

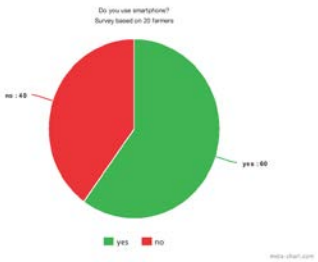
2. Drip Irrigation Method: Drip irrigation also known as trickle irrigation or micro irrigation is an irrigation method which minimizes the use of water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing, and emitter. In this irrigation system, a small amount of water is applied at frequent intervals in the form of water droplets through perforations in plastic pipes or through nozzles attached to tubes spread over the soil to irrigate a limited area around the plant. A precise amount of water equal to the daily consumptive use or the depleted soil water needs to be applied. The soil water can be maintained at the field capacity during the crop growing period. Deep percolation losses can be completely prevented and the evaporation loss is also reduced.

Drip irrigation requires about half of the water needed by sprinkler or surface irrigation. When compared with overhead sprinkler systems, drip irrigation leads to less soil and wind erosion.

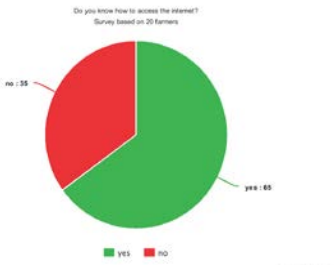
3. Pot Irrigation Method: Pot irrigation method is more suitable for areas having scanty rainfall. In saline areas where flow irrigation is not suited, pot irrigation method is successful.

Questionnaires Prepared for the current research-

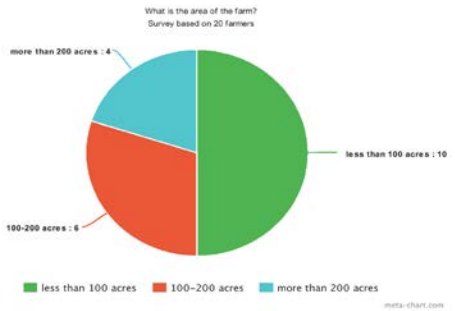
1. Do you use Smartphone?



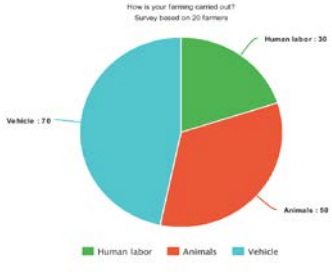
2. Do you know how to access the internet?



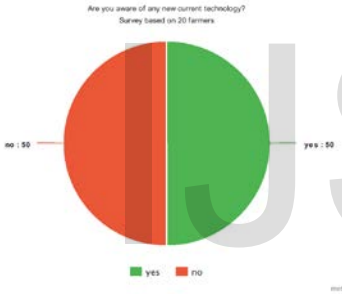
3. What is the area of the farm?



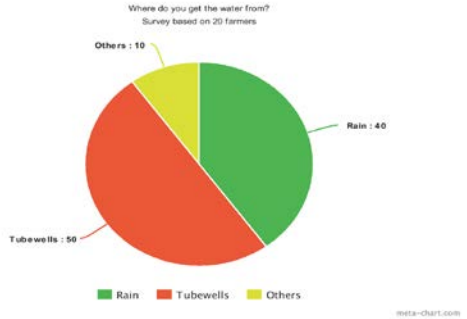
4. How is your farming carried out? Human, animal, vehicle.



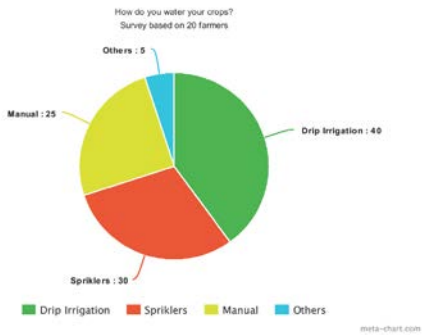
5. Are you aware of any new current technology?



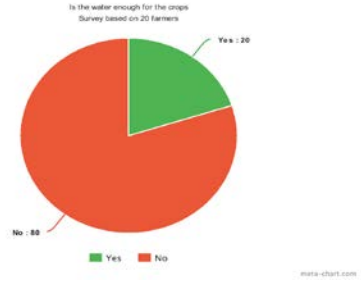
6. Where do you get the water from? Rain, Tube-well, pond..



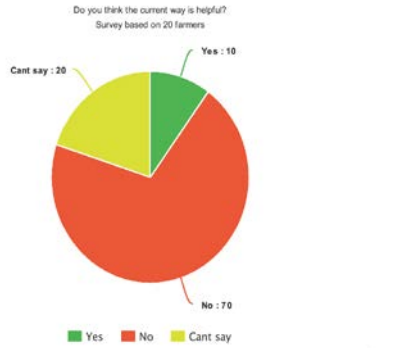
7. How do you water your crops? Type of irrigation



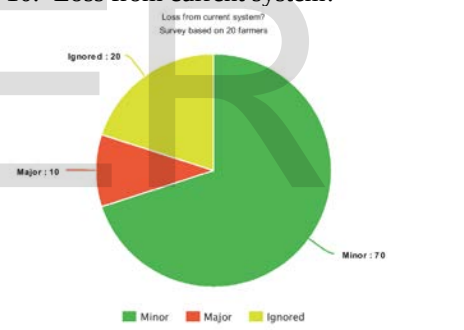
8. Is the water enough for the crops



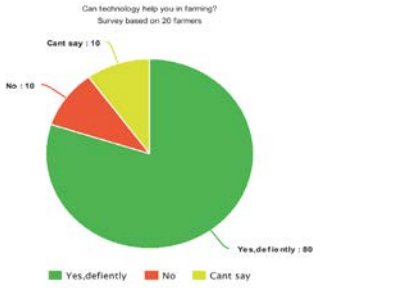
9. Do you think the current way is helpful or is there any drawback?



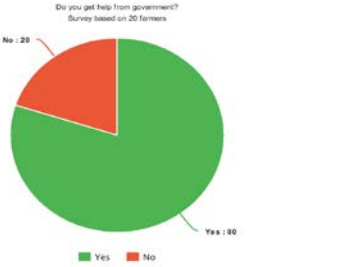
10. Loss from current system?



11. Can technology help you in farming?



12. Traditional irrigation or automatic irrigation?



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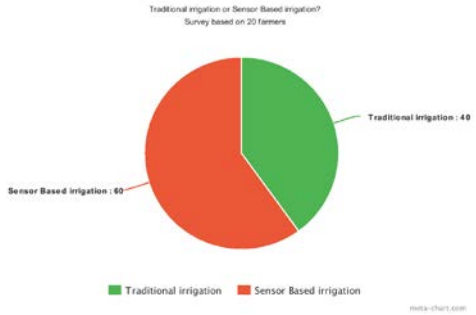
13. Do you get help from the government?



V. SENSOR BASED DRIP IRRIGATION

Conventional irrigation methods like overhead sprinklers and Flood-type feeding systems usually wet the lower leaves and Stem of the plants. The entire soil surface is saturated and often stays wet long after irrigation is completed. Such a condition promotes infections by leaf mold fungi. Flood-type methods consume a large amount of water, but the area between crop rows remains dry and receives moisture only from the incidental rainfall. The drip irrigation technique slowly applies a small amount of water to the plant's root zone. Water is supplied frequently, often daily, to maintain favorable soil moisture condition and prevent moisture-stress in the plant with proper use of water resources.

Sensor based systems can provide various benefit over the traditional system. By using Sensor based energy is consumed, properly converted, wastage is avoided to a greater extent. No need for farmer to be present there. Labour work is avoided. More focus is given to crop. Quick with all time update. Sensor based framework installed in the field may gather various physical parameters related to irrigation. These includes ambient temperature, ambient humidity, soil temperature, drip water temperature, soil moisture, soil pH, water pressure, flow rate, amount of water, energy calculation(power),chemical concentration and water level. The data is sent to the central server wirelessly through the motes and gateways.

Based on the data ranges, the central server generates necessary control actions, which are routed to the respective controllers through control buses enabling implementation of closed-loop sensor based of the drip irrigation system. The basic feature of the product is to enable switching on and off of the motor remotely. The device ensures that all the fault conditions are checked and only then the motor is started.

VI. CONCLUSION

Conventional methods consume a large amount of water, but the area between crop rows remains dry and receives moisture only from the incidental rainfall whereas the drip irrigation technique slowly applies a small amount of water to the plant's root zone. So by using the new Sensor based sensor drip irrigation technique, we can control the wastage of water, there is no need of laborers.

It is time saving, led to removal of human error in adjusting available soil moisture levels and to maximize their net profits in accordance to factors like sales, quality and growth of their product.

As the demand for water increases, along with the need to protect aquatic habitats, water conservation practices for irrigation need to be effective and affordable. Precision irrigation will optimize irrigation by minimizing the waste of water, and energy, while maximizing crop yields. The most effective method for determining the water demands of crops is the based on the real time monitoring of soil moisture, and direct water application used in conjunction with the information about soil hydrological properties and evapotranspiration.

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