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DESIGN AND IMPLEMENTATION OF OPSIS AND AUTOMATED PLANT WATERING SYSTEM

SWATHI R [1], SUBASH A [2], SHIRIL KUMAR S [3], VAIRAMANI P [4], SREELEKHA S [5]

[1,2,3,4] Students, Department of civil engineering, SRM Valliammai Engineering College, Chengalpattu, Tamilnadu
[5] Assistant professor, Department of civil engineering, SRM Valliammai Engineering College, Chengalpattu, Tamilnadu

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Abstract – *The aim of this automation is to ensure that the availability of water for crop need to be developed for sloped region agriculture to sustainable in the face of climatic changes. Sloped region agriculture can outperform other irrigation methods. Irrigation is costly so automation need to be improved or newly developed not only with the aim of sustainable use of precious water resources but also with the aim of reducing soil erosion, destroy of soil structure. So that the mulching sheet been introduced in this technique to overcome the drawback and used for protecting the root of the plant from heat, cold. The field is modified into a small setup with the distribution column for the uniform supply of water and better irrigation. The modern watering system would be effectively used to water plants when they needed by using moisture sensor. If the moisture content is less the specified threshold which is predefined, and water is supplied to the plant till it reaches it threshold.*

Key Words: Mulching sheet, Moisture sensor, automation, climatic changes, sloped region agriculture.

1.INTRODUCTION

New irrigation methods are being developed to irrigate upland crops that aim to use water more efficiently and to improve profitability and sustainability. Subsurface irrigation system has been developed to overcome the prevailing practical issues of drip irrigation. It is essential to minimize major water losses through evaporation, surface runoff and percolation in order to economize on the limited availability of water.

Since water availability directly influences the efficiency use all other inputs, better water availability in turn ensure optimum yields from a given combination of inputs. Therefore, emerging irrigation technologies ideally should be developed to enhance crop water availability in order to make agriculture practice sustainable in the long run.

In surface irrigation methods, water infiltrates the soil and provide irrigation water to the root zone of crops. The uniformly distribution and application efficiency basically depends on the degree of the land levelling.

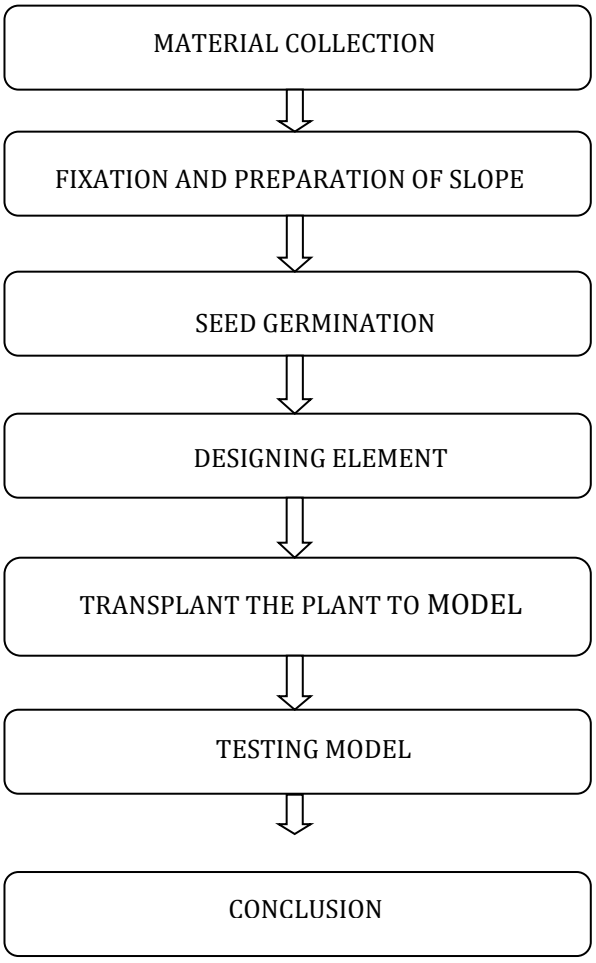
2. NEED FOR STUDY

Sloped region agriculture automation is designed to irrigate the upland crop with the high application efficiency with uniform distribution. Mulching sheet are most commonly used to protect the plant's root nutrient. The first most obvious one is super water capillarity.

3. OBJECTIVE OF THE STUDY

The proposed project aims to develop a smart irrigation system in order to get a significant saving consumption of water to irrigate the crops.

4. METHODOLOGY



5. MATERIAL COLLECTION

(i). Red soil has a better drainage capacity than the other soil, phaeozems are characterized by a humus rich surface layer covered in the natural state which is highly arable, so that it been chooses for the chilly plant.

Fig -5.1: Red soil

(ii). Mulching sheet acts as a barrier to keep powerful fumigant and ozone depletant in the soil.

Fig-5.2: Mulching sheet

(iii). Moisture sensor measures the volumetric water content in the soil.

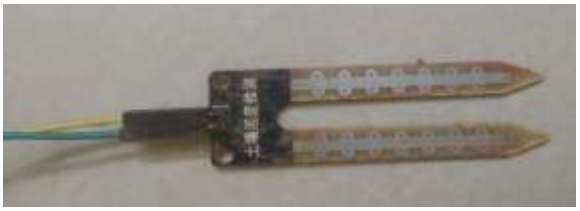


Fig-5.3: Moisture sensor

(iv) Submersible motor is selected in such a way that it is connected with the sensor in which it will be submerged into the water for the automatic flow when the soil gets dry or wet.

Fig-5.4: Submergible motor

(v) Microtube are been inserted into the distribution column pipe in order to have a steady and frequent flow of water into the plant.

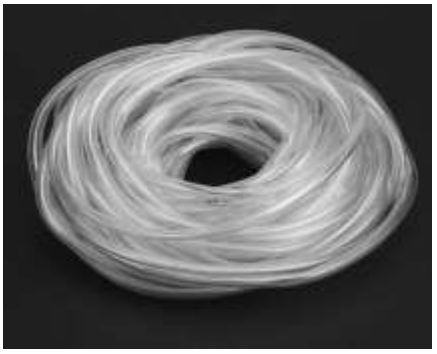


Fig-5.5: Micro Tube

6. SEED GERMINATION

The plant selected for the germination is chilies plant. The purpose of selecting this plant is, it provides an efficient utilization of environmental resources, provide greater financial stability for the farmers, etc., and it can be able to grow in any type of land surface.

BASE PERIOD: 195 to 210 days
TEMPERATURE: 21° c to 38° c

The germination of seeds undergoes five stages are as follows:

Fig 6.1: Imbibition **Fig 6.2:** Respiration

Fig-6.3: Light **Fig-6.4:** Growth regulator

Fig-6.5: Embryo Development

7. SLOPE FIXATION AND CALCULATION

Slope Ratio = 1:2

(i) . Slope with Gradient over an angle = 25°

Length = 50cm

Depth = 65cm

{Dimensions are taken form model size}

Tan 25°= opposite /adjacent

0.466 = opposite / 50 = 23cm

Initial point of the slope = 65cm - 23cm

= 42cm

Slope with gradient over an angle = 27°

Length = 40cm

Depth = 50cm

Tan 27° = opposite / adjacent

0.509 = opposite / 40

= 20.38cm

Initial point of the slope = 18cm + 20.38cm

= 38.38cm

Fig-7.1: Slope fixation

8. TRANSPLANTATION

In agriculture transplanting or replanting is the technique of moving a plant from one location to another. Most often this takes the form of starting a plant from seed in optimal conditions, such as in a greenhouse or protected nursery bed.

Fig-8.1: Transplantation

9. IRRIGATION SYSTEM INSTALLATION

For the OPSIS Treatments, two plots of 6.5 cm x 5.0 cm were prepared by installing four OPSIS lines at 1.2cm spacing. Water tank stored water and 4inch PVC pipes where used to make water supply column and water distribution column. To detect the moisture content in the soil surface moisture sensor is being installed.

Fig-9.1: Irrigation system setup

10. AUTOMATED PLANT WATERING SYSTEM INSTALLATION

The Power supply is been connected to the Arduino board, Motor pump and the extension board. The motor pump is connected to the water sprinkler and then supply the water to the plant, on the other the extension board is connected to the moisture sensor so that the it could be able to detect the moisture content in the soil and then if it less than the threshold value the sensor detect to the Arduino board and then the motor starts automatically.

Fig-10.1: System Installation

11. COST COMPARISON

Total approximate cost of one-acre chilly farm is calculated for both conventional method and opsis method

SI.NO	DESCRIPTION	CONVENTIONAL METHOD (In Rupees)	OPSIS METHOD (In Rupees)
1	Seed Cost	5000	5000
2	Transplantation Cost	500	500
3	Fertilizer cost	2000	1000
4	Plowing cost	1000	1000
5	Mulching sheet cost	-	2000*
6	Moisture sensor	-	3000*
7	Harvesting cost	2500	2500
8	Water distribution column	-	8000*
9	**Total**	**11,000**	**23,000**

*** Indicates initial installation setup**

Table-11.1 Cost Comparison

12. CONCLUSION

The agricultural sector is of vital importance for the region. It is undergoing a process of transition to a market economy with sustain tile changes in the social, legal, structural, productive and supply setups, as is the case with all other sectors of the economy.

These changes have been accompanied by a decline in agricultural production for most countries and have affected also the national seed supply sectors of the region. Due to relatively low demographic pressure projected for the future.

The presence of some favorable types of climax and other positive factors including very wide formal seed supply sector, it should be possible to overcome problems of foods insecurity in the region, and even to use this region to provide food to other food deficient regions. Opportunities must therefore be created to reach these results.

Appropriate policies should be established, at various level in order to facilitate seed investment and development in the region.

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BIOGRAPHIES

SWATHI R
Student, B.E. Department of Civil Engineering, SRM Valliammai Engineering College, Chennai.

SUBASH A
Student, B.E. Department of Civil Engineering, SRM Valliammai Engineering College, Chennai.

SHIRIL KUMAR S
Student, B.E. Department of Civil Engineering, SRM Valliammai Engineering College, Chennai.

VAIRAMANI P
Student, B.E. Department of Civil Engineering, SRM Valliammai Engineering College, Chennai.

SREELEKHA S M.E (Ph.D)
Assistant professor(O.G), department of Civil Engineering, SRM Valliammai Engineering college, Chennai.