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Creation of Native Valley Conditions for Vegetation by Incubation Technique

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ABSTRACT: An agro incubator is a well treated system that incubates plants for its productive growth. This automated system provides optimum conditions for the plants. Water, temperature, manure, light are sensed and adequate amount of resources are supplied automatically and efficiently for the recreation of the plant's native habitat in a scientific manner. Plant requirements are provided without any resource wastage.

KEYWORDS: Soil moisture sensor, Temperature sensor, Incubation

I.INTRODUCTION

An **incubator** is anything that performs or facilitates various forms of incubation. It is an apparatus used to maintain environmental conditions for the suitable growth and maintenance for a neonate or maintaining eggs of birds or reptiles, microbiological cultures or cell cultures. There is an urgent need to create strategies based on science and technology for sustainable resource management including technical, agronomical, managerial, and institutional improvements.So as an incubator provides all the necessary conditions for the newborns, an agro incubator provide optimum conditions like adequate amount of water, organic pesticides, appropriate temperature and light for the plant growth. This method of plant cultivation results for best plant yields as well as reduces man power and wastage of resources.

This paper provides an effective way of monitoring plants by microcontroller based technology. It detects soil-moisture by sensors placed in the root zone of the plants. It waters plants whenever their soil moisture level drops below a predefined value .Alerts if the temperature around the plants drops below preferred value by the temperature sensors, and required temperature is maintained. An algorithm was developed with threshold values of temperature and soil moisture that was programmed into a microcontroller for regulation.

II.SYSTEM OVERVIEW

The agro incubator consists of soil moisture sensing system, temperature sensing and altering system, artificial light supply, a watering system and auxiliary system. The effective working of these together brings out the desired output.
a. *Soil moisture sensing system:* Nowadays a lot of water is being wasted for plant irrigation. A soil moisture sensor checks this problem. Measuring soil moisture is important in agriculture to manage the irrigation systems more efficiently. Sensors are placed in the root zone of the plants. It consists of soil moisture sensing probes for sensing the water content in the soil. A soil moisture probe is made up of multiple soil moisture sensors. Since analytical measurement of free soil moisture requires removing a sample and drying it to extract moisture, soil moisture sensors measure some other property, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for moisture content. The relation between the measured property and soil moisture must be calibrated and may vary depending on soil type. The signals from the sensors are processed and are given to the microcontroller. The microcontroller analyses the condition and creates the output. For the analysing part, a reference voltage value corresponding to the soil moisture condition is set. This reference value varies from plant to plant. If the soil moisture condition drops below the defined value water is pumped. Also the program designing is done in such a way that the

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moisture sensors senses the moisture content at different points and the pump irrigate accordingly. This technique generally uses less water to grow a crop, and also they are able to increase yields and the quality of the crop by better management of soil moisture during critical plant growth stages.

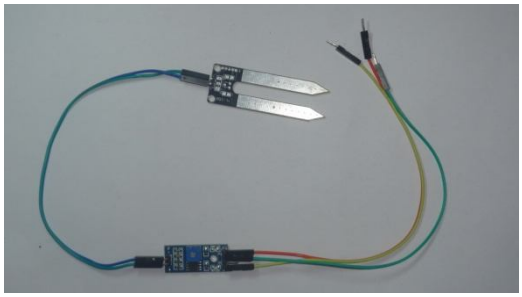

Fig.1: Soil Moisture Sensor

Fig.2: Moisturing System

b. *Watering system:* Depending upon the requirement of water for the crops, water pumps are used for the uniform irrigation of water. The program in the microcontroller is set such that it prevents watering from 11.30 am to 3 pm.

c. *Temperature sensing system*: Geographical area determines the temperature of a particular region. The crops cultivated in these areas vary accordingly. The temperature of a region could easily be incorporated in other region having different temperature by proper controlling techniques like temperature sensing system. Temperature sensors measure the amount of hotness or coldness that is generated by an object or system, allowing us to "sense" or detect any physical change to that temperature producing either an analogue or digital output. The sensed temperature is analysed by the microcontroller and if the temperature is humid, exhaust fan makes out necessary regulations. If the temperature is more than the appropriate temperature, it is controlled by providing mist.

d. *Artificial light supply:* Photosynthesis is the process of food preparation by plants in the presence of sunlight. It converts light energy to chemical energy to carry out activities.

$$6CO_2 + 6\,H_2O \xrightarrow{\text{Sunlight energy}} C_6H_{12}O_6 + 6O_2$$

(Carbon dioxide) (Water) (Sugar) (Oxygen)

When exposed to light greater than 670nm far red light and 700nm, red light rate of photosynthesis increases. But when exposed only to shorter wavelength, violet light photosynthesis rate decreases. But combination and simultaneous supply of these light results in better yields. So we supply a combination of both shorter and longer wavelength light (violet and red respectively). Now the plant growth varies greatly.

e. *Auxiliary System*: This system includes an add-on organic pesticides, LCD display, control panel. For the better results pesticides are provided at equal interval of time. In a LCD display, sensor conditions are displayed. In Control panel switches are provided for the conversion from automatic mode to manual mode.

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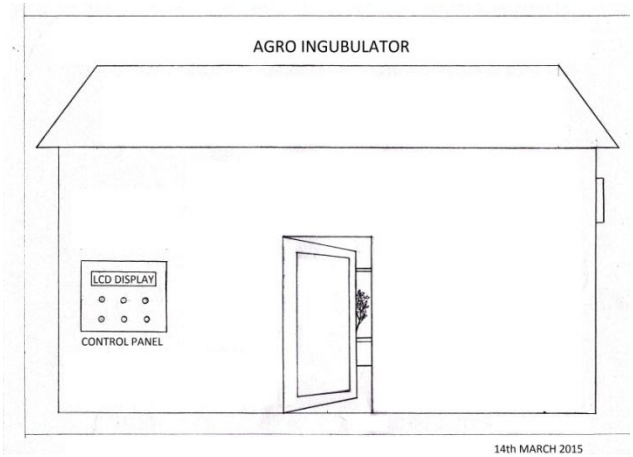

Fig.3 Front View of System

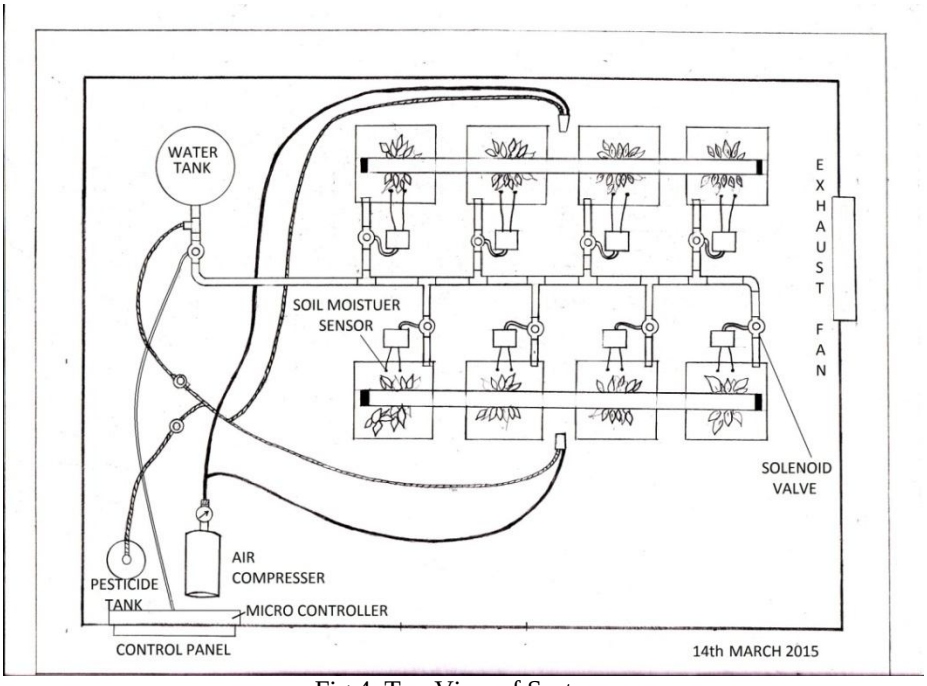

Fig.4: Top View of System

III. SYSTEM HARDWARE

The hardware used in the system consists of the water tank, the soil moisture sensor, temperature sensor, artificial light. The controller packaging includes valve, a battery supply, mist and exhaust fan, the Arduino UNO microcontroller and the small water pump.

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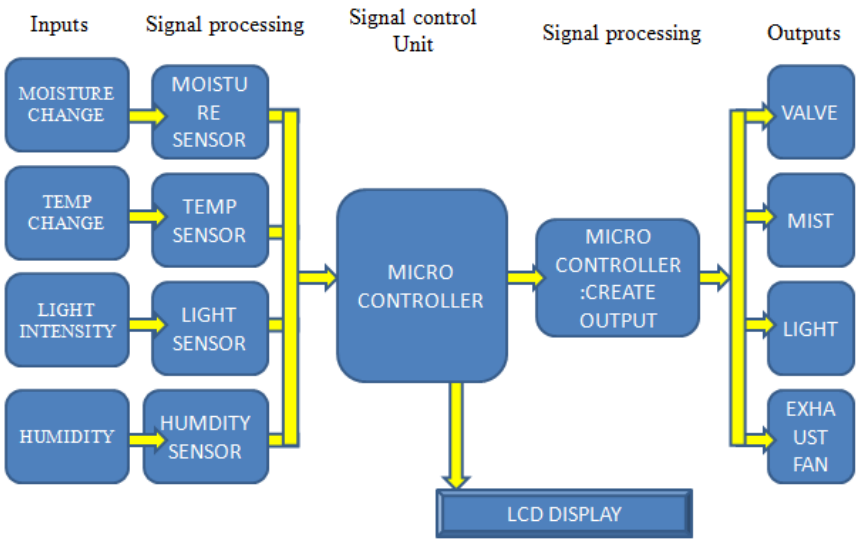

Fig 5:Block Diagram

IV. RESULT AND DISCUSSION

The system of incubation for plants results in high yielding qualitative products. The irrigation system can be adjusted to a variety of specific crop needs and temperature monitoring in compost production can be easily implemented. Along with an appreciative system, maximum resource exploitation without wastage is carefully done.

Considering the lifecycle of strawberry, different range of temperature should be provided for its better growth and better results. Also, if we consider Kerala's climatic condition, the required temperature range is not available for strawberry cultivation. This difficulty could be easily corrected by this incubation technique. Necessary climatic conditions for strawberry cultivation during its floral, propagation and vegetative growth are given along with PH value maintained soil and add-on organic pesticides.

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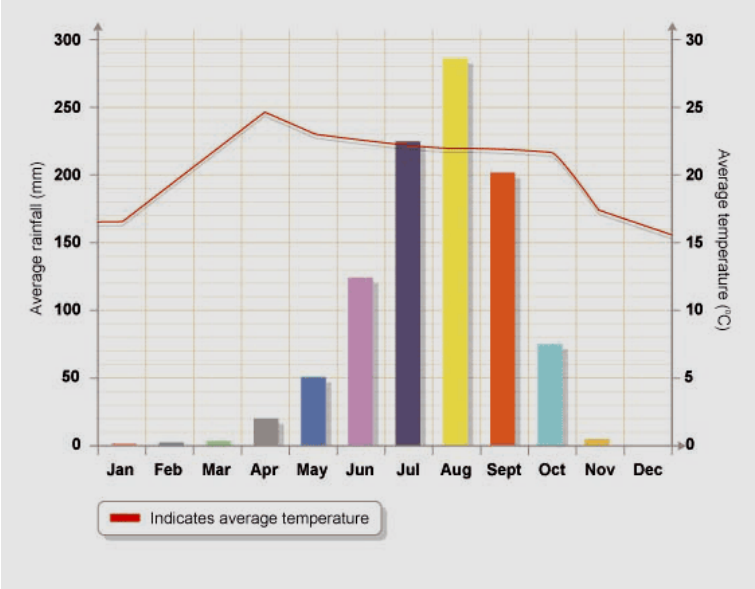

Fig 6: Climatic condition of Kerala

In the fig 6, it shows the graph of average rainfall(mm) Vs month and average temperature(°C) Vs month of Kerala.

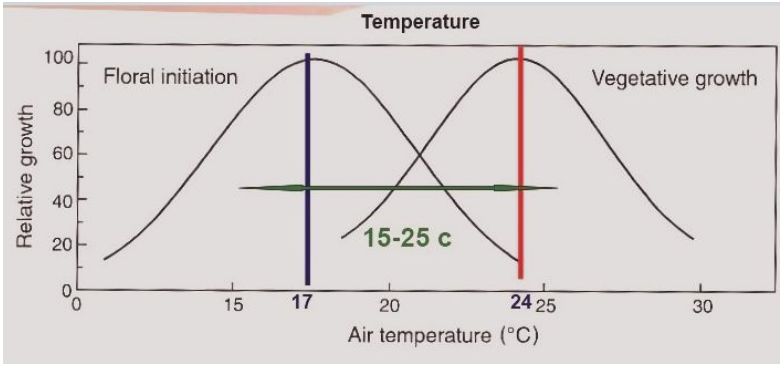

Fig 7: Relative growth of strawberry by Incubation technique

In the fig 7, it shows the graph of relative growth Vs air temperature (°C). The maximum floral initiation is obtained at about 17°C and vegetative growth will be maximum at 24°C.

Most of the agricultural, decorative, ornamental plants and plant products are effectively incubated and appreciable yields can be obtained. Since the products are available in our hand in our supervision it is trustworthy. It could also be done in small and large scale production. It could be easily incorporated in homes too and requires minimum maintenance as well.

V .CONCLUSION

The automated incubation system implemented was found to be feasible and cost effective for optimizing resources for plant cultivation. This irrigation system allows cultivation in places with water scarcity thereby improving sustainability. Agro Incubator is a highly sensitive, low cost and reliable system. It could be effectively used in

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cultivation of fruits like strawberries, pears, apples etc at our place. It could also be made and maintained at any place. It requires less area, simple and is an efficient method.
Besides the monetary savings in water use, the importance of the supplying products in our supervision justify the use of this kind of irrigation.

VI. FURTHER EXTENSION

Generally we come across sprinklers that water the plants along a path with fixed diameter. So water is not reached uniformly. To overcome this disadvantage, pressure controlled valves could be introduced so as to control the water discharge. Hence it becomes uniform. If increase of pressure is made, the water pumping diameter increases and vice versa. The pressure variations are set at periodic time intervals and thus the water flow is regulated.

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