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Effects of Drip Irrigation, Embedded System and Fertilizers on Sugarcane

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I. Introduction

Conventional planting at 90 cm row spacing recorded significantly highest cane and CCS yields (117.86 and 15.95 t/ha). Irrigation at 1.2 IW/CPE ratio recorded significantly higher cane. The maximum water saving was observed in paired row planting and paired cum trench planting at 30-150 cm row spacing with 0.6 IW/CPE ratio.[1]. The interested also in interactions involving land and water resources in agriculture, the institutional and regulatory aspects of water pricing, allocation and use, the valuation of natural capital stocks in agricultural settings, and the potential implications of global climate change for agricultural water management. Basic soil-water-plant relationships and basic engineering studies will be considered only if they are relevant to the active management of water in agriculture. Agricultural education, extension, and advisory services are a critical means of addressing rural poverty, because such institutions have a mandate to transfer technology, support learning, assist farmers in problem solving, and enable farmers to become more actively embedded in the agricultural knowledge and information system. Extension is responsible to almost one billion small-scale farmers worldwide. It is thus urgent to seek the best ways to support such farmers in terms of information, technology, advice, and empowerment. Many donors, governments, and nongovernmental organizations enthusiastically promote today. As a result of their popularity, there is some discussion as to whether the approach should be scaled up and out and incorporated into mainstream extension practices. A yield monitoring system is one of the most important elements in precision farming. It gives qualitative information and direct feedback to the growers by absolute precise measurements of the yield variability within the grove. This is also the first step in the process of site-specific crop management. Site-specific agriculture focuses on improving management to increase profitability and yield monitoring is essential for the generation of accurate yield maps. The growers can use the yield information and maps for management practices to prove the yield of the crop for the next season, which would increase farm profit and minimize the effects on the environment.[2]

II. Agronomy

A. Seed Rate:

Seed rate is the most sensitive input subsequently reflected in millable canes and cane yield. Seed rate mostly depends upon the type of soil. The studies on the of different eye budded sugarcane setts were undertaken at central sugarcane research station. It was revealed that use of two eye budded setts plated at 25 to 30 cm save 35 to 40 per cent seed material without affecting the yields. Another trial on use of single eye budded setts was conducted from June to net year October season during the same period. Planting single eye budded setts at 30 to 45 cm, reduced seed material to extent of 60 percent as compared to three eye budded setts without reduction in cane yield.

B. Planting Method:

The traditional method of planting accommodates about more than 1 lakh population in hectare. However, cane weight is about 1 kilogram or less than that. This method has many drawbacks. As a regards various methods of planting wet and dry method of sugarcane planting revealed that dry method is suitable for heavy saline and

chopan soils, whereas wet methods of planting is better for light to medium type of soil from germination, tillering and cane yield.

C. **Water Management:**

Sugarcane crops stands in the field for more than year or so. Its water and fertilizer requirement is quite high. However, its application depends upon source of water. In case of well irrigation the proportionate quantity of water applied with optimum quantity of water applied. In canel irrigation there is tendency to apply water in excess quantity might be due to its unassured availability. Use of paired row method of planting with drip methods of irrigation with fertilizer applications in 4 to 20 splits was conducted at Mahata Phule Krishi Vidyapith, Rahuri, Maharashtra, India revealed that planting cane with pair row with one lateral or two paired row with two lateral are equally better. It was also observed that applications of fertilizers in 20 splits though drip was beneficial.

III. Soil-Science

A. **Soil Survey and Classification:**

Majority soils were having high pH (8.0) and some soils were in the range of 7.5 to 8.0 pH(2 to 33 % in different divisions). The organic carbon status of soil was from medium to high, available P_2O_5 was from low to medium and $CaCO_3$ and K_2O available was from medium to high. Micronutrient survey indicates that 88 percent soils were deficient in Fe, 63 percent soils were deficient in Zn and 48 percent soils were deficient in both Fe and Zn.[3]

B. **Use of Soil Conditioners/Saline Alkali Soil Improvement:**

The different rotational crops dhaincha, Onion, guinea grass and Shevari were found effective in improving saline alkali soil; Garlic, Cotton, Sugarcane also helped to reduce soluble salt.

C. **Fertilizer Management use efficiency:**

Application of N through different sources as sulphate of ammonia, urea, ammonium chloride ammonium phosphate and liquer ammonia doses not showed any statistical difference. Use of urea super granuales in two equal splits, were found more effective than use of prilled urea to adsali and suru sugarcane.

IV. Technology to Irrigation

Agricultural irrigation is highly important in crop production everywhere in the world. In Turkey, 75% of the current fresh water is consumed in the agriculture irrigation. Therefore, efficient water management plays an important role in the irrigated agricultural cropping systems. The demand for new water saving techniques in irrigation is increasing rapidly right now. In order to produce “more crop per drop”, growers in (semi) arid regions currently explore irrigation techniques in the range from using less fresh water. One of them is making agriculture in a manner of sense, which uses different type of sensors. A site-specific wireless sensor-based irrigation control system is a potential solution to optimize yields and maximize water use efficiency for fields with variation 2000). Afterwards, soil moisture sensors and sprinkler valve controllers are begun to use for site-specific irrigation automation. The advantages of using wireless sensors are having the reduced wiring and piping costs, and easier installation and maintenance in large areas.[4-6] Agriculture has, throughout History, played a major role in human societies endeavors to be self-sufficient in food. Irrigation is an essential component of crop production in many areas of the world. In cotton for example, recent studies have shown that proper timing of irrigation is an important production factor and that delaying irrigation can result in losses. Automation of irrigation system has the potential to provide maximum water use efficiency by monitoring soil moisture at optimum level. The control unit is the pivotal block of entire irrigation system. It controls the flow of water and therefore enables the grower to acquire optimized results.

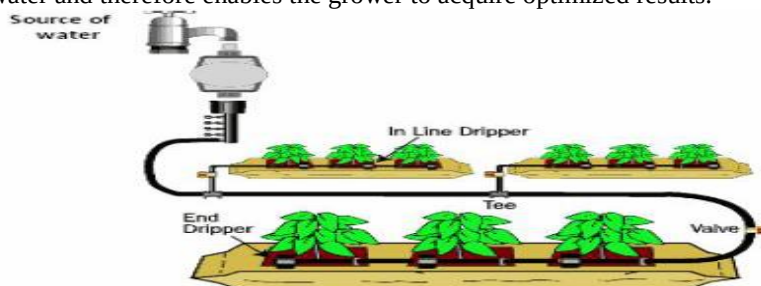


Figure 1 Simple Model of Drip Irrigation System.

Greenhouses form an important part of the agriculture and horticulture sectors in our country as they can be used to grow plants under controlled climatic conditions for optimum production. Automating a greenhouse envisages monitoring and controlling of the climatic parameters which directly or indirectly govern the plant growth and hence their production. So what is new on the horizon? Now that we understand the concepts of maximizing irrigation efficiency, how can we not only maintain, but also increase, crop yields with less water and less acreage? The answer lies in improved irrigation water distribution and management combined with proper nutrient management.

V. Methodology

The important parameters to be measured for automation of irrigation system are soil moisture and temperature. The entire field is first divided into small sections such that each section should contain one moisture sensor and a temperature sensor. RTD like PT100 can be used as a temperature sensor while Tensiometer can be used as the moisture sensor to detect moisture contents of soil. These sensors are buried in the ground at required depth. Once the soil has reached desired moisture level the sensors send a signal to the micro controller to turn off the relays, which control the valves. The signal sent by the sensor is boosted up to the required level by corresponding amplifier stages. Then the amplified signal is fed to A/D converters of desired resolution to obtain digital form of sensed input for microcontroller use. A 16X1 line LCD module can be used in the system to monitor current readings of all the sensors and the current status of respective valves. The solenoid valves are controlled by microcontroller through relays. A Chemical injection unit is used to mix required amount of fertilizers, pesticides, and nutrients with water, whenever required. Varying speed of pump motor can control pressure of water. It can be obtained with the help of PWM output of microcontroller unit. A flow meter is attached for analysis of total water consumed. The required readings can be transferred to the Centralized Computer on the receiver side for further analytical studies, through the wireless mode i.e. using RF module connected to the microcontroller unit. Using this technique the data can be transferred to the remote place. So the user can access the data sitting at his Home or Office. While applying the automation on large fields more than one such microcontroller units can be interfaced wirelessly to the Centralized Computer. The microcontroller unit has in-built timer in it, which operates parallel to sensor system. In case of sensor failure the timer turns off the valves after a threshold level of time, which may prevent the further disaster. The microcontroller unit may warn the pump failure or insufficient amount of water input with the help of flow meter.

VI. Software

6.1 SOFTWARE DETAIL

The programming in `_C_` language that will convert in assembly using keil software. It is basically used for coding of controller.

6.1.1 Introduction to Keil Micro Vision (IDE)

Keil an ARM Company makes C compilers, macro assemblers, real-time kernels, debuggers, simulators, integrated environments, evaluation boards, and emulators for ARM7/ARM9/Cortex-M3, XC16x/C16x/ST10, 251, and 8051 MCU families. Keil development tools for the 8051 Microcontroller Architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development. When starting a new project, simply select the microcontroller you use from the Device Database and the μ Vision IDE sets all compiler, assembler, linker, and memory options for you.

6.2 EMBEDDED C

Use of embedded processors in passenger cars, mobile phones, medical equipment, aerospace systems and defense systems is widespread, and even everyday domestic appliances such as dish washers, televisions, washing machines and video recorders now include at least one such device. Because most embedded projects have severe cost constraints, they tend to use low-cost processors like the 8051 family of devices considered in this book. These popular chips have very limited resources available most such devices have around 256 bytes (not megabytes!) of RAM, and the available processor power is around 1000 times less than that of a desktop processor. As a result, developing embedded software presents significant new challenges, even for experienced desktop programmers. If you have some programming experience - in C, C++ or Java - then this book and its accompanying CD will help make your move to the embedded world as Quick and painless as possible.

VII. Results and discussion

The study this system gives better result. It is increasing the productivity of the sugarcane. The increase of productivity depends on so many parameters it is mentioned in above discussion. The productivity also increased by using embedded system used for control the water and fertilizers.

References

1. Prof. D.D. Pawar, Head, Interfaculty Department of Irrigation water Management, "A report of research work done at interfaculty department of irrigation water management", Mahatma Phule Krishi Vidyapeeth, Rahuri, Ahmednagar, Maharashtra, India.

2. Kristin Davis , Ephraim Nkonya, Edward Kato, Daniel Ayalew Mekonnen, Martins Odendo, Jackson Nkuba, “Impact of Farmer Field Schools on Agricultural Productivity and Poverty in East Africa”, Knowledge, Capacity, and Innovation Division
3. Fifth years of research on sugarcane, Mahatma Phule Krishi Vidyapeeth, Central Sugarcane Research Section, Padegaon, Maharashtra, India.
4. R. M. Faye, F. Mora-Camino ,S. Sawadogo, and A. Niang, 1998 IEEE. An Intelligent Decision Support System for Irrigation System Management
5. Vories, E.D., Glover, R.E., Bryant, K.J., Tacker, P.L., 2003. Estimating the cost of delaying irrigation for mid-south cotton on clay soil. In: Proceedings of the 2003 Beltwide Cotton Conference National Cotton Council, Memphis, TN, USA, pp. 656–661
6. Mahesh M. Galgalikar, Gayatri S Deshmukh “Real-Time Automization of Irrigation system for Social Modernization of Indian Agricultural System” 2010 International Journal of Computer Applications (0975 - 8887) Volume 1 – No. 22

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