

Performance Evaluation of Developed Low Cost Microcontroller Based Automated Drip Irrigation System

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ABSTRACT

Efficient irrigation management is necessary in many irrigation methods as to allocate the more budget in agricultural water use. India being an agricultural country needs some innovation techniques in the agricultural field. This can be achieved through modern technologies which assist computing, communication and control within devices. Automatic irrigation systems presently available are costly and are not adopted by most of the Indian farmers. Therefore, appropriate low cost technology has to be developed to facilitate high water use efficiency. In view of above issues, an attempt has been made to develop a low cost microcontroller used in automated drip irrigation system based on soil moisture. The microcontroller based soil moisture sensor is designed using keil μ vision 3 software for maximum of four sensors present in each field and controls the irrigation water supply in the field to be using solenoid valve. Soil moisture sensor was calibrated to switch off the motor when soil moisture reaches to field capacity and switch on the motor when soil moisture reaches to 70% of field capacity. The experimental site was divided into three plots with 12 m \times 35 m size to conduct experiments with sweet corn (*zea mays*) crop. The yield response of sweet corn crop with plant to plant spacing of 20 cm for different row to row spacings (75 cm row to row spacing and 40 cm \times 110 cm paired row spacing) and irrigation application methods (flood irrigation, single row drip and paired row drip method) was evaluated. The crop water requirement, emission uniformity, cob characteristics and wetting pattern using surfer software was observed. Overall yield response was observed to be best in microcontroller based soil moisture sensor with single row drip spacing as 7.93 t ha⁻¹ and water saving was observed as 36% when compared to flood Evapotranspiration method. Water use efficiency for sweet corn crop is highest in single row drip method as 23.88 kg/ha-mm followed by paired row drip and flood method as 19.51 and 14.29 kg/ha-mm respectively. Water use efficiency for sweet corn crop is highest in single row drip method as 23.88 kg/ha-mm followed by paired row drip and flood method as 19.51 and 14.29 kg/ha-mm respectively.

Key words : Automatic drip irrigation, Keil μ vision 3, Microcontroller, Soil moisture sensor.