

Estimating Water Content of Leaves by Using Innovative Laser Sensor

**Khattab, Yosria K.^{1*}, H. Hassan², M. E. Shawkey³, A. M. Abou El Magd⁴,
and W.M. Sultan⁵**

^{1,5} Agricultural Engineering Research Institute, ARC, Dokki, Giza, Egypt

^{2,4} National Institute of Laser Enhanced Science, Cairo University, Egypt

³ Faculty of Agriculture, Cairo University, Egypt

Abstract : The aim of this investigation is to use the applicable laser technology for automating drip irrigation systems, in order to save water and energy and increase crop production. In this respect a new instrument is designed and built in National Institute Laser Enhanced Science (NILES) Cairo University. The optical electronic instrument with Laser Control Unit (LCU) consists of laser source with wavelength 530 nm, sensor and micro control unit. The use of (LCU) depends on the optical properties of leaf (transmittance, reflectance and absorbance) of laser beam. The correlation between Leaf Water Content (LWC) and Laser Beam Transmitted (LBT) from leaves was used to detect when the automate irrigation system operate and how much water applied. A laboratory experiment was carried in (NILES) to test the (LCU), on many leaves of different vegetable crops such as cucumber and squash. The results showed that: 1) Laser beam transmitted increased while leaf water content decreased with time after irrigation. 2) for cucumber leaves the minimum value of LBT was 65 mV when the value of LWC was 91% meanwhile, the maximum value of LBT was 91mV when the value of LWC is 70%. 3) The data indicated that there were few differences between cucumber and squash in laser beam transmitted property and its relation with leaf water content, this may be due to the big similarity in the leaves properties between cucumber and squash.

Key words : *Laser Sensor, Water Content of Leaves, automate irrigation system, drip irrigation system, wavelength, cucumber and squash.*