

(23)

Application of Infrared Thermography for Efficient Irrigation: A Review

Gunasekara D.S., Jayasinghe G.Y.*

Department of Agricultural Engineering, University of Ruhuna, Matara, Sri Lanka

**victorlion3000@gmail.com*

Abstract

Precision agriculture technologies have become more prominent and useful in prevailing commercial agriculture. Using precise amount of irrigation water will reduce the yield losses and minimises the possible water losses due to over irrigation. Irrigation opportunity time can be easily and effectively detected by infrared thermography. In infrared thermography heat patterns emitted from an object are used to create an infrared image. This image indicates the amount of energy emitted from the relevant object. This technique is non-invasive and can be used even from a distance. Promotion of this technology in agriculture is a good remedy for water scarcity and also to reduce the cost of production. The energy emitted by plants indicates the leaf temperature. There is a relationship between the leaf temperature and status of water within the plant. When the plants are in water stress, stoma gets closed to reduce the transpiration losses and as a result temperature rises up. In thermography this leaf temperature is measured and different levels of canopy temperatures are indicated in different colours and different shades of colours. Temperature values obtained from thermogram can be converted into crop water stress index (CWSI) and the status of water stress in crops can be understood with its use. According to the level of water stress amount of water to be applied can be determined. According to different colours in the thermal image water distribution can be planned. By using this technique, accurately crops can be irrigated on time before they acquire permanent wilting point and the water content in the root zone can be maintained in plant available water range. Further, this technique needs to be diffused more into the Sri Lankan agriculture sector as there are many farmers who are struggling with water scarcity. This paper is a comprehensive review of the possible application of the infrared thermography for irrigation scheduling, deciding the water distribution pattern in a crop field and a way to manage irrigation water efficiently.

Keywords: Infrared thermography, Irrigation, CWSI, Temperature