

TESTING AND DEVELOPMENT OF A SOIL MOISTURE
DEFICIT INDICATOR FOR IRRIGATION SCHEDULING

By

WADDUWAGE PALITHA

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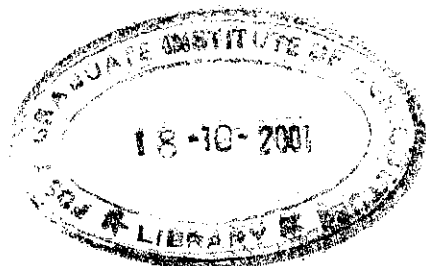
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ABSTRACT

A study was conducted at the Regional Agricultural Research Station, Makandura in the North Western Province of Sri Lanka to test and develop an irrigation scheduling indicator and to compare it with two common methods of estimating potential evapotranspiration (ET_o), namely United States Weather Bureau Class A pan evaporimeter and Penman method. A standard lysimeter was constructed and installed in the field with a grass cover to calibrate the indicator and the other two methods of estimating ET_o .

Potential evapotranspiration from standard grass lysimeter were compared during the Maha season of 1991/92 with pan evaporation, Penman method and evaporation values from five indicators. This was continued during the Yala season of 1992, except that the indicators were covered with different mask diameters to simulate the changes of crop coefficients. In addition, soil moisture depletion was monitored with neutron probe from four plots of brinjal to determine the crop coefficients.

The results showed that the indicator can be used as a device to schedule irrigation. The indicator with a mask diameter of 9.2 cm provided a very close agreement with the potential evapotranspiration. The different mask diameters can simulate the different crop coefficients due to the changes in evaporative surface. However, the main drawback of the indicator is the difficulty in measuring the water level accurately. The indicator can be used as a reliable scheduling device if this constraint can be



surmounted. The potential of popularizing this indicator is high, since the cost of this device is only Rs. 770.00. Therefore, a further study is recommended to improve the indicator to a commercial prototype.

Pan evaporation underestimated the potential evapotranspiration, both during the Maha and Yala seasons. The pan coefficient for Maha and Yala seasons were 1.03 and 1.55. These values are different to what was given by the Food and Agricultural Organization (FAO). It is necessary to develop pan coefficients for Maha and Yala seasons with longterm monitoring of evaporation from Class A evaporation pan and potential evapotranspiration from lysimeter studies with more replicates.

The Penman method overestimated the standard grass evapotranspiration by a factor of 1.3 during the Maha season. However, there was an underestimation during the Yala season by a factor of 0.81. There is hardly any published literature with regard to the suitability of different methods of evapotranspiration techniques to Sri Lanka. The procedure mentioned in the FAO irrigation and drainage paper No. 24 is being followed without verifying the suitability of such methods. The results from this study indicated the necessity of a long term monitoring research with replicated lysimeter experiments to verify the suitability of such methods to estimate potential evapotranspiration.