

ABSTRACT

Lysimetric evaluation of evapotranspiration prediction models for some selected food crops

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Evapotranspiration (ET) information is needed for many applications in agricultural and natural resource management. In order to test the commonly used prediction methods in the humid, tropical conditions of the Caribbean, six drainage lysimeters were constructed and installed at the University of the West Indies Field Station, Valsayn, Trinidad, to measure 10-day and monthly ET from well-watered, irrigated grass (*Axonopus compressus*) used as reference crop and two food crops [maize (*Zea mays* L.) and sweet pepper (*Capsicum annuum*)].

It was found that the monthly estimates of reference crop ET were more accurate than the 10-day estimates. Likewise, the dry season estimates were better than those of the wet season estimates. For monthly estimates of reference crop ET, the highest ranked methods were the Blaney-Criddle FAO, the Penman-Monteith FAO, and the Pan FAO methods in the wet season, the dry season, and over the full research period respectively. For 10-day estimates of reference crop ET, the highest ranked methods were the Pan FAO, the modified Jensen-Haise and the Pan FAO method in the wet season, the dry season, and over the full research period respectively.

For improved monthly estimates of reference crop ET, adjustment factors, ranging from 0.75 to 0.99, were developed for the three prediction methods that showed the highest correlation with lysimeter measured reference crop ET over the full research period. These include the Penman FAO, Penman-Monteith FAO, and Radiation FAO methods. Similarly, for improved 10-day estimates of reference crop ET, regression equations were developed using the Pan FAO method and the evaporation from a class A pan (E_{pan}) in the wet season, and using the Hargreaves method in the dry season.

Crop coefficients for the two food crops were computed. In the dry season, the observed crop coefficients for maize were within the range of published figures (0.94 to 1.28), but for the sweet pepper crops, the crop coefficients remained fairly constant at 1.0.

Further studies were recommended to improve the accuracy and applicability of the prediction methods over a wider range of crops and climatic conditions.

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