

EVALUATION OF EVAPOTRANSPIRATION ESTIMATION METHODS: A STUDY IN ANURADHAPURA, SRI LANKA

L.G.N. Lakmali, M.H.J.P. Gunarathna and M.K.N. Kumari

Department of Agricultural Engineering and Soil Science , Faculty of Agriculture, Rajarata University of Sri Lanka, Puliyankulama, Anuradhapura, Sri Lanka

Evapotranspiration is an important agro-meteorological parameter for climatological and hydrological studies as well as for irrigation planning and management. Among the various evapotranspiration estimation methods, Penman-Monteith method could be considered as a standard method due to worldwide acceptance in most climatological regions. However, use of Penman-Monteith method is still limited due to higher requirement of weather parameters, which may not be available in most of the meteorological stations. Therefore, it is vital to replace Penman-Monteith method using an alternative method or methods, which require minimum numbers of climatological data or using easily accessible parameters. Hence, this study attempted to investigate the most appropriate method or methods to replace Penman-Monteith method. Two years' meteorological data such as temperature, relative humidity, solar radiation, wind speed and dew point temperature (from April 2012 to March 2014) of automatic weather station located at Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura were used to identify the best method/s to replace Penman-Monteith method. Mean monthly evapotranspiration values were calculated using selected twelve methods representing temperature and radiation based methods. Mean Absolute Error was calculated to find out the method, which give the minimum deviation compared to the Penman-Monteith method. Data were analyzed using Microsoft Excel and ET₀ Calculator software. Results revealed that Linacre method gave the minimum deviation compared with Penman-Monteith method. Existing methods were calibrated using simple linear regression analysis to find out the best method to replace Penman-Monteith method. With regression coefficient of 0.757 ($R^2=0.934$), Blaney-Criddle method showed the best fitted line with Penman-Monteith method. Therefore, this study concluded that, with the coefficient of 0.757, Blaney-Criddle equation, which requires only temperature as an essential data for calculation, could be successfully used to estimate evapotranspiration in Anuradhapura area.

Keywords: Blaney-Criddle equation, Evapotranspiration, Mean absolute error, Penman-Monteith method