

Stochastic modelling of maize evapotranspiration under the climatic conditions of Banswara

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ABSTRACT : Stochastic modelling of maize evapotranspiration has done using 8 years (1998–2005) data. The performed statistical tests indicated that the series of the evapotranspiration data is trend free. The periodic component of evapotranspiration can be represented by second harmonic expression. The stochastic components of the evapotranspiration follow third order model. Validation of generated evapotranspiration series was done by comparison of generated evapotranspiration series and measured evapotranspiration series. The correlation coefficient between generated evapotranspiration series and measured evapotranspiration series was found to be 0.99. The correlation was tested by t-test and found to be highly significant at 1 per cent level. The standard error (0.13 mm) is quite low. The regression equation is very near to 1:1 line. Therefore, developed model can be used for future prediction of maize evapotranspiration series.

Key words : Stochastic, Auto correlation function, Auto regression

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INTRODUCTION

Evapotranspiration is an important parameter for estimation of crop water requirements. Frequently, it is required to estimate evapotranspiration of places where measured evapotranspiration is not available. The process of evapotranspiration is stochastic in nature. Usually, the deterministic models do not consider the random effects and may not represent the evapotranspiration quite accurately. On the other hand, the stochastic models are based on the time dependent variations and consider random effects involved in the process. Stochastic models explain the extent of dependence of a present observation on the past observations

therefore; stochastic modelling of evapotranspiration may provide good insight and understanding of the processes for useful applications in water resources development. Keeping this in mind, the present study was undertaken with the objective of developing and validating the appropriate stochastic model for maize evapotranspiration.

EXPERIMENTAL PROCEDURE

Location of the study area:

The study was conducted at the Agricultural Research Station, Borwat Farm, Banswara. The area comes under the sub-humid region of the agro-climatic zone IV-A of the state of Rajasthan, and is situated at 24°35' N latitude, 73°42' E longitude and at an altitude of 582.17 m above mean sea level. The annual rainfall in this region is 646.6 mm and more than 80 per cent of this amount is received during the monsoon season alone, due to the influence of the southwest monsoon.

Collection of meteorological data:

The data of pan evaporation was collected from Meteorological Observatory of the College of Technology and Engineering, Banswara. Meteorological data for a period of 26

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