Stochastic modeling of water deficit for crop planning under climatic conditions of Mirzapur district in Uttar Pradesh

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ABSTRACT

The information regarding the period and magnitude of water deficit is critical so that advance actions can be taken to avoid moisture stress to the crops. A method for predicting the weekly dynamics of water consumption deficit in agricultural crops using three decades (1984-2013) of meteorological data is developed for Mirzapur, District (Uttar Pradesh) in Vindhya Zone of Indo-Gangetic Plains. The turning point test shows that the weekly water deficit is identically distributed and Kendall's rank correlation test show that there is no definite trend of weekly water deficit. The auto correlation function analyzed using Fourier series shows that the periodicity is observed in weekly water deficit. The significant harmonics is also identified and statistical properties of the generated weekly water deficit series is compared with the observed weekly water deficit. The developed stochastic model is validated by predicting weekly water deficit for the next two years and compared with the observed water deficit. The mean weekly water deficit varied from minimum 0.34 mm in starting of August (32 SMW) to maximum 40.17 mm in middle of June (22 SMW). The mean water deficit for Mirzapur district is 12.38 mm week^{-1}. The coefficient of correlation of observed and simulated weekly water deficit is 0.89. The simulated weekly water deficit using developed model can be used for forecasting of weekly water deficit and optimization of life saving irrigation for different crops at Mirzapur district as drought mitigation strategy under climate change scenario.