

Abstract:

Recent climatic events in Africa have shown the need for increased understanding of the vagaries of rainfall and the demands for water. Water availability and usage for agriculture must consider not only amounts but also the timing of water requirements during the growing season. Rice cultivation in Kenya is an important food source for which irrigation is essential to produce successful yields. In order to describe rainfall probabilities in relation to water demands, we have employed the Gamma Probability Density Function; for calculating crop water demands potential evapotranspiration calculations recommended by Doorenbos and Pruitt (1975) were used. Evapotranspiration and rainfall probabilities were calculated for twelve 10-day crop phenology periods during the rice growing season. A twenty-year sample was analysed for rainfall but data for only seven seasons were available for estimating evapotranspiration. Estimates obtained from fitting the 10-day periods for the twenty-year precipitation sample show that: (1) all individual crop periods are positively skewed (non-Gaussian); (2) periods of low amounts of precipitation are less skewed than for times of higher rainfall; (3) rainfall increases as the rice season progresses but the statistical variability becomes greater with the increased precipitation amounts; (4) there are no ten-day periods during the growing season in which rainfall probability equivalents are higher than 50% of the water demands; (5) during the initial stages of the growing season there is a substantial probability of receiving no rainfall at all; and (6) seasonal precipitation amounts as an indicator of the necessity to irrigate can be very misleading. The methodology used here is superior in irrigation investment decisions and estimations of maximum amounts of water needed in irrigation periods.