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DETERMINATION OF CROP COEFFICIENTS FOR SUMMER GREENGRAM BY LYSIMETRIC STUDIES IN SEMI-ARID VIDARBHA REGION

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Abstract

The Food and Agriculture Organization (FAO) provides crop coefficient values to estimate crop water use, but these often lack validation under local climatic conditions, limiting their accuracy in specific regions of the world. Understanding the importance of optimizing crop water use, the crop coefficient values for summer greengram using lysimetric studies were determined for semi-arid region of Vidarbha, India. The experiment was carried out by installing two digital lysimeters to measure daily crop evapotranspiration, while daily reference evapotranspiration was computed using the FAO Penman-Monteith method. An automatic weather station was installed at the experimental site to get the climatic data of the site more accurately. Summer greengram was cultivated inside and around the lysimeters and daily ETc values were recorded using soil water balance method. The plant growth parameters and yield of greengram were also checked during respective growth stages. Crop coefficients were calculated as the ratio of ETc to ETo. From obtained daily Kc, weekly Kc were calculated to develop the polynomial equation using linear regression method. From developed polynomial equation, daily Kc values were obtained. The daily Kc values were then averaged to get weekly average Kc values for summer greengram which were averaged for two years and found to be 0.56, 0.65, 0.77, 0.90, 1.03, 1.13, 1.20, 1.21, 1.15, 0.99, 0.72 for eleven crop weeks respectively. The stagewise crop coefficients obtained after averaging the values of two years were obtained as 0.59 for the initial stage, 0.97 for the development stage, 1.16 for the mid-season stage, and 0.80 for the late-season stage. The results revealed significant deviations from the FAO-recommended Kc values, where the FAO values underestimated the actual water requirements of greengram. The greengram crop required about 28.52% more water during its growth period than what the FAO suggested. These findings underscore the importance of using locally developed Kc values using lysimeters to optimize irrigation schedules in the region.

Key words: crop coefficients, evapotranspiration, greengram, Penman Monteith method

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