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Effect of altitude on crop water need in Jeju Island, Korea

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Spatial and temporal irrigation water need was estimated for upland crops in four study watersheds of Jeju Island, Korea using a method based on water balance and net water consumption concept. And evapotranspiration was also analyzed, which is an essential component of the hydrological cycle and this method. The annual potential evapotranspiration decreased linearly to high elevation, and altitudinal lapse rates were -0.32 mm/m to -0.28 mm/m. Actual evapotranspiration showed increase with elevation to about 200∼400 m according to watershed, and gradual decrease with higher elevation due to vegetation species, water availability, and cold limitation. Net water need for representative crop showed linear decrease with an elevation, and lapse rates varied -0.52 mm/m to -0.45 mm/m. For cropping areas below 200 m in elevation, annual net water need were 559∼680 mm. Accurate prediction of regional and seasonal water need in the past, present, and future, can be utilized to practical purposes of water resources management, such as assessment of water scarcity, and establishment of reasonable distribution and additional security planning. Managers of crops also can determine how much supplemental water is needed to achieve maximum productivity, and reduce unnecessary water use in the fields.

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