

Evaluation and Determination of Evapotranspiration and Crop Coefficient of Olive Crop at Different Stages of Growth Using Remote Sensing Techniques in Tarom Region, Zanzan Province

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Abstract

Evapotranspiration of orchard crops is often determined by indirect method and based on meteorological data due to the difficulties inherent in direct measurement instruments such as installation of large lysimeters or precision equipment, and long growing seasons of tree crops. Evapotranspiration estimation with sufficient accuracy is not feasible due to spatial variability of meteorological parameters and, sometimes, due to inappropriate distribution of meteorological stations. Therefore, using methods based on remote sensing, which account for these variations, is much more desirable. In this research, evapotranspiration of olive trees at different phenologic stages was measured using direct and indirect methods in Tarom district of Zanzan Province. In the direct method, actual evapotranspiration was determined by measuring moisture balance components, whilst in the indirect one, it was specified with the help of satellite imagery, the SEBAL algorithms, and Penman-Monteith equation. Olive crop coefficient was subsequently calculated and evaluated by determining reference crop evapotranspiration. The results indicated that evapotranspiration calculated by the remote sensing method at different stages of the growth had acceptable conformity with soil moisture balance data and evapotranspiration values obtained from the Penman-Monteith equation (the respective correlation coefficients were 0.95 and 0.88) and both evapotranspiration curves along the growing season had a similar increasing and decreasing trend. Moreover, crop coefficient obtained by the SEBAL algorithm and the water balance methods were well correlated ($R^2=0.86$) and the remote sensing method with the aforementioned advantages can be used in predicting evapotranspiration.

Keywords: SEBAL Algorithm, Water use efficiency, Penman-Monteith equation, Water requirement.

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