

Determination of Olive Evapotranspiration in Standard and Actual Situation using Remote Sensing Technique

To evaluate the effectiveness of using satellite images to determine the actual evapotranspiration and crop coefficient Olive in different stages of growth, a trial was conducted for two years on 1394-1393 and 1393-1392 growing seasons in the two regions, Tarom, Zanzan (Olive Research Station Tarom) and the central part of Saveh (National Research Station Saveh). In this experiment, the determination of evapotranspiration and crop coefficient Olive at the same time conducted in several ways. First in elected gardens by measuring the components of water balance evapotranspiration was calculated by the difference between the amount of incoming water and outgoing water content of the region olive root development. In the next step the grass reference evapotranspiration was calculated based on meteorological data on the satellite passes through the FAO Penman-Monteith equation. And then olive crop coefficient at different growth stages was estimated using the relationship of $K_c = E_{Tc} / E_{To}$. This actual evapotranspiration and crop coefficient obtained from the water balance method was used to evaluate other results. Based on the method of using satellite images to determine evapotranspiration, is balance or energy balance. and SEBAL algorithms is a set of steps that calculates this components. So by Applying SEBAL algorithms, components of energy balance determined and ultimately by calculating the amount of energy remaining, actual evapotranspiration plants was calculated. Such that after receiving the images and their processing by special softwares of ERDAS, ENVI, REF-ET and Arcmap and Applying SEBAL algorithms, Olive evapotranspiration and moment crop coefficient were calculated in both areas at different growth stages. Then, using the reference evapotranspiration, daily actual evapotranspiration and crop coefficient by water balance was calculated, and with the help of statistical parameters, with results of the water balance method were compared and evaluated. In another approach olive crop coefficient without the use of reference evapotranspiration grass, and were calculated directly from the satellite images and were compared with crop coefficient obtained from water balance method. At the end in order to validation of obtained data, from the usual method of the determination of actual evapotranspiration plants hence relationship FAO-Penman-Mantys- 56 was used. In this way, reference crop evapotranspiration of grass was calculated by using the long-term meteorological data. and using the crop coefficient obtained from water balance method, actual evapotranspiration olive were estimated in the days satellite overpass each of the regions and at different stages of growth. and with Evapotranspiration results obtained from the SEBAL algorithm and water balance were compared. Results showed that firstly energy balance method except of in stage of beginning of olive growth was underestimate actual evapotranspiration and crop coefficient relative to the water balance method But correlation coefficient between the results of two methods were high (above 0.75 for evapotranspiration and crop coefficient of 0.90 for) so that SEBAL algorithm, as a reliable method for estimating evapotranspiration and crop coefficient Olive, was recommended Secondly, with regard to the statistical obtained, use of long-term meteorological data in the FAO Penman-Monteith relation is also

recommended for estimating evapotranspiration and crop coefficient Olive less accurate relative to SEBAL algorithm.

Keywords: Water use Efficiency, Water Requirement, Algorithm SEBAL, Olive Remote Sensing

University of Zabol
Graduate school
Faculty of Soil and Water
Department of Water Engineering

**The Thesis Submitted for the Degree of Ph.d. (in the field of
Irrigation and Drainage Engineering)**

**Determination of Olive
Evapotranspiration in Standard and
Actual Situation using Remote Sensing
Technique**

Supervisor:
Dr. P. Afrasiab

Advisors:
Dr. M. Delbari
Dr. M. Taheri

By:
H. Jafari

Jun 2016