

DETERMINATION OF WHEAT CROP WATER REQUIREMENTS USING REMOTE SENSING TECHNIQUES

By

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B.Sc. Agric. Sc. (Agricultural Engineering), Cairo University, 2007.

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تقدير الاحتياجات المائية لمحصول القمح باستخدام تقنيات الاستشعار عن بعد

رسالة مقدمة من

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ABSTRACT

Eslam Farg Ahmed Farg: Determination of Wheat Crop Water Requirements Using Remote Sensing Techniques. Unpublished M. Sc. Thesis, Department of Agricultural Engineering, Faculty of Agriculture, Ain Shams University, 2012.

Crop water requirements are representing by the actual crop evapotranspiration. Estimation of crop evapotranspiration (ET_C) and crop coefficient using remote-sensing data is essential for planning the irrigation water use in arid and semiarid regions. This study focuses on estimating the crop coefficient (K_C) and crop evapotranspiration (ET_C) using SPOT-4 satellite data integrated with the meteorological data and FAO-56 approach in south Nile Delta, Egypt.

Reference evapotranspiration (ET_O) estimated using FAO Penman-Monteith and tabled single crop coefficient values adjusted to real values. SPOT-4 images geometrically and radiometrically corrected were used to drive the vegetation indices (NDVI and SAVI).

Results indicated that the middle season stage had the highest values of calculated VI's that return to the high reflection from the plant canopy at the near infrared and high absorption at the red wavelength. On the other hand, VI's values of the initial growth stage were lower than the middle season stage and higher than the late season. In addition, the analysis of spectral signatures differences show the late growth stage was the highest reflection overall the visible range (blue, green and red).

The analysis of the calculated and predicted values for crop evapotranspiration (ET_C) and crop coefficient (K_C) show that middle growth stage was higher than the other growth stages. Where the late season was lower and initial growth stage was the lowest.

Multi linear regression MLR analysis applied to develop the crop coefficient (K_C) prediction equations for the different growth stages from vegetation indices. The results showed R^2 were 0.82, 0.90 and 0.97 as

well as adjusted R^2 were 0.80, 0.86 and 0.96 for developing, mid-season and late season growth stage respectively. Also validation of the empirical equations results showed high correlation between the calculated and the predicted K_C values 96, 93 and 91 for initial, middle and late season growth stages respectively.

Key words: Evapotranspiration, VI's, NDVI, SAVI, K_C , ET_C , Reflection, Nile Delta, MLR.

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