DETERMINATION OF WHEAT CROP WATER REQUIREMENTS USING REMOTE SENSING TECHNIQUES

By

ESLAM FARG AHMED FARG

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

A thesis submitted in partial fulfillment
of
the requirements for the degree of

MASTER OF SCIENCSE

in
Agricultural Science
(Agriculture Mechanization)

Department of Agriculture Engineering
Faculty of Agriculture
Ain Shams University

2012

Approval Sheet

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تقدير الاحتياجات المائية لمحصول القمح باستخدام تقنيات الاستشعار عن بعد

رسالة مقدمة من

اسلام فرج أحمد فرج

بكالوريوس علوم زراعية (الهندسة الزراعية) ، جامعة القاهرة ، ٢٠٠٧

للحصول على

درجة الماجستير في العلوم الزراعية

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تاريخ المناقشة : ٢٩ / ٩ / ٢٠١٢

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كلية الزراعة

رسالة ماجستير

اسم الطالب : اسلام فرج أحمد فرج

عنوان الرسالة : تقدير الاحتياجات المائية لمحصول القمح باستخدام تقنيات الأستشعار عن بعد

اسم الدرجة : درجة الماجستير في العلوم الزراعية (الميكنة الزراعية)

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تاريخ التسجيل : ٩ / ٢ / ٢٠٠٩

الدراسات العليا

ختم الإجازة

أجيزت الرسالة

بتاريخ : ٢٩ / ٩ / ٢٠١٢

موافقة مجلس الكلية

/ / ٢٠١٢

موافقة مجلس الجامعة

/ / ٢٠١٢

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 Unpublished M. Sc.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 (Kc) 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.

ACKNOWLEDGEMENT

Now I've reached the end and it is time to express my deep hearted gratitude to all the people who have encouraged me to finish this work. But above all I thank Allah for blessing, mercy, strength that made it possible for me to complete my studies and enabling me to accomplish my thesis.

I would like to begin by saying how greatly indebted I am to my thesis advisor Prof. A. m. El-Gindy, Dr. M. S. Abd El-wahed and Prof. S. M. Arafat who help and guide me through the development of this thesis. Their cooperation, wise advice, suggestion and guidance through the months have brought me to the point of successfully completion of the thesis. Words really fail to thank you for always being interested and spontaneously taking on the responsibility in the progress of my work.

It is my profound privilege to acknowledge gratitude to assistant Dr. M. A. Abo El Ghar. My special thanks are also due all researchers and colleges in National Authority of Remote Sensing and Space Sciences teaching me RS & GIS, and their encouragement, patience and curiosity gave me the required impetus to complete my research.

I would like to thank those researchers in the field of ET modeling, processes and application of remote sensing in agriculture sector especially in irrigation and crop water requirements that unselfishly provided their findings, software and publications, thus greatly contributing to my research.

I have no words to express my heartiest thanks and gratitude to my parents and brother whose affection, sacrifices and blessing have always been the most vital source of inspiration to me.

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