

**MONITORING MOISTURE DISTRIBUTION
UNDER SOME IRRIGATION SYSTEMS
IN DIFFERENT SOILS**

By

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B.Sc. Agric. Sc. (Soil Science), Ain Shams University ,1992

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ABSTRACT

Saber Attia Elbendary Omar: Monitoring Moisture Distribution Under Some Irrigation Systems in Different Soils. Unpublished M.Sc. Thesis, Department of Soil Science, Faculty of Agriculture, Ain Shams University , 2012.

Soil moisture is an important factor across a range of environmental processes including plant growth; soil biogeochemistry; erosion; and land atmosphere heat and water exchange. Timely and accurate estimates of soil moisture are therefore highly desirable for understanding and modeling these processes . Moreover remote sensing approaches have primarily focused on microwave wavelength, where moisture exerts strong control over soil dielectric properties . Therefore, the aim of this investigation was to study the effect of uniformity of water distribution on soil moisture distribution under center pivot irrigation system as functions of both soil hydrophysical properties and time. Uniformity of water application pattern as a function of time was also concerned. Field experiments were carried out in the experimental farm of faculty of agriculture; Ain Shams University, El-Kantar city, Kalubia Governorate. The studied area is located between longitude $30^{\circ} 12' 53''$, $30^{\circ} 12' 53''$, $30^{\circ} 12' 50''$, $30^{\circ} 12' 51''$ -E and latitude $31^{\circ} 08' 01''$, $31^{\circ} 07' 57''$, $31^{\circ} 07' 58''$, $31^{\circ} 08' 01''$ - N. To study the effect of uniformity of water distribution from the tower on water distribution of the surface soil as functions of both soil hydrophysical properties and time , water collector cans of 15 cm diameter and 23 cm height were spread on a grid distribution with 11 * 10 lines and the distance between each other was 10 meters to estimate uniformity coefficient of applied water from central pivot tower.

Reflectance spectrometer was used to detect soil water content and its attributed distribution pattern as a function of irrigation event's time compared with the gravimetrically method. Generally, uniformity of water application pattern was 78.4% while in the soil, uniformity of water distribution was different with time. Redistribution of soil water is the main process which makes the soil tended to equilibrate, consequently uniformity of water distribution were increased as a function of time after irrigation events cutt of , 81.2%, 85.3%, 92.7% 95.6%, and 97.4% for 1-h, 24h, 48h, 72h and 96h .

Concerning, the effect of soil hydrophysical properties on water distribution pattern profile in the soil, water depletion equation was calculated. The high values of coefficient of determination (R^2) were found at high soil water levels; after one hour, between the reflectance values at 700 nm (Red-NIR) wavelength and the volumetric water content ($R^2= 0.9$). On the other hand, after one hour, the values of R^2 decreased with decreasing the wavelength from 700 nm to 470 nm. So, portable reflectance spectrometer can be used to detect soil water content with 700 nm (Red-NIR) wavelength at saturation and near saturation conditions.

Keywords: Soil Moisture, Moisture Distribution, Reflectance, VIS, NIR, Reflectance spectrometer, Uniformity of Water Distribution, Center Pivot

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