

## **Using the soil water balance to analyze the deep percolation losses and the irrigation adequacy of irrigated citrus crops (Haouz plain, Morocco)**

Houda Nassah (1), Younes Fakir (1), Salah Er-raki (2), Said Khabba (1), Olivier Merlin (3,4), Bernard Mougenot (3,4)

(1) Faculty of Science Semlalia, University Cadi Ayyad, Marrakech | Morocco, (2) Faculty of Science and Technology, University Cadi Ayyad, Marrakech, Morocco, (3) Résultats de recherche Centre d'Etudes Spatiales de la BIOSphère (CESBIO), Toulouse, France, (4) Résultats de recherche - Institut de recherche pour le développement (IRD), France

In the semi-arid Haouz plain, located in central Morocco, agriculture consumes about 85% of the available water resources. Therefore, the management of irrigation water is important to avoid the water loss by soil evaporation and by deep percolation (DP) below the plant root zone. Estimating the irrigation water demand has been investigated by many studies in the Haouz plain, but DP losses beneath the irrigated areas have not been quantified yet. In this context, the objectives of the present work are threefold :1) to evaluate DP over irrigated citrus orchard under drip and flood irrigation systems using the soil water balance equation; 2) to compare the obtained results to direct measurements of DP by a “flux-meter”; and 3) to optimize the irrigation rates that avoid excessive DP losses and water stress. The results showed that the weekly DP losses vary in average from 15 mm/week to more than 40 mm/week depending to the amount of water supply. The irrigation systems have also an important impact on DP losses evaluated to 38 % in drip irrigation and 12% in flood irrigation. Additionally the density of canopy influences the DP percentage inducing a difference of 10% between the denser citrus site and the sparse one. The comparison of DP losses calculated by soil water balance with those measured by a flux-meter installed beneath the root zone show that the first method gives higher values than the second does. Finally we evaluated the adequacy of the water supply for the crop needs based on two performance indices: depleted fraction (DF) and relative evapotranspiration (RET), showing that the drip irrigation has respond to the culture demands with an excessive quantity of irrigation, unlike to the flood one.