Development and Preliminary Results from the Testbed Infrastructure of the DRIP Project

Ioannis Daliakopoulos, Dimitrios Papadimitriou, Theofilos Matsoukas, Nikolaos Zotos, Harris Moysiadis, Konstantinos Anastasopoulos, Ioannis Mavrogiannis and Thrasyvoulos Manios

1Department of Agriculture, Hellenic Mediterranean University, Crete, Greece
2Landco Ltd, Athens, Greece
3Future Intelligence Ltd, Athens, Greece
4Anelixis Consulting SA, Heraklion, Greece

Striving to tackle a common water resources scarcity problem, the DRIP Project aims to develop a state-of-the-art integrated system that will optimize tree crop irrigation [1]. To this end, we have developed 5 free lysimeters measuring 3 m in height and 3 m in diameter, each with a total effective volume of ca. 20 m$^3$. Lysimeters were planted with 5 10-year-old olive trees, including their root ball to a depth of 1 m, monolithically transplanted from the experimental olive orchard of the Hellenic Mediterranean University. The remaining volume was layered with soil from the same source and a gravel filter to allow leaching. Each lysimeter is equipped with IoT sensors relevant to the modeling of the soil-plant-water system; 12 measuring soil moisture, temperature, and electrical conductivity and one measuring leachate flow. Additionally, meteorological parameters are monitored for the entire infrastructure. Sensors provide real time data to an on-line system through a network of 15 telecommunication nodes that together with an edge-gateway form a local wireless 6LoWPAN mesh network, thus implementing a state-of-the-art Internet of Things (IoT) system. Experimental data collected from the lysimeters is used to model water movement using the HYDRYS 2D/3D model. Modeling output will be used for the development of the commercial DRIP system, an advanced irrigation scheduler for the harsh conditions of the agricultural environment that takes feedback from environmental sensors.

References

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