SOIL SOLUTION DYNAMICS IN THE IRRIGATED SUGARCANE CROP BY SUB-SURFACE DRIP IRRIGATION

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FAPESP Process 2012/21151-4 | Term: Feb 2013 to Jan 2016

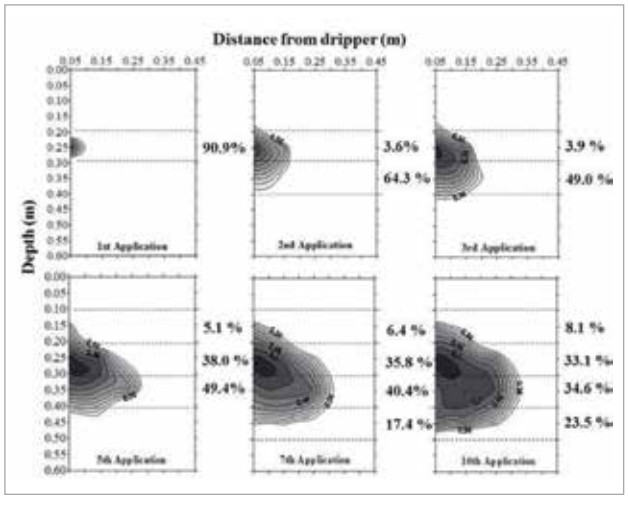

Figure 1. Comparison of the profile electrical conductivity (dS m^{-1}) at the end of each application on soil solution flow of 1.0 L h^{-1}

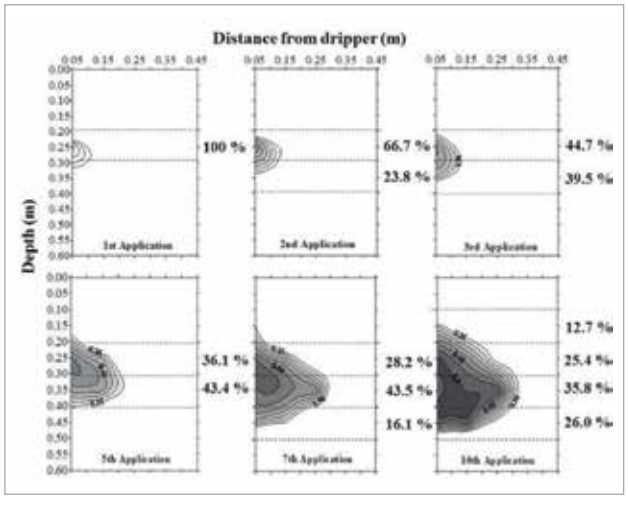

Figure 2. Comparison of the profile electrical conductivity (dS m^{-1}) at the end of each application on soil solution flow of 1.6 L h^{-1}

The inappropriate use of water resources in agriculture, in search of high yield has caused negative impacts on water reserves, decreasing the efficiency of irrigated and fertirrigated productive systems. Due to the potential of subsurface drip irrigation, combined with the need to research with the irrigated sugarcane crop (*Saccarum offinarum* L.), has been increasing demand for information about this technique, especially, with relation to the wet bulb dimension and position in the soil and the water and nutrients distribution available to plants. Thus, this project aims to study, by means of Time Domain Reflectometry (TDR), under controlled conditions, the solution dynamics in a sandy soil with and without the sugarcane crop installation, for two application rates: 1.6 and 3.8 L h^{-1}. To achieve the aims, the project will be divided into three stages: first, it will be studied the we bulb formation, evaluating the effects of the interaction between water-soil-solute in the solution soil distribution and storage; in the second, the estimation of nutrients absorption at each stage of plants development; and in the third, the comparison of results obtained experimentally with those simulated by means of Hydrus 2D program, for the soil solution dynamics. It is hoped this project a better understanding about the water and nutrients behavior in wet bulb and its availability to irrigated sugar cane by subsurface drip irrigation.

SUMMARY OF RESULTS TO DATE AND PERSPECTIVES

In Figures 1 and 2 were observed the electrical conduction profiles, by virtue of the large number of graphics, wetted soil volumes chosen to represent the profiles were 1, 2, 3, 5, 7, 10 L; between the treatments (1.0 to 1.6 L h^{-1}). Each isoline represented by a shade of black, has value of 0.02 dS m^{-1}, it is possible to analyze the formation of the wet bulb by advancing wetting front in the soil.

The results showed that the flow of drippers did not have a differential effect on the formation of the wetted soil volume. According to the values of electrical conductivity readings obtained with the TDR, we analyzed the wetted soil volumes were characteristic forms were described by ZUR (1996), with rounded and elliptical shapes.

Analyzing the wetted soil volumes in both flows were greater horizontal displacement at the beginning, but after the fifth application displacements of the two directions were equal, and getting the last application the average values of 0.50 m (vertical) and 0.38 m (horizontal).

Regarding storage, the highest observed for the two treatments in the 0.30-0.40 m layer, with mean values of 23.3 and 25.3 %, respectively. These monitored for both flows, the largest solute storage began in the third layer (0.20-0.30 m), moving to the fourth layer (0.30-0.40 m) from the third application, noting that there is a relation between the solute storage into the wet bulb, because with the increase of the volume applied, there was a direction of the solute storage to the deeper layers.

Look at a distribution of soil solution, being a higher concentration near the emitter and thus a reduction thereof, when it approaches the wetting front. As can be noted the presence of solute in the wet bulb into average displacement horizontal of 0.37 m vertically from the emitter of 0.18 m.

It was possible to know the dynamics of soil solution with the formation of spherical wet bulbs having the same behavior for the two flows. It was noted that a greater storage of electrical conductivity was coming from the drip zone and possessed a distribution gradient with the highest concentration near the emitter and lowest near of the wetting front.

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