

EGU2020-4575

<https://doi.org/10.5194/egusphere-egu2020-4575>

EGU General Assembly 2020

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## Study of the wet bulb in drip irrigation in stratified soils using HYDRUS

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The “enarenado” (sand-covering soil) is a technique used in greenhouses located in the southeast of Spain that consists of placing a layer of soil between 20 and 40 cm above the original material, a thin layer of organic matter and above it a layer of sand of about 5 to 10 cm.

It is necessary to know the shape of the wet bulb produced by the emitters for a correct design and management of the drip irrigation systems. In stratified soils, as in the case of “enarenado” soils, the distribution of water can change substantially with respect to the case of homogeneous soils. The objective of this work is to present the methodology of data acquisition and the actions carried out so far to obtain a model that precisely defines the evolution of humidity in wet bulbs generated in “enarenado” soils characteristic of intensive horticultural crops.

The tests have been carried out at the facilities of the IFAPA Center La Mojonera, Almería, SE Spain. The textures of the added soils are sandy loam and clay loam, representative of the horticultural crops of Almeria. The crop was pepper, Mazo variety, planted on September 15, 2018 in the two selected greenhouses. The irrigation is automatic, with drippers of nominal flow  $Q_n = 3 \text{ l/h}$ , self-compensating, anti-drainage of Netafim. Irrigation control is carried out using classic tensiometers with built-in pressure transducer.

The humidity has been measured at 10 points distributed around a dripper, 7 probes at 5 cm deep in the added soil layer and 3 probes at 18 cm depth, near the original soil layer. The sensor used is TE5 Decagon. The plantation frame coincides with that of the drippers,  $S_g = 50 \text{ cm}$  and  $S_r = 120 \text{ cm}$ , for this reason the probes were placed up to half of the plantation frame.

The data collected show a small variation in humidity over time. That is, the added soil, with a clayey texture, quickly redistributes moisture and the probes register very small variations.

Once the values specified in the methodology have been measured, the theoretical humidity retention curves of greenhouse soils have been calibrated. With the data collected, the system has been simulated by completing the fields that the Hydrus model needs. This operation has been specified in the definition of a simple, multi-layered 3D model. In general, the model predicts moisture behavior well in the conditions set.

