



Influence of different irrigation levels on the root water uptake and the physiology of root-chicory

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In the context of global warming and given recent heat waves observed in Western Europe, the relationship between the soil water status and the plant health has recently received more attention, especially for cash crops like chicory. In this study we particularly investigated the impact of soil water status on the chicory root water uptake and density and made a link with physiological and yield parameters.

During five months, we imposed different irrigation levels to 10 plants of chicory (*Cichorium intybus* var. *sativum*) growing in greenhouses. Each seed, coming from an autogamous selection in this allogamous species, was sown in a column of 1.42m height and 0.4m diameter filled with yellow sand and irrigated from the bottom with Hoagland solution.

On those 10 columns, we measured the distribution of soil moisture with TDR (8 columns) and ERT (2 columns) probes. Lateral windows also allowed us to follow the root growth. The column weights were also monitored in order to quantify the plant transpiration. During the experiment, several physiological indices were also followed like the gas exchange (CO₂ and transpiration), the chlorophyll fluorescence, the stomatal conductance, the plastochron, and the Leaf Area Index (LAI). At the end of the experiment, the complete root length density and the water content profiles were measured. We had also a look to the osmotic potential, the pigments content and the isotopic discrimination of carbon in the leaves, which gives information about the level of stress. At a biochemical point of view, we measured the content in enzymes involves in inulin metabolism and sugars synthesis. We observed that the plants suffering from a slight water stress developed better. A simple 1-D model was built which describes the root growth in function of the irrigation level and of the soil and atmospheric boundary conditions.