

## Leaf water status assessment of olive by vegetation indices

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### Abstract

Information of plant water status, such as Relative Water Content (RWC) and Leaf Water Potential (LWP), during crop development are important for optimizing crop production and irrigation management. However, these methods are traditionally estimated by destructive and time-consuming in situ.

In the past decades, many relationships between spectral data from remote sensing observations and various biophysical and physiological crops parameters have been proposed. A common and widely used approach to analyse crop spectral signatures acquired from remote sensing platforms is based on the extraction of Vegetation Indices (VIs).

This study aims to assess the relationship between VIs with RWC and LWP in a drip irrigated olive orchard located in Alfândega da Fé, Portugal. Three irrigation strategies were implemented: well-watered (WI), sustained deficit irrigation (SDI) and farmer-managed irrigation (FMI). Spectral measurements (400 to 1000 nm) at leaf level were obtained with a spectroradiometer and the corresponding RWC and LWP were acquired in situ. A total of 23 VIs most commonly used in olive-growing were used and a good agreement were found. Transformed Chlorophyll Absorption Reflectance Index (TCARI) and TCARI divided by Optimized Soil Adjusted Vegetation Index (OSAVI) were the VIs with the higher correlation with LWP and RWC,  $R^2=0.71$  and  $R^2=0.77$ , respectively.

Thus, the use of VIs poses as a good alternative for the traditional destructives methods for estimating RWC and LWP.

**Keywords:** Cv. Cobrançosa, irrigation, leaf reflectance, remote sensing, relative water content, leaf water potential