

UAVs challenge to asses water stress in an olive orchard

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The estimated olive trees area cultivated in Spain is about 2,400,000 ha. General trends for water supply limitations in Mediterranean countries make essential to understand the olive tree water relations. Recently, the use of unmanned aerial vehicles (UAV) for vegetation monitoring is becoming a common practice. With a quick turnaround in the study area, high spatial resolution imagery is obtained. Process management and statistical analysis become very important to get accurate information from such an extensive data matrix.

The 27th of September of 2017, UAV platforms were flown at three different times of the day over an olive orchard located in La Puebla de Montalbán (Toledo). An experimental design was applied in the field to cover a range of irrigation treatments, from 100% till 30% of a reference treatment. Remote sensing narrow-band multispectral imagery in the 490–800-nm spectral region, with 10 cm spatial resolution, was obtained in each fly. Several vegetation indexes were estimated, namely, normalized difference vegetation index (NDVI), transformed chlorophyll absorption ratio (TCARI), triangle greenness index (TGI) and Green Ratio Vegetation Index (GRVI). At each flight time and treatment, two physiological parameters were measured in the field: stem water potential (SWP) and stomatal conductance (SC).

Based on these parameters, non-parametric statistical test were performed to study the best index that discriminate the irrigation treatments and the best hour of the day to obtain the remote sensing image. The results are discussed in the context of water stress in olive orchard.

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