

A micro-UAV-based prototype for high resolution phenotyping under hydrocarbon-induced plant stress

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Text

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Phenotyping is a non-invasive technique for the characterization of plant genotype performance under diverse growing conditions for the support of breeding improvement based on precise plant information. Unmanned aerial vehicles (UAVs) are a tool for the field-level, high-throughput phenotyping through the use of on-board sensors that allow capturing spectral information of the ground cover with high spatial and temporal resolution. However, the measurement of separated spectral bands is commonly available only for the small-type or larger UAVs due to payload restrictions. In this study, the development of a micro-UAV based prototype for the monitoring of vegetation that grows in an environment contaminated by hydrocarbons is presented. The prototype is intended to work under drought stress scenarios where hydrocarbons formed a hydrophobic layer in the soil. The prototype is designed to capture multispectral images, hyperspectral firms of the Field-Of-View (FOV) and thermal images in the VIS, VIS and LWIR bands, respectively, in order to obtain water stress indicators such as the Photochemical Reflectance Index (PRI) and to observe the canopy temperature differences. The strategic value of the micro-UAV prototype is on the design and assessment of soil recovery strategies such as phytoremediation by means of an efficient, cost-effective and low-weight equipment.

Keywords: UAVs, phenotyping, phytoremediation, stress detection, hyperspectral, thermal.

