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PHENOTYPING PLANT-PATHOGEN INTERACTIONS

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Pathogens usually cause alterations in plant metabolism that can be detected using imaging techniques even in the absence of symptoms. In our previous works we have applied variable chlorophyll fluorescence, multicolour fluorescence imaging and thermography (providing information about photosynthesis, secondary metabolism and transpiration, respectively) to monitor infections on plants caused by virus, bacteria and fungi (Granum et al. 2015 *European Journal of Plant Pathology* 142:625-632; Pérez-Bueno et al. 2015 *Physiologia Plantarum* 153:161-174; Montero et al. 2016 *Physiologia Plantarum* 157:442-452; Pérez-Bueno et al. 2016 *Frontiers in Plant Science* 6:1209; Pérez-Bueno et al. 2016 *Frontiers in Plant Science* 7:1790; Pineda et al. 2017 *Functional Plant Biology* 44:563-572; Pineda et al. 2018 *Frontiers in Plant Science* 9:164).
In the present work, white root rot in avocado trees caused by *Rosellinia necatrix* has been analysed both at lab and field scale using proximal and remote imaging sensors. At lab scale results indicated that changes on plant metabolism only take place at a late stage of the infection. This changes where related to water stress as a consequence of a loss in functionality of the root system. In contrast, the reflectance index NDVI, measured from a remotely piloted aircraft system, proved to be a good predictor of white root rot in avocado orchards, even in the absence of symptoms. Furthermore, we propose the use of a logistic regression analysis fed with NDVI data as a sensitive and reliable method of detection at field scale. This method would be of great help in the control of orchards since current methods to detect *R. necatrix* are based on invasive and time consuming microbial and molecular techniques.
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