

# Exploring VIS/NIR reflectance indices for the estimation of water status in highbush blueberry plants grown under full and deficit irrigation

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## Abstract

Remote sensing based on visible and near infrared (VIS/NIR) reflectance is being recognized as a promising option to estimate water status in crops. In this research, we explored the relationship between the midday leaf water potential ( $\Psi_{MD}$ ) and stomatal conductance ( $g_s$ ) with the normalized difference vegetation index (NDVI) and the water index (WI) in leaves of blueberry shrubs subjected to two irrigation treatments based on crop evapotranspiration (ET<sub>c</sub>): mild water deficit (60% of ET<sub>c</sub>) and full-irrigation (100% of ET<sub>c</sub>). Moreover, the impact of the irrigation doses on photosynthesis as well as on fruit yield and quality was assessed. Noteworthy, we detected positive correlations between  $\Psi_{MD}$  with NDVI ( $R^2 = 0.61^{**}$ ;  $P < 0.01$ ) and WI ( $R^2 = 0.60^{**}$ ,  $P < 0.01$ ). Besides,  $g_s$  was positively related to NDVI ( $R^2 = 0.58^{**}$ ,  $P < 0.01$ ) and WI ( $R^2 = 0.69^{**}$ ,  $P < 0.01$ ). Nonetheless, both indices appear to be more sensitive to water stressed plants. Despite mild water deficit decreased photosynthetic performance, fruit yield and quality were maintained or improved. Our results revealed that the spectral indices studied here could be used as non-destructive predictors of plant water stress in blueberry orchards. Further studies are needed to confirm our outcomes.