Vegetation indexes for management of irrigated wine vine orchard

H. Oldoni[1], R. L. Martins[1], L. M. Rabello[2], L. H. Bassoi[2]

[1]FCA UNESP Botucatu, SP, Brazil
[2]Embrapa Instrumentation São Carlos, SP, Brazil
e-mail: luis.bassoi@embrapa.br

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Vegetation indexes help the evaluation of plant canopy. The objective of this work was to obtain different leaf coverage indexes of wine vine cv. Chardonnay/Paulsen 1103 (growing season January to May 2017), in a drip irrigated orchard in Espírito Santo do Pinhal, State of São Paulo, Brazil, to evaluate its spatial and temporal behavior, and to determine sites for measurement and sampling of plant attributes. The Crop Circle™ active terrestrial optical sensor was used to measure normalized difference vegetation index (NDVI), normalized difference red-edge (NDRE) and canopy chlorophyll content index (CCCI), with georeferenced walking in all plant rows. The active terrestrial optical sensor ClorofiLOG™ was used to measure relative total chlorophyll index (RTCI), every three plants (georeferenced) in alternating rows. Measurements were made from flowering to the beginning of maturation stages. Data were submitted to descriptive and geostatistical analysis to characterize the spatial dependence of the data and interpolation by ordinary kriging for the NDVI, NDRE and CCCI data, and simple kriging for the RTCI data. The interpolated data were submitted to similarity analysis using the Pearson correlation matrix. Two management zones (higher and lower NDVI and NDRE values) guided the sites for pre-dawn leaf water potential ΨL measurements (using a Scholander chamber), berry sampling for laboratory evaluation (weight, must volume, pH, soluble solids content, and malic acid concentration), counting of number of cluster per vine (NC) and measurement of yield per plant (Y). Higher similarity (> coefficient of correlation) was observed between RTCI and CCCI data on most measurement days. A difference ($p < 5\%$) between Ψ values from both zones were found in days with less soil water availability. More plant tissue water was found in higher NDVI and NDRE zones. Differences ($p < 1\%$) of NC and Y between both zones also occurred. Higher NDVI and NDRE zone presented higher NC and Y. The phenotyping using terrestrial optical sensors proved to be suitable and feasible for guidance of measuring and sampling sites in a vine orchard management based on precision agriculture.

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