Relationship between Chlorophyl Content and Calculated Index Values of Citrus Trees

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Abstract : Based passive remote sensing technologies have been widely used in many plant species. However, use of these techniques in orange trees is limited. In this study, the relationships between chlorophyll content (Chl) and calculated red edge (RE) and vegetation index values of the citrus leave at different growth stages were formed the basis for the analysis. Canopy reflectance by hand-held spectroradiometer and total Chl analysis at the lab were measured simultaneously, from the random samples taken from four different parts of an orange orchard. Plant materials consisted of four different age groups of 15, 20, 25, and 30 years old orange trees. Reflectance measurements were conducted between 450 and 900 nanometer (nm) wavelength at four different bands (3 visible bands and 1 near-infrared band) at the four basic physiological periods (flowering, fruit setting, fruit maturity, and dormancy) of orange trees. According to the statistical analysis conducted, there was a strong relationship between the chlorophyll content and calculated indexes ($p \leq 0.01$; $R^2 = 0.925$ at red edge and $R^2 = 0.986$ at vegetation index) at the fruit setting stage of 20 years old trees. Again at this stage, fruit setting, total Chl content values among all orange trees were significantly correlated at the RE and VI with the R^2 values of 0.672 and 0.635 at the 0.001 level, respectively. This indicated that the relationships between Chl content and index values were very strong at this stage, in comparison to the other stages.

Keywords : spectroradiometer, citrus, chlorophyll, reflectance, index

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