

Estimation of Apple leaf water content based on new indexes

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Abstract: Leaf water content (LWC) is an important parameter for evaluating crop health and predicting crop yield. Remote sensing technology is a means of quick and nondestructive in situ assessment of the water content in leaves. The objective of this study was to develop a precise, efficient, and nondestructive technique for the estimation of leaf water content in apple. Data from PROSAIL and 60 percent of 2012 were used for the development of new indices and the comparison of these new indices with existing indices. Data from 40 percent of 2012 was used to validate the proposed indices for estimating water content. New water indices were developed and compared to the existing indices that are currently used for water detection. The new indices were as follows: Double-peak Canopy Water Index II (DCWI II), Water index (900,970)/NDVI, NHI/NDVI, NDII/MTVI2, NDMI /OSAVI, and NDMI /WDRVI. In this study, DCNI II proved to be the best spectral index for estimation of chlorophyll content. This index combined the bands that are sensitive to chlorophyll content changes, with the highest determination coefficient (R²) and lowest root mean square error (RMSE) was selected to estimate LWC in apple. The results indicated that these methods could be used to improve the estimation accuracy of water content by selecting the sensitive band of water content changes or decreasing the influence of LAI changes.

Keywords: Water content, Spectral indices, Apple, Water estimation