

SPECTRAL EVOLUTION

Measuring Water Content in Vegetation

Measuring water content in vegetation—usually by measuring leaf water content—is important for determining the health of vegetation under study. Water stress restricts transpiration by closing the plant stomata and allowing for less water evaporation from the leaf surface. It affects the efficiency of photosynthesis and in agriculture, can limit crop production. Measuring the water content/stress rapidly and non-destructively provides important information on plant health. In most cases, the best predictive models for water content were leaf/variety specific.

A portable field spectroradiometer like the PSR+ from Spectral Evolution can allow researchers to measure water content/water stress in the field. The PSR+ is a full range unit—350-2500nm—that has high resolution/high sensitivity and unsurpassed reliability with all solid state electronics and no moving optical components. In spectra taken with a PSR+ the main water absorption features in green/healthy vegetation are typically at 760nm, 970nm, 1200nm, 1450nm, and 1950nm. The most pronounced are at 1450nm and 1950nm. In addition to these dominant features, important indications of content/stress can also be found in less prominent but still recognizable features between 400-700nm. Where high water content results in relative low reflectance from 700-1100nm and higher reflectance in 400-700nm.

The spectral data is collected quickly, accurately, and without harming the sample with a unique leaf clip and ILM-105 illumination that keeps the light source and its heat away from the leaf sample. Spectra and associated data are saved as ASCII files that can be directly used with 3rd party software for chemometrics, simulation software, multivariate statistical analysis programs, and more.

All Spectral Evolution spectroradiometers run our DARWin SP Data Acquisition software with pull down menus for 19 popular vegetation indices, including WBI (Water Band Index), NDWI (Normalized Difference Water Index), and NDVI (Normalized Difference Vegetation Index).

WBI is sensitive to changes in water canopy content indicated in the strength of absorption around 970nm compared to absorption at 900nm and is useful for analyzing canopy stress and crop management. NDWI is often used to determine forest canopy stress by looking at water absorption at 857nm and 1241nm.

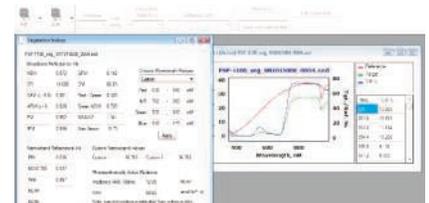
NDVI is the most well-known vegetation index and is a simple index for quantifying green vegetation. NDVI has a value range of -1 to 1. Healthy/green vegetation typically has a value between 0.20 to 0.80.



The PSR+ can be used in the field to measure moisture in vegetation.



An optional leaf clip includes an internal reference standard and an external trigger



A pull down menu within our DARWin SP Data Acquisition software provides immediate access to vegetation indices.

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