

SPECTRAL EVOLUTION

Detecting plant stress by measuring leaf water stress

Early detection of leaf water stress is critical for precision agriculture. Spectroscopy is well-suited for accurate measurement of water stress in plant leaves and provides an effective technique for nondestructive, rapid and accurate measurement. Water stress can signify overall plant physiological health and is important for agricultural assessment of nutritional health, diseases, crop quality and other critical factors. Knowledge of plant health and water stress can lead to precision irrigation strategies based on real data.

Water stress has an impact on a plant's photosynthetic performance and the severity decides whether or not a plant can recover from damage inflicted with additional irrigation.

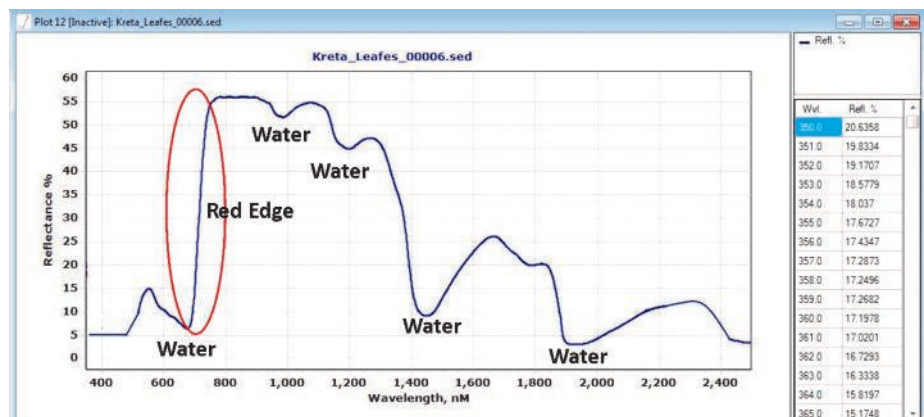
The PSR+ is a high resolution/high sensitivity field spectroradiometer covering the full UV/VIS/NIR range from 350-2500nm. It is a rugged, field portable instrument with all solid state photodiode arrays and no moving parts for reliable operation. The PSR+ provides auto-shutter, auto-exposure and auto-dark correction for one-touch operation. It can be equipped with both direct attach lenses and fiber mount FOV lenses. It is available with a range of accessories including contact probe, Miniprobe, pistol grip, benchtop probe and leaf clip. For measuring leaf water stress the unique leaf clip is an invaluable resource. The leaf clip has a pushbutton trigger and a separate tungsten halogen illuminator that rail mounts to the PSR+ - keeping heat away from your sample during measurement to prevent burn-out. An integral swing-away reflectance panel provides for convenient reference measurements.

A researcher can use the leaf clip to measure leaf water stress *in situ*. The resulting spectra can show the primary water absorption feature wavelengths for analysis of water stress: 760,970,1200,1450 and 1950 nanometers. Changes in the red edge that indicate water stress (moving to shorter wavelengths) can also be noted as an indication of less chlorophyll production. All spectra are saved as ASCII files for use with third party software including ENVI, R2 and chemometrics software. In addition, the DARWin SP Data Acquisition software which controls the instrument includes pull-down menus for 19 vegetation indices including WBI (Water Band Index) and NDWI (Normalized Difference Water Index).

An optional GETAC PDA has a digital camera and GPS and tags photos, coordinates, voice notes and altimeter readings to your scans.



The PSR+ field spectroradiometer and leaf clip can be used to measure water content in leaves.



A spectra taken with the leaf clip and PSR+ showing the water absorption bands and the red edge.

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