SPECTRAL EVOLUTION

Vegetation Studies

One of the major applications for remote sensing technology is vegetation studies. Remote sensing is used for the management of land and water resources, crop forecasting, disaster assessment, yield production, canopy studies, and other vegetation applications. Spectral reflectance properties in different wavelength bands are critical to vegetation identification, crop yield forecasting, and crop condition assessment.

The cells in plant leaves effectively scatter light because of the high contrast in the index of refraction between water-rich cell contents and the inter-cellular air spaces. Plants that are engaged in photosynthesis use blue and red light as energy sources. They reflect little light back from these wavelengths. The underlying principle for using NIR spectroscopy is that plants with different nutrient levels reflect light differently in specific wavelengths.

Vegetative indices have been designed to help detect sparse green vegetation and minimize the effects of soil brightness, topographical distortion and atmospheric noise. The first vegetative indices were simple ratios of the red and NIR bands. New indices have been created to detect sparse green vegetation and minimize the effects of soil brightness in the background, distortion due to topography, and any atmospheric noise.

Many researchers are using a portable NIR spectroradiometer, like SPECTRAL EVOLUTION's PSR+, to study vegetation in situ and confirm, modify, and better understand hyperspectral remote sensing data.

Because it is fast and non-destructive, remote sensing is a popular technology for reliably measuring and estimating biophysical and biochemical vegetation variables. By capturing and analyzing data such as leaf area index (LAI) and canopy chlorophyll content, vegetation can be modeled and compared to vegetation indices to reveal health, stress, infestation, pollution, climate changes, drought, fertilization, and a range of other conditions.

For example, growers need accurate information on crop conditions and landscape variability during the growing cycle. Remote sensing data can be gathered in the field to confirm canopy reflectance measurements obtained by satellite or flyover and analyzed to check a crop's specific wavelengths for crop stress.

In another example, researchers can build an accurate picture of an ecosystem by measuring reflectance and radiometry. Both canopy and individual leaf measurements can be made to provide a clear picture of landscape coverage and health.

A field portable spectroradiometer can be used for a wide range of vegetative studies in the field

An optional leaf clip includes an internal reference standard.

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Vegetative Indicies:

- NDVI (Normalized Difference Vegetation Index)
- SR (Simple Ratio Vegetation Index)
- SAVI (Soil Adjusted Vegetation Index)
- ARVI (Atmospherically Resistant Vegetation Index)
- EVI (Enhanced Vegetation Index)
- IPVI (Infrared Percentage Vegetation Index)
- PRI (Photochemical Reflectance Index)
- WBI (Water Band Index)
- PAR (Photosynthetically Active Radiation)
- GRVI (Green Ratio Vegetation Index)
- DVI (Difference Vegetation Index)
- Red/Green (Red Green Ratio)
- Green NDVI (Green Normalized Difference Vegetation Index)
- MSAVI2 (Modified Soil Adjusted Vegetation Index Type II)
- Sum Green (Summed Green Vegetation Index)
- NDVI705 (Red Edge Normalized Vegetation Index)
- NDWI (Normalized Difference Water Index)
- NDNI (Normalized Difference Nitrogen Index)
- CCI (Chlorophyll Content Index)

NIR spectroscopy is used in agricultural/vegetation applications, like:

- Plant health assessment
- Early detection of insect infestation
- Measurement of photosynthesis efficiency
- Crop and soil assessment
- Detection of nutrient deficiencies
- Irrigation assessment
- Forest and canopy studies
- Canopy studies

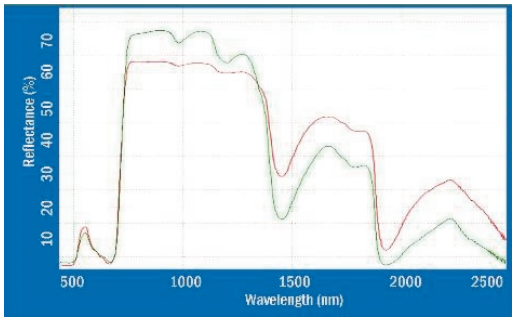
The lightweight, rugged PSR+ is ideal for in-the-field vegetation studies and provides:

- Fast, full-spectrum UV-VIS-NIR measurements - 350-2500 nm with just one scan
- Superior reliability in the field with 100% diode array optics with no moving parts
- Bluetooth interface
- Lithium-ion rechargeable batteries for field use
- Standalone operation - internal memory holds 1000 scans
- Getac PS-236 PDA provides GPS, photo tagging, audio notes, a screen that's made for viewing in direct sun light, and an almost unlimited capacity for scans
- Field switchable optics for varying target sizes and measurement modes

The PSR+ can be ordered with a backpack and hard Pelican case for shipping, and tripod, among other accessories. It can be ordered with a companion fiber optic illumination module, leaf clip with internal reference standard, and bifurcated fiber optic cable.

In addition to the PSR+ and other portable spectroradiometers, SPECTRAL EVOLUTION also offers a full range of portable spectrometers and lab spectrometers. For more information, visit: www.spectralevolution.com.

The reflectance spectra on the right were collected from green and red leaves using a PSR+. They were generated using DARWin SP Data Acquisition software and plotting multiple scans on the same graph for easy comparison and analysis.



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