

# SPECTRAL EVOLUTION

## Spectral reflectance measurements to estimate cellulose content

Determination of cellulose content in plants or biomass can provide critical information on plant health or biomass characteristics. An NIR field spectroradiometer like the PSR+ or RS-3500 can measure cellulose fast, with no sample prep, non-destructively in the field.

Determination of cellulose content is traditionally done with time-consuming and costly wet chemistry. With a PSR+ or RS-3500, the process begins with scans of the plant or biomass material. NIR analysis for cellulose relies on absorption features created by chemical bonds that include C-O, O-H, C-H, and N-H. Common absorption peaks indicating cellulose in a PSR+ or RS-3500 spectra from 350-2500nm can include the following:

- ◆ A broad absorption peak at around 1216nm from C-H stretching
- ◆ Several possible features around 1490nm—O-H stretching
- ◆ Features between 1620 and 1780 nm attributable to O-H stretching
- ◆ Feature around 1920-1930nm from O-H and C-O groups
- ◆ Feature at 2100-2110nm is from O-H and C-H stretching
- ◆ Feature at 2270-2272nm is from O-H and C-O
- ◆ Feature at 2336 belongs to C-H stretching

The PSR+ and RS-3500 are both portable full range, UV-VIS-NIR instruments with high resolution and low noise. DARWin SP Data Acquisition software includes 19 vegetation indices in a pull down menu, including the NDVI and Red/Green indices which can be used to determine the health of a plant or a canopy. The PSR+ provides the field researcher with the option of using direct attach lenses for standoff measurements or a fiberoptic cable with FOV lenses, a contact probe, sphere, pistol grip, our unique leaf clip and other accessories. The RS-3500 is equipped with a fiber optic cable and works with all our accessories including FOV lenses. Both instruments offer auto-exposure, auto-dark correction, and auto-shutter for one touch operation.

The PSR+ and RS-3500 are lightweight and rugged—built with photodiode arrays and no moving parts for consistent reliable operation in field conditions. Additional Vegetation remote sensing applications include:

- ◆ Species identification
- ◆ Assessment of phosphorous and potassium nutrients in plants
- ◆ Measurement of moisture and water content
- ◆ Soil characterization and analysis
- ◆ Ground truthing satellite imagery and measurements
- ◆ Total organic carbon (TOC) in soil
- ◆ Biomass research



*Take leaf reflectance measurements in the field with the PSR+ or RS-3500 bundle and our optional leaf clip.*

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