

SPECTRAL EVOLUTION

Using an NIR Spectroradiometer to Identify Plant Diseases

NIR spectroscopy can be an effective tool for identifying plant diseases that affect agricultural production. An NIR field spectroradiometer can measure key indications of biotic stress caused by disease. Examples of diseases that can be identified with an NIR spectroradiometer include aflatoxins in corn, late blight disease, yellow leaf curl virus in tomatoes, leaf spot or powdery mildew in sugar beets, yellow rust in wheat, *Fusarium* infection in barley, and rice blast, to name a few. Infected leaves have a different spectral image than healthy leaves. The symptoms and stress caused by the pathogens change pigmentation, alter surface temperature, and reduce chlorophyll content.

By measuring reflectance with a full range spectroradiometer like the SPECTRAL EVOLUTION SR-6500, RS-8800, RS-5400, PSR+, or RS-3500 with our unique leaf clip, the effect of pathogens on plants can be evaluated. In general, maximum differences in reflectance have been found in the range of 380–750 nm between plants subjected to biotic stress and healthy plants, along with high reflectance in the SWIR 1135–2400 nm range.

Using chemometrics software allows a researcher to create models for identifying different plant diseases. Our DARWin SP Data Acquisition software saves your spectra as ASCII files for use with analysis software such as chemometrics programs like Unscrambler from Camo Analytics. Unscrambler allows you to build, optimize and test your model. The coefficients from your model are used in the prediction engine built into our DARWin software to identify plant diseases in new samples.

Our field spectroradiometers allow for fast, non-destructive measurements *in situ* during all phases of crop growth. By monitoring and measuring the change in the spectral image of leaves, early detection of many diseases is possible. The progression of diseases, which is usually accompanied by an increase in severity and development of further symptoms like leaf area loss or lesions, can be arrested early treatment to reduce crop loss.

SPECTRAL EVOLUTION rugged field spectroradiometers include:

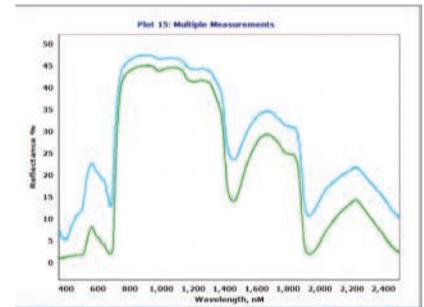
SR-6500— ultra-high resolution field portable spectroradiometer for analyzing the finest spectral features. Use with our unique leaf clip for vegetation studies. Available with a range of fiber mount Field of View lenses.

RS-5400— high resolution field portable spectroradiometer for *in situ* measurements with high resolution and sensitivity.

RS-8800—high resolution spectroradiometer controlled via iPhone, Android device or tablet. Used with *Sensagrip*TM probe to provide real-time accurate measurements of scan angle, sun angle, distance from target and real-time target viewing so users of every experience level can scan at nadir for more accurate measurements.

PSR+ — high resolution/high sensitivity field portable spectroradiometer with both direct attached lenses and fiber mount FOV options. Operate in standalone mode with built-in LCD display and memory to store up to 1000 scans.

RS-3500— high resolution budget-friendly field spectroradiometer for a range of remote sensing applications. Available with as a remote sensing bundle.



Scans of healthy leaf in green versus stressed leaf in blue in a multiple plot DARWIN SP display.



Our spectroradiometers are designed for field use: rugged, lightweight, battery operated. Our unique leaf clip includes an integrated light source and built-in reflectance standard for ease-of-use and keeps your sample away from heat.

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