

# SPECTRAL EVOLUTION

## Measuring Nitrogen in Soil

NIR field spectrometry is an important tool for characterizing several soil properties in one scan including carbon, organic and inorganic content, salinity, soil mineralogy, clay content, pH, cation exchange capacity (CEC), moisture and total nitrogen. Nitrogen is an important macro-nutrient for plant growth in soil. The ability to measure nitrogen in soil can be a key to promote a better understanding and approach to prescriptive fertilization as part of precision agriculture.

Conventional soil chemical measurements are time-consuming and costly and often result in the destruction of original samples. Proximal soil analysis using a field spectrometer or spectroradiometer like the PSR+ provides a window into the health of the soil and subsequent health of vegetation growth. By taking *in situ* measurements rapidly and without preparing or in any way affecting the sample, spectral information related to the main nitrogen absorption features near 1450, 1850, 2250, 2330, and 2430 provide not only indications of nitrogen content but also can be used to derive quantitative information on total nitrogen using chemometrics.

The PSR+ is a lightweight, reliable high resolution spectroradiometer designed for field use. The PSR+ covers the full UV/VIS/NIR range from 350-2500 nanometers with unmatched sensitivity and accuracy. It is easy for one person in the field to use with an optional handheld microcomputer and direct screw-on lenses, or fiberoptic connection to a pistol grip or sample contact probe. The PSR+ includes our exclusive DARWin SP Data Acquisition software with access to the USGS spectral library and 19 vegetation indices. It can work in standalone mode to store up to 1000 field scans before offloading. It is supplied with two rechargeable lithium-ion batteries each capable of up to 4 hours of use for a total of 8 hours of scanning. The PSR+ is also available with a benchtop probe and sample compactor for soil analysis use in the lab.

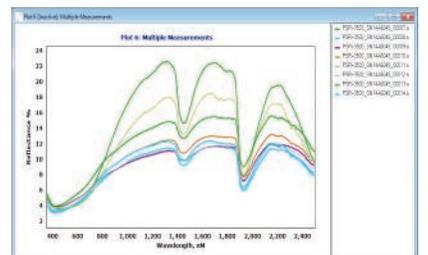
Optional EZ-ID sample identification software includes access to mineral identification libraries — very useful for identifying clays in soil. Using pattern matching algorithms, EZ-ID matches your target scan to known samples and provides a matching “confidence level” percentage. It also allows you to quickly take scans of known samples and create your own region-specific library.

Since DARWin saves all your spectra as ASCII files, it can easily be imported into 3rd party analysis or chemometric programs like TSG, Cammo’s Unscrambler and R<sup>2</sup>.

In addition to measuring nitrogen content, other soil analysis applications can include: topsoil fertility, erosion risk, hydraulic properties, soil degradation, total organic carbon, organic matter in soil, CEC, and indirect measurement of soil pH.



*Soil analysis using NIR spectroscopy can measure water, carbon, nitrogen, clay, pH, and organic matter.*



*DARWin SP Data Acquisition software allows you to display multiple scans for comparison and saves as ASCII files for use with chemometrics software*



*An optional benchtop contact probe with sample soil compactor is useful for lab-based measurements.*

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