

# SPECTRAL EVOLUTION

## Measuring Potassium in Soil

Potassium is a key ingredient in plant health, responsible for the movement of water, nutrients, and carbohydrates in plant tissues. Potassium is involved with enzyme activation within plants which affects protein, starch and adenosine triphosphate (ATP) production. The production of (ATP) can regulate photosynthesis rates. Potassium also helps to regulate the opening and closing of the stomata which regulates the exchange of water vapor, oxygen, and carbon dioxide. If K is deficient or not supplied in adequate amounts, growth is stunted and yield is reduced. Potassium is also key in fighting biotic (pathogens, insects, weeds) and abiotic (drought, salinity, cold, frost, and water-logging) stresses.

Spectroscopy can be a useful tool in measuring the amount of potassium in soil. It is fast, inexpensive, non-destructive and measurements can be taken *in situ*. Potassium has a distinctive spectral absorbance feature in a reflectance scan between 2450 and 2470nm. The depth and breadth of this feature can indicate the relative amount of potassium contained in the soil sample.

The SR-6500, RS-5400, PSR+ and RS-3500 are lightweight, reliable high resolution NIR spectroradiometers designed for field use. They cover 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 one of these spectroradiometers with an optional handheld microcomputer and direct screw-on lenses, or fiberoptic connection to a pistol grip or sample contact probe. They include our exclusive DARWin SP Data Acquisition software with access to the USGS spectral library and 19 vegetation indices. The PSR+ works in standalone mode to store up to 1000 field scans before offloading. The spectroradiometers are supplied with two rechargeable lithium-ion batteries each capable of up to 4 hours of use for a total of 8 hours of scanning. They are also available with a benchtop probe and sample compactor for soil analysis use in the lab.

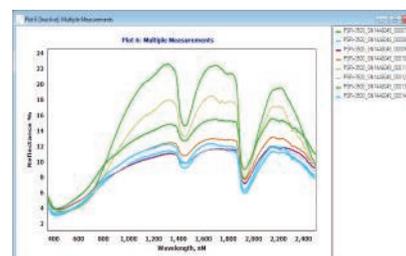
Optional EZ-ID sample identification software includes access to mineral identification libraries — very useful for identifying clays in soil. Using pattern matching algorithms, EZ-ID matches your target scan to known samples and provides a matching “confidence level” percentage. It also allows you to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

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

In addition to measuring potassium content, other soil analysis applications can include: nitrogen and phosphorus measurement, 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 potassium, phosphorus, 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 soil measurements.*

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