

Diffuse reflectance spectroscopy for rapid soil analysis.

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Abstract

Diffuse reflectance spectroscopy (DRS) is a technology for nondestructive characterization of the composition of materials based on the interaction of visible–infrared light (electromagnetic energy) with matter. There is potential for use of DRS to increase efficiencies and reduce costs in both large-area applications (soil survey, watershed management, pedo-transfer functions, soil quality indicators) and site-specific management problems (precision agriculture, farm advisory services, process studies). In particular, the ability to rapidly characterize large numbers of samples with DRS opens up new possibilities for risk-based approaches to soil evaluations that explicitly consider uncertainty in predictions and interpretations of soil properties.

Over the next few years, developments can be expected toward cheaper and more portable spectrometers, coupled with more flexible software and easier calibration methods. The technology should be increasingly used in a wide range of soil studies and surveys, and spectrometers are likely to become standard equipment in soil laboratories. Soil spectral libraries will likely form the basis for a new generation of expert systems and probabilistic advisory systems for predicting soil properties and responses to soil management. DRS can also be used for characterization of organic resource quality for soil management.

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