

Improving Accuracy and Quality Control of Routine Soil Analyses Using Diffuse Reflectance Spectroscopy.

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Abstract

Our previous work has demonstrated that a number of soil and organic resource properties can be predicted using diffuse reflectance (350-2500 nm) spectroscopy (DRS). Here we investigated how DRS can be used in combination with routine soil and plant analysis to improve both precision and accuracy of the reference method. Sets of soil and plant samples were repeatedly analysed using several laboratory reference methods and DRS. The relative accuracy of the two methods was compared using the root mean square error of prediction of the DRS method, based on calibrations for each reference replicate using partial least squares regression, and the error in the reference method.

The relative precision of the methods was evaluated using mixed effects modelling based on predicted values for each replicate of the reference method using an independent calibration model. DRS was found to be almost universally more repeatable than conventional laboratory methods. Lack of precision in the reference method can be compensated for by using many DRS calibration samples, and result in higher accuracy than that of the reference method. Guidelines are given for routine use of DRS in soil and plant testing laboratories for improved quality control.

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