

MSc. thesis at FiBL, Soil Sciences

Title	Potential of near-infrared spectroscopy in agricultural consulting and field research
Background	<p>Near Infrared (NIR) spectroscopy is a non-destructive and fast method for qualitative and quantitative characterization of soils. Many studies show that essential soil parameters such as organic matter and texture can be determined quickly, accurately and reproducibly even under difficult conditions. Simple but powerful near-infrared spectrometers including analysis software are now available at low cost and could be used directly by the end user.</p> <p>In the context of this master thesis we will test the potential of these NIR spectrometers for the qualitative and quantitative characterization of soil samples. We will focus on the measurement of the organic matter content.</p>
Methods	<p>We will test the accuracy and reproducibility of the spectrometer using already characterized FiBL archive samples and by sampling additional reference sites.</p> <ul style="list-style-type: none">• Accuracy, reproducibility of organic matter determination• Detection of spatial variability on the field scale• Evaluation of external factors affecting the measurement (humidity, illumination, particle size/sample preparation of the samples)• Global vs. local regression/influence of different soil types• Evaluation of the included software and comparison with own analysis in R
Contact	Dr. Markus Steffens
Starting date	October 2018
Literature	<p>Reeves, J.B., 2010. Near- versus mid-infrared diffuse reflectance spectroscopy for soil analysis emphasizing carbon and laboratory versus on-site analysis: Where are we and what needs to be done? <i>Geoderma</i> 158, 3-14.</p> <p>Soriano-Disla, J.M. et al. 2014. The Performance of Visible, Near-, and Mid-Infrared Reflectance Spectroscopy for Prediction of Soil Physical, Chemical, and Biological Properties. <i>Applied Spectroscopy Reviews</i> 49, 139-186.</p> <p>Viscarra Rossel, R.A. et al. 2006. Visible, near infrared, mid infrared or combined diffuse reflectance spectroscopy for simultaneous assessment of various soil properties. <i>Geoderma</i> 131, 59-75.</p>