

An Improved Visible Range Absorption Spectroscopy on Soil Macronutrient

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Abstract : Soil fertility is commonly evaluated by soil macronutrients such as nitrate, potassium, and phosphorus contents. Optical spectroscopy is an emerging technology which is rapid and simple has been widely used in agriculture to measure soil fertility. For visible and near infrared absorption spectroscopy, the absorbed light level is useful for soil macro-nutrient measurement. This is because the absorption of light in a soil sample influences sensitivity of the measurement. This paper reports the performance of visible and near infrared absorption spectroscopy in the 400-1400 nm wavelength range using light-emitting diode as the excitation light source to predict the soil macronutrient content of nitrate, potassium, and phosphorus. The experimental results show an improved linear regression analysis of various soil specimens based on the Beer-Lambert law to determine sensitivity of soil spectroscopy by evaluating the absorption of characteristic peaks emitted from a light-emitting diode and detected by high sensitivity optical spectrometer. This would denote in developing a simple and low-cost soil spectroscopy with light-emitting diode for future implementation.

Keywords : macronutrients absorption, optical spectroscopy, soil, absorption

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