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Capability of visible-near infrared spectroscopy in estimating soils carbon, potassium, and phosphorus

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The optical spectroscopy technique has many advantages over conventional analytical methods since it is fast and easy to implement and with no use of chemical extractants. The objective of this study is to quantify soil total carbon (C), available Phosphorus (P) and exchangeable Potassium (K) using VIS-NIR reflectance spectroscopy. A total of 877 soils samples were collected in various agricultural fields in Mali. Multivariate analysis was applied to the recorded soils spectra to estimate these soil chemical properties. Results reveal the over performance of the principal component regression (PCR) compared to the partial least square regression (PLSR). For the coefficient of determination ($R2$) PLSR accounts for 0.29, 0.42 and 0.57; while the PCR gave 0.17, 0.34 and 0.50 respectively for C, P and K. Nevertheless, this study demonstrates the potential of the VIS-NIR reflectance spectroscopy in analyzing the soils chemical properties.

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