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1. Introduction

Quality of soils determines the health of plants: associated vegetation and crops, and forest ecosystems. Forest soils influence many factors like the rate of tree growth, natural reproduction and forest composition. Understanding of soil properties is therefore an important component of solutions to improving food production and security, reducing poverty and facilitating recovery of degraded/destroyed agricultural lands and major water catchment areas. The degradation and destruction of ecosystems are a result of demand pressure for arable and productive land from the fast growing populations in Kenya and by extension developing countries. This problem has provoked initiatives towards development of models for fast assessment of soil properties, an area that has been pioneered by the World Agroforestry Center (ICRAF) in Nairobi, Kenya with a focus on soils in Sub-Sahara Africa. Under the same initiative the Agrifood Research Finland (MTT Finland) partnered with ICRAF in search of solutions to improving food production in selected Sub-Sahara States. The efforts have resulted in large number of soil samples, which will require a long time period to provide solutions with regard to soil fertility and management (Shepherd and Walsh, 2007). The search for means to shorten the analytical period of soil samples in Sub-Saharan Africa and beyond triggered experiments to develop soil property models for fast and accurate assessment of regional soil properties from fewer soils samples. This article reports the role of TXRF analytical method in heavy metal speciation of soils samples from Mt Kenya forest and application in prediction model calibration of MIR spectroscopy spectra for high through put assessment of soil properties.