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REDUCING CARBON FOOTPRINT IN COFFEE FARMING; EVALUATION OF SOIL PHYSICOCHEMICAL PROPERTIES IN SELECTED FARMS IN KERICHO COUNTY, KENYA

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Introduction

Promoting intensification and sustainable practices in coffee farming can achieve food security, resilience, and higher incomes. Coffee management practices affect soil CO_2 emission. Soil physical properties impact biology by changing the physical environment of soil microbes (Ozlu et al., 2022). Nutrient retention in soils is controlled by texture, organic carbon, cation exchange capacity, pH, and iron and aluminum oxides (Seybold et al. 1997). Low-carbon, Climate-Smart Agriculture practices that interlink best practices that reduce CO_2 emissions can be introduced in the coffee value chain.

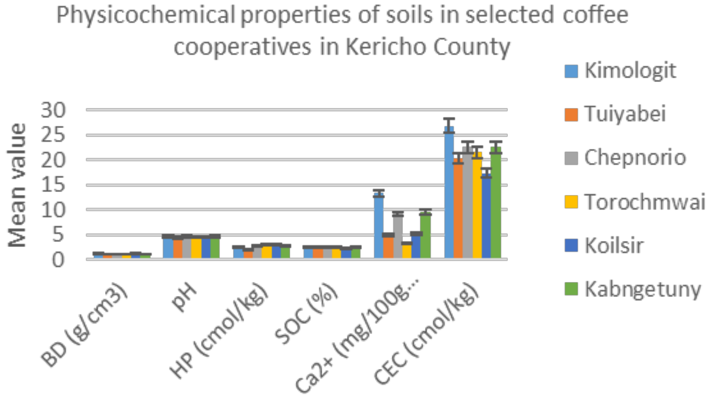

Figure 1: Means of physicochemical properties of soils in selected coffee cooperatives in Kericho County

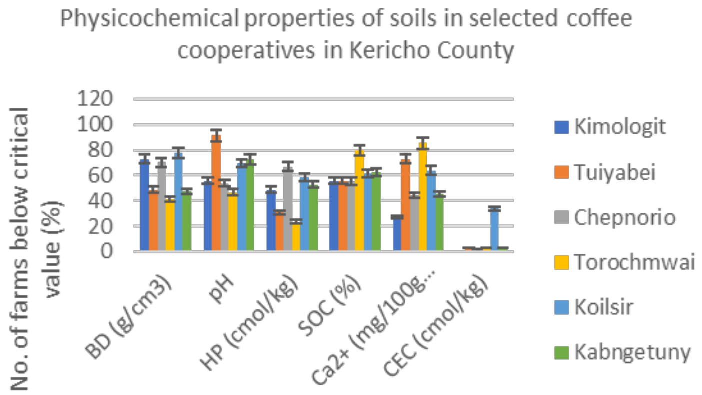

Figure 2: Physicochemical properties of soils in selected coffee cooperatives in Kericho County

Materials/Methods

The study was carried out in 6 Coffee Cooperative societies (Figure 3) in Kericho, Kenya in September 2022. A total of 152 farms were sampled. Soil samples were analyzed at KALRO- CRI laboratories for the parameters shown in the table below.

No	Parameter	Method
1	pH	Potentiometric
2	Exchangeable acidity (HP)	Titration
3	Exchangeable Calcium(Ca^{2+})	Spectrophotometric
4	Cation Exchange Capacity (CEC)	Leaching
5	Organic carbon (OC)	Wet oxidation
6	Bulk density (BD)	Core method

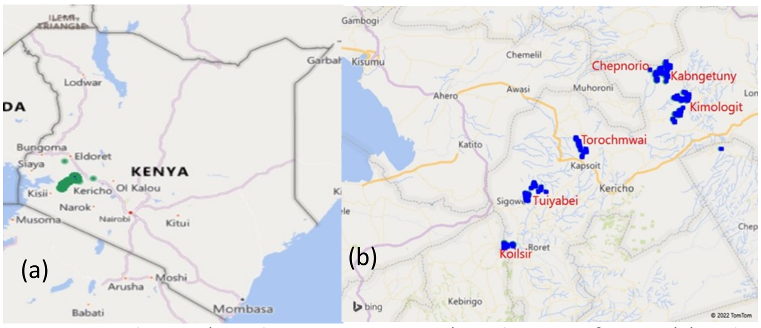

Figure 3: Study area (Kericho County in Green) on the map of Kenya (a) and the location of the collaborating societies within the County (b)

Results/Discussion

Most farms had soils with low porosity and high compaction. The mean soil pH across the farms was suitable for coffee farming. Low soil organic indicated that the rate of soil organic matter decomposition was high or soil organic matter was not adequate thus leading to low soil fertility. The exchangeable Calcium from half the farms was adequately supplied. The cation exchange capacity was high across all the farms indicating capacity for the soils to exchange cations for another.

Conclusion/Perspectives

Most individual farms' soil physicochemical properties were below the critical threshold.

There is need to promote use of organic fertilizers that buffer soil pH, increase soil organic carbon and exchangeable Calcium, and reduce bulk density.

Intercropping coffee with compatible shade and fruit trees can increase carbon storage and improve soil health is recommended.

References:

Ozlu, E.; Arriaga, F.J.; Bilen, S.; Gozukara, G.; Babur, E. (2022). Carbon Footprint Management by Agricultural Practices. Biology 11, 1453. https://doi.org/10.3390/

Seybold, C.A., Mausbach, M.J., Karlen, D.L., Rogers, H.H. (1997). Quantification of soil quality. In: Lal R, Kimble J. M., Follett R.F., Stewart, B.A. (eds) Soil processes and the carbon cycle. CRC, Boca Raton, pp 387–404