

ABSTRACT

In Africa, banana is mainly produced by small-scale farmers under complex production systems for both home consumption and income generation. Low soil fertility continually constraints its production and farmers are embarking on emerging technologies such as improved fallow, cover crops, integrated soil fertility management, agroforestry with fast growing tree species to address this challenge. This study aims at assessing the sustainability of grevillea-banana agroforestry systems by investigating the variability in their soil physico-chemical properties. Soil samples were collected in banana sole stands, *Grevillea robusta* sole stands and grevillea-banana intercrops in three agro-ecological zones during the dry and rainy seasons. Soil physico-chemical properties significantly differed among agro-ecological zones, cropping systems and between seasons. Soil moisture, total organic carbon (TOC), P, N, Mg decreased from the highland to the lowland zone, through the midland zone whereas soil pH, K and Ca showed the opposite trend. Soil bulk density, moisture, TOC, $\text{NH}_4^+\text{-N}$, K and Mg were significantly higher in the dry season compared to the rainy season but total N was higher in the rainy season. Intercropping banana with grevillea trees significantly decreased soil bulk density, TOC, K, Mg, Ca and P. Soils under banana sole stands accumulated higher potassium, magnesium, calcium, phosphorus with a higher soil bulk density and pH compared to grevillea-banana intercrops and grevillea sole stands. This suggests that intercropping banana and grevillea trees increases the competition for these nutrients and requires careful attention for the optimization of their interactive benefits.