Properties of selected organic residues added on highly weathered Rhodic Ferralsol and Luvic Arenosol soils under cashew, southern Tanzania

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Abstract

The qualities of fresh cashew, maize, and goat farmyard manure (FYM) residues commonly added to soils and their long-term effects on the soil fertility of poor Luvic Arenosol and Rhodic Ferralsol soils were investigated. The results indicated that organic residues had different compositions of nutrients. Nitrogen, carbon, lignin, and soluble polyphenol varied among the organic residue sources. Potential alkalinity was 340 mmol OH, 397 mmol OH, and 746 mmol OH kg-1 in cashew, maize, and goat FYM residues, respectively. Available alkalinity followed the same pattern (103 mmol OH, 294 mmol OH, and 594 mmol OH kg-1), while soluble available alkalinities were 49 mmol OH, 176 mmol OH, and 193 mmol OH kg-1 in cashew, maize, and goat FYM, respectively. For both soils, sites with a history of organic residue removal were slightly more acidic and nutrient-depleted than soils with histories of organic residue additions. A marked difference was observed in a soil with the addition of goat FYM. An increase in soil pH following organic residue additions was strongly correlated ($r = 0.71$) to an increase in soil exchangeabe Ca for seven out of the eight soils which suggested a liming effect of organic residue. The results indicated that improvements in soil fertility will depend on the source of organic residue added and the initial characteristics of soils.