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Evolution of soil chemical properties in the rotational agroforestry system with *Acacia auriculiformis* for 22 years, DRC

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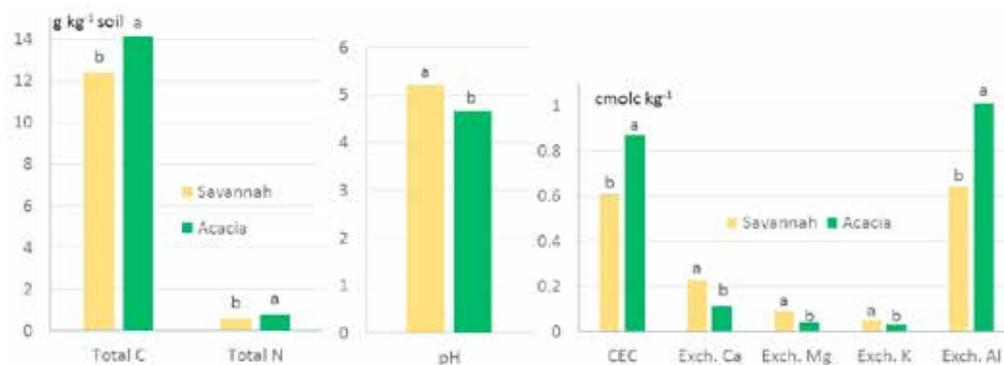
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To produce charcoal and prevent the deforestation around Kinshasa (Gond *et al.*, 2017), 7,700 ha of *Acacia auriculiformis* were planted on savannah ecosystems, in 1987 (Bateke Plateau, DR Congo). Since 1995, the plantation was managed using the rotational woodlot system alternating agricultural and charcoal production on the same area (Kimaro *et al.*, 2007). The 7,700 ha produced a large amounts of charcoal, cassava and maize during many years (Bisiaux *et al.*, 2009).

However, farmers have observed for a while a decline in wood and crop productivity. The aim of this study was to compare chemical properties of soils in six acacia stands in two farms having undergone different agroforestry trajectories: - one 22-year-old acacia stand, never-harvested; 4 stands in their 2nd rotation after 1 cropping cycle; and 1 stand in its 3rd rotation after 2 cropping cycles - and soils in the native control savannah.

Compared to the original savannah, all acacia stands showed an increase in soil C, N and N-NO₃- contents, but a decline in soil pH and exchangeable cations, and an increase in exchangeable Al and CEC (Fig 1).

To maintain the sustainability of the system, we recommend different practices in order to improve the nutrient balance and decrease the soil acidity. Such practices are the debarking of tree stems before carbonization, the restitution of small branches and charcoal residues to the soil, and the supply of natural rock phosphate (Dubiez *et al.*, 2018).



Total carbon content, total nitrogen content, pH in water, Cation Exchange Capacity (CEC), Exchangeable Ca, Mg, K and Al in the soil at a depth of 0-20 cm in the savannah and the six acacia stands.

Letters indicate differences (ANOVA; $p < 0.05$) between the savannah and the Acacia stands.

Keywords: Bateke plateau, Agroforestry, Charcoal production, Shifting cultivation, N₂ fixation.

References:

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