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# Soil suitability for the production of rice, groundnut, and cassava in the peri-urban Niayes zone, Senegal

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ABSTRACT

In Senegal, the peri-urban Niayes region has biophysical and socio-economic potential to contribute to national food security. Peri-urban agriculture highly contributes to the local food supply, but one potential constraint to expansion is soil suitability for new crops. We examined the suitability of soils for the cultivation of upland rice (*Oryza sativa* L.), cassava (*Manihot esculenta* Crantz), and groundnut (*Arachis hypogaea* L.) in a peri-urban wetland outside of Dakar. The selected crops are central to local diets. Study sites were located along a toposequence. We evaluated soil suitability metrics for these three crops based on physical and chemical characteristics. The results show that soil texture varied from sandy to sandy loam. The organic matter concentration varied between 0 g $kg^{-1}$ and 2 g $kg^{-1}$. Total nitrogen and organic carbon had low values in all sites except in S4 while macronutrients (Ca, Mg, Na, and K) varied across sites. Calcium was the most abundant cation in the soils; followed by Mg, Na, and K. Based on these factors, we found that there is high suitability for groundnut production in peri-urban Dakar, slight potential for cassava, and marginal or poor suitability for rice production. It attempts to fill the knowledge gap with new data for soil suitability in research development (R&D) in Senegalese agriculture. The same approach could be applied in other areas when introducing new crops for diversification.



## 1. Introduction

Despite large global increases in crop productivity, yields in sub-Saharan Africa have remained stagnant over the last half-century (Ba and Aubry, 2011). These yield gaps have motivated recent trends in international agricultural development focused on increasing production among smallholder, rural farmers in Africa (Toenniessen et al., 2008). There is some evidence that these efforts are impacting on yields (Denning et al., 2009), with the potential to positively impact rural livelihoods.

However, demographic evidence and projections in sub-Saharan Africa show large-scale movement from rural, farming areas to urban areas (Seto et al., 2011; Linard et al., 2013). In 2010, for instance, 42% of Senegal's population was located in urban areas (Masse et al., 2013). This demographic clustering poses important challenges for feeding a largely urban population. This challenge was exemplified in 2008 food riots in developing countries, such as Senegal, over high prices of staple items (Cohen and Garrett, 2010). Thus, affordably meeting the food demand of a growing urban population in countries such as Senegal is a key priority.

The Food and Agricultural Organization (FAO) estimates that urban agriculture contributes to feeding up to 800 million urban dwellers (Zezza and Tasciotti, 2010). And 30–70 percent of urban families in poor countries engage in some form of urban food production (FAO, 2010; Cohen and Garrett, 2010). Urban and peri-urban food production can, thus, play an important role in providing food for growing and dense urban areas (Cohen and Garrett, 2010).

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In Senegal, peri-urban agriculture already contributes an important concentration of horticultural products to urban markets. The Niayes zone, a peri-urban wetland, gives 80% of all horticultural production in Senegal and represents 65% of all agricultural production in Senegal (Diallo et al., 2015a). Farm sizes vary but are rarely more than 1 ha. These small farms are partly due

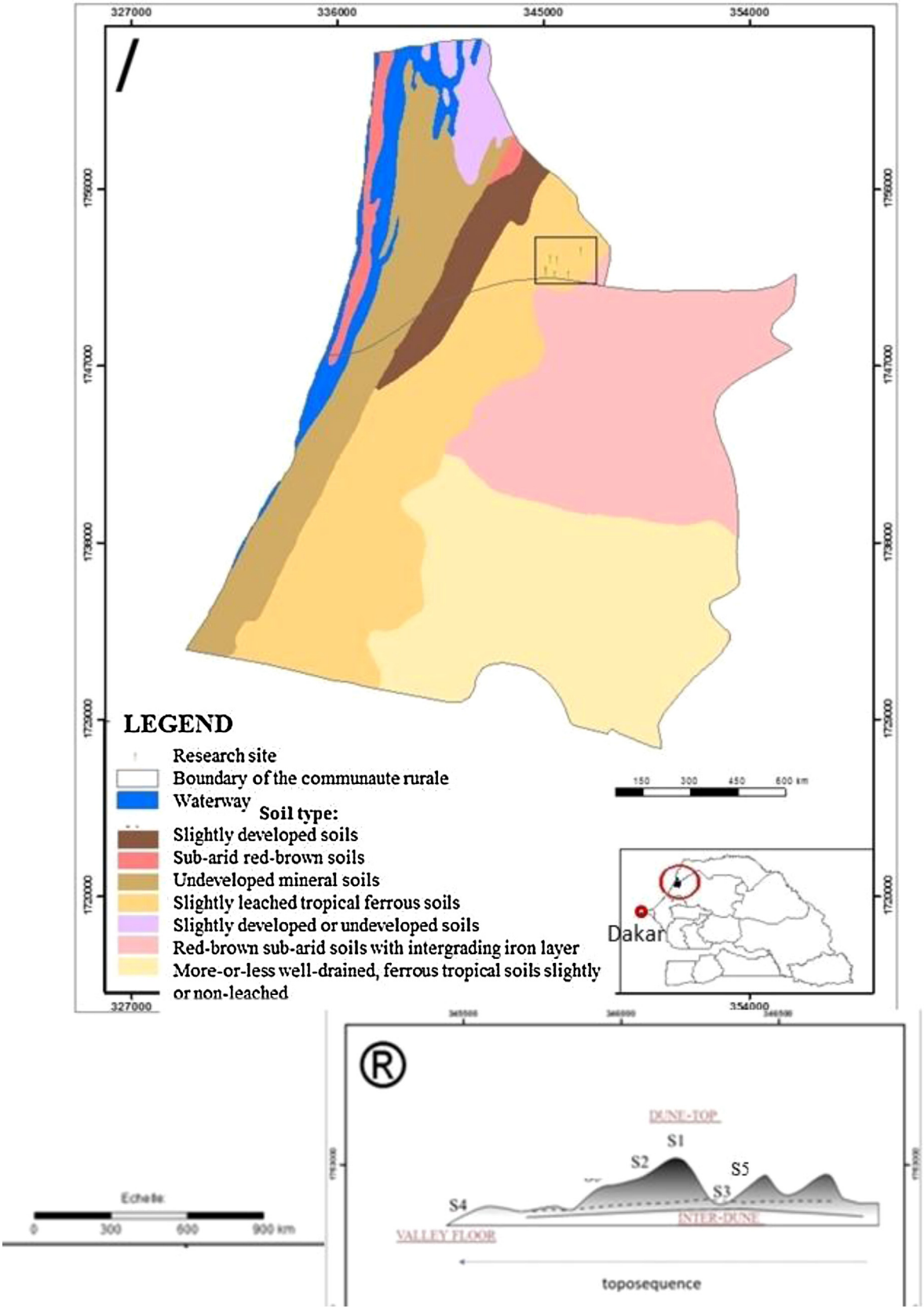


**Fig. 1.** Geographic sites location along toposequence in the Niayes zone.