



Spatial variability and environmental drivers of arbuscular mycorrhizal fungal communities associated with *Solanum aethiopicum* (L., 1756) in Côte d'Ivoire

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ABSTRACT

Objective: This study assesses the diversity of spore-based arbuscular mycorrhizal fungal (AMF) communities associated with *Solanum aethiopicum*, as well as the role of the main environmental factors and management practices in shaping their spatial distribution across the agroecological regions of Côte d'Ivoire.

Methodology and Results: Rhizospheric soil and fine-root samples were collected in June 2023 from 16 *Solanum aethiopicum* fields across four agroecological regions of Côte d'Ivoire: South, East, Centre, and North. AMF spores were extracted by wet sieving, identified morphologically at the genus level, and analyzed together with root colonization, soil properties, and farming practices using univariate and multivariate statistics in R. Spore density and root colonization varied significantly among regions, with the highest values in the Centre and East and the lowest in the North. AMF communities were dominated by *Glomus*, *Acaulospora*, and *Funneliformis*. While alpha diversity did not differ significantly among regions, community composition was mainly structured by soil properties, with additional effects of phosphorus inputs and fungicide use.

Conclusions and application of Results: The results indicate soil fertility acts as the main environmental filter structuring spore-based arbuscular mycorrhizal fungi (AMF) communities in African eggplant systems whereas local farming practices modulate community composition. Organic matter and mulching gradients covaried with multivariate ordination patterns, suggestions that management can influence AMF associated soil biological functioning beyond purely regional effects. The moderate regional effect observed suggests that local edaphic and agronomic conditions are more important than geography alone for explaining AMF community turnover in

the studied systems. These findings support the integration of soil biological indicators and AMF-sensitive management practices into fertility management strategies to improve the sustainability of tropical vegetable production in Côte d'Ivoire and similar agroecosystems.

Keywords: African eggplant; interspecific interactions; diversity; distribution; agricultural practices.