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Integration of agrosystems with mycorrhizal shrub *Guiera senegalensis* in Sanghaïe (Niakhar - Fatick)

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Abstract

Guiera senegalensis, a predominant species in Senegalese agrosystems, plays a crucial role in soil fertility and agricultural productivity. This study aims to evaluate the impact of *Guiera senegalensis* on the dynamics of soil microbial communities, focusing particularly on arbuscular mycorrhizal fungi. An experiment was conducted in the Peanut Basin of Senegal at Sanghaïe since 2021, where various fertilisation practices were applied to crops (millet and peanut) associated with *Guiera senegalensis*. The management system is based on crop rotation between peanuts and millet, where different agronomic and microbiological parameters of the crops, as well as the soil, were monitored according to the evolution of the position of the shrubs.

Data analysis collected from 2021 to 2023 showed that the combined treatment of 50 % fertiliser recommended dose + 50 % of manure recommended dose significantly increased crop yield. Without the addition of fertiliser (neither chemical nor organic), at each metre away from *Guiera senegalensis*, the yield decreases by 12.23 kg ha⁻¹. With the addition of fertiliser, the yield decreases significantly by 61.71 kg ha⁻¹ with mineral fertiliser, whereas by replacing half of this dose with half-dose of farmer's manure, this decrease is 1.50 kg ha⁻¹ and becomes non-significant compared to the control without addition at each metre away from *Guiera senegalensis*.

Furthermore, in 2023, analysis of mycorrhisation data shows a significantly lower mycorrhizal infection potential ($p = 0.0495$) in soils under *Guiera senegalensis* cover in plots where millet is grown. For peanut plots, the mycorrhizal potential of the soils is significantly higher ($p = 0.0463$) outside the shrub. However, the mycorrhisation of crops shows that a higher intensity is observed outside the *Guiera senegalensis* effect ($p = 7.373 \times 10^{-8}$ for millet and 0.000341 for peanut).

This study highlights the importance of taking into account biotic interactions to optimise the sustainability of agrosystems in Senegal, offering promising prospects for the integration of *Guiera senegalensis* into agricultural development in the Niakhar-Sanghaïe region.

Keywords: Agrosystem, mycorrhisation, Niakhar-Sanghaïe

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