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Adoption Dynamics and Livelihood Returns of Alley Cropping Systems in São Tomé and Príncipe

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ABSTRACT

Agroforestry systems are promoted for sustainable intensification in sub-Saharan Africa, yet adoption rates remain low. The island nation of São Tomé and Príncipe presents a unique context of smallholder vulnerability and soil degradation, where alley cropping has been introduced but its uptake and economic viability are poorly understood. This paper analyses the determinants of smallholder adoption of alley cropping systems using Gliricidia sepium and evaluates their comparative livelihood returns against conventional monocropping. A mixed-methods approach was employed, combining a structured survey of 150 smallholder households with in-depth interviews and farm budget analysis. A logistic regression model identified factors influencing adoption, while gross margin analysis quantified economic returns. Adoption was significantly associated with secure land tenure and access to extension services. Adopting households reported a mean increase of 28% in net farm income per hectare from maize intercropped with Gliricidia, primarily due to reduced fertiliser costs and improved yields. Alley cropping presents a financially viable pathway for sustainable livelihood enhancement in this context, but its scalability is constrained by institutional and tenure-related factors. Policy should prioritise strengthening land tenure security and integrating agroforestry extension into national agricultural support programmes. Future projects should adopt phased implementation with continuous technical backstopping. agroforestry, smallholder adoption, livelihood analysis, Gliricidia sepium, land tenure, São Tomé and Príncipe This study provides the first quantitative evidence on the livelihood returns of Gliricidia-based alley cropping in the country and introduces a nuanced adoption model integrating tenure

security as a critical variable.

Keywords: *Agroforestry, Adoption Dynamics, Sustainable Livelihoods, Sub-Saharan Africa, Alley Cropping*

Article Highlights

- Adoption linked to secure land tenure and access to extension services.
- Gliricidia alley cropping increased net farm income by 28% versus monocropping.
- Scalability constrained by institutional and tenure-related factors.
- First quantitative evidence on livelihood returns for this system in São Tomé.

Policy Implication

Strengthening land tenure security and integrating agroforestry into national extension programmes are critical for scaling adoption.

Presents a mixed-methods analysis of adoption determinants and economic viability.