



Tropentag, September 10-12, 2025, hybrid conference

“Reconcile land system changes
with planetary health”

Evaluating the impacts of *Sesbania sesban* and *Cajanus cajan* hedgerow spacing and pruning incorporation on cassava (*Manihot esculenta*) yield and soil fertility in southern Ethiopia

MITIKU AYELE HANDISO, BELAYNEH LEMAGE BONGIDO, YENESEW ANIMAW

Jinka Agricultural Research Center, Southern Agricultural Research Institute, Ethiopia

Abstract

Agroforestry, particularly hedgerow intercropping, has emerged as a promising solution, offering multiple benefits such as enhanced soil fertility through nitrogen fixation, organic matter addition from prunings. However, there is a gap on how to configure and manage hedgerow systems for maximum agronomic and environmental benefits. This study evaluated the effects of hedgerow spacing (4 m vs. 6 m) and pruning incorporation of *Sesbania sesban* and *Cajanus cajan* on cassava (*Manihot esculenta*) yield and soil fertility in Southern Ethiopia. A randomised complete block design (RCBD) with four replications were implemented in a hedgerow agroforestry system across smallholder farmers' fields, considering farmers as replicates to account for variability in soil properties and management practices. The five testing treatments included: *S. sesban* at 4 m (T1) and 6 m (T2), *C. cajan* at 4 m (T3) and 6 m (T4), and sole cassava as a control (T5). Results showed that *S. sesban* at 4 m (T1) significantly enhanced soil fertility parameters (e.g., organic matter 3.4 %, total nitrogen 0.11 %) and cassava yield (marketable yield 42 t/ha), while *C. cajan* at 6 m (T4) optimised cassava marketable yield (51.6 t/ha). Hedgerow species and spacing influenced biomass production, with *S. sesban* contributing higher total biomass (up to 22.9 t/ha) than *C. cajan* (up to 8.2 t/ha). Pearson's correlation analysis revealed strong positive relationships between cassava yield and soil fertility parameters ($r = 0.82\text{--}0.95$, $p < 0.001$). These findings underscore the potential of optimised hedgerow spacing and pruning incorporation in enhancing sustainable agricultural practices by reducing reliance on synthetic fertilisers, improving soil health, and enhancing resilience to climate variability, offering practical agroforestry options for smallholder farmers. Further research could explore long-term impacts, varietal interactions, and scalability.

Keywords: Agroforestry, *Cajanus cajan*, cassava, hedgerow spacing, *Sesbania sesban*, smallholder farmers, soil fertility