

## **Integration of Agroforestry Shrub for Diversification and Improved Smallholder Production: A Case of *Cajanus cajan*-*Zea Mays* (Pigeonpea-Maize) Production in Ghana**

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**Abstract :** In the face of global concerns such as population increase, climate change, and limited natural resources, sustainable agriculture practices are critical for ensuring food security and environmental stewardship. The study was conducted in the Forest zones of Ghana during the major and minor seasons of 2023 cropping seasons to evaluate maize yield productivity improvement and profitability of integrating *Cajanus cajan* (pigeonpea) into a maize production system described as a pigeonpea-maize cropping system. This is towards an integrated soil fertility management (ISFM) with a legume shrub pigeonpea for sustainable maize production while improving smallholder farmers' resilience to climate change. A split-plot design with maize-pigeonpea (Pigeonpea-Maize intercrop - MPP and No pigeonpea/ Sole maize - NPP) and inorganic fertilizer rate (250 kg/ha of 15-15-15 N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O + 250 kg/ha Sulphate of Ammonia (SoA) - Full rate (FR), 125 kg/ha of 15-15-15 N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O + 125 kg/ha Sulphate of Ammonia (SoA) - Half rate (HR) and no inorganic fertilizer (NF) as control) was used as the main plot and subplot treatments respectively. The results indicated a significant interaction of the pigeonpea-maize cropping system and inorganic fertilizer rate on the growth and yield of the maize with better and similar maize productivity when HR and FR were used with pigeonpea biomass. Thus, the integration of pigeonpea and its biomass would result in the reduction of recommended fertiliser rate to half. This would improve farmers' income and profitability for sustainable maize production in the face of climate change.

**Keywords :** agroforestry tree, climate change, integrated soil fertility management, resource use efficiency

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