



Tropentag, September 10-12, 2025, hybrid conference

“Reconcile land system changes
with planetary health”

Using wood vinegar to promote sustainable cowpea production in northern Ghana

EDWIN K. AKLEY¹, BARBARA K. ARTHUR²

¹*CSIR-Savanna Agricultural Research Institute , Ghana*

²*University for Development Studies (UDS), Soil Science, Ghana*

Abstract

Organic and agroecological practices offer significant benefits for soil health and fertility. By enhancing soil structure, promoting biodiversity, improving nutrient availability, reducing erosion, and creating a more resilient and productive soil ecosystem, these practices ensure the long-term sustainability of agriculture and food security.

Wood vinegar technology, which is a highly recommended biofertiliser, has the potential to significantly enhance organic farming practices. It stimulates crop growth and development and is a biocontrol agent for pest and disease management. Wood vinegar (WV) contains pyroligneous acid, which can be utilised as a bio stimulant and biopesticide. Its phytotoxicity can be harnessed for herbicidal purposes in undiluted form, while diluted concentrations can stimulate plant growth. The potential of wood vinegar in boosting organic farming practices is substantial, making it a valuable tool for sustainable agriculture and food security.

This study assessed the efficacy and effective methods of application of wood vinegar (WV) on the growth and yield of two different cowpea varieties (Padituya and Wang-kae), with a focus on whether a combination of Foliar + Soil drenched (SD) application of WV would yield better results amongst other treatments: control (no WV), foliar applied, and SD applied. The study followed a randomised complete block (RCB) design and assessed nodulation, root phenotyping, shoot biomass, pod, grain, and stover yields. Biomass yield revealed that the application of WV increased shoot biomass production compared to control (no WV application) in both Wang-kae and Padituya. WV had a more significant positive effect on yields (pod and grain) of Wang-kae compared to Padituya. The results also revealed that the combined application of Foliar + SD generally depressed biomass, nodulation, and grain yield. In conclusion, WV application is a promising technology for boosting cowpea production, particularly for low-input external production systems without input. Additionally, applying WV through foliar and Soil drenching seems efficient enough, but more significant benefits are associated with soil drenching of WV.

Keywords: Cowpea grain yield, Foliar application , organic farming, Pyroligneous acid, Soil drenching, Soil enzymes, Soil quality