Research Focus

I have worked and published as a Soil Physicist with my research focus primarily on soil and water conservation as well as soil amendment for sustainable crop cultivation. The overall relevance of my research work is to conserve and amend degraded soils for optimum crop yields especially by small scale farmers thereby promoting self-sufficiency in food production in Nigeria. My research focal points comprise of soil and water conservation, soil amendment/biochar as soil conditioner and prediction of soil water behaviours.

To conserve soil and water, vetiver grass strips were planted across slopes (5 – 13%) at surface intervals of 5m, 10m and 20m and compared with plots without vetiver grass. Arable crops (maize, cowpea, okra, potato, yam and cassava) were grown within alleys either as sole or intercrop for five growing seasons. In this research, runoff and soil loss were consistently and significantly lower in plots with vetiver grass than plots without vetiver grass. In addition, soil loss during harvesting of root crops was quantified. Hand rubbing method removed 93 and 96% of soil adhering to cocoyam and potato, respectively when compared with washing. As a result, hand rubbing was recommended for small scale farmers.

In addition, long-term effects of organic fertilizer application on soil physical properties and yields of maize and okra were investigated. Soil water retention capacity and yields of maize and okra were markedly improved in loose coarse textured soil amended with organic fertiliser at the rate of 100 – 120 kg N ha^{-1}. The use of *Gliricidia* biochar as soil amendment for the production of *Moringa* seedlings on a degraded soil was also investigated. The results established that in places where inorganic fertilizers are limited, *Gliricidia* biochar could be applied to produce *Moringa* seedlings.

Furthermore, suitability of Kostiakov (1932), Philip (1957) and Horton (1940) models in predicting infiltration of water was examined in an Alfisol. Horton model showed consistent deviation from actual field results due to non convergence of the iteration procedure. However, Philip model (R^2 = 0.90 – 0.97) more effectively predicted infiltration water for Alfisols than Kostiakov (R^2 = 0.16 – 0.70). It is therefore recommended that Philip model should be used for the prediction of infiltration water when designing and planning irrigation projects on Alfisols.