**MODELLING EFFECTS OF RESIDUALBIOCHAR, RICE HUSK AND RICE STRAW ON PRODUCTIVITY OF MAIZE (*Zea mays* L.) FOR SUSTAINABLE SOIL FERTILITY RESTORATION IN THE GUINEA SAVANNAH ZONE**

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**ABSTRACT**

The [International Fertilizer Development Center’s](http://r.search.yahoo.com/_ylt%3DA0LEVjjo9BBXPTgAARwnnIlQ%3B_ylu%3DX3oDMTByOHZyb21tBGNvbG8DYmYxBHBvcwMxBHZ0aWQDBHNlYwNzcg--/RV%3D2/RE%3D1460757864/RO%3D10/RU%3Dhttp%3A//ifdc.org//RK%3D0/RS%3Dna5LmRp81dbHH.5QdpxiH32CBME-) (IFDC) concept and approach to integrated soil fertility management as a set of agricultural practices adapted to local conditions to maximize the efficiency of nutrient and water use and improve agricultural productivity on poor fertility soils in the Sudan and Guinea savannah zones of West Africa is innovative to the rural communities. A field experiment was conducted at Nyankpala, near Tamale during the 2014 cropping season and continued during 2015, to investigate the residual effects of available indigenous organic materials (Biochar – partially burnt rice husk, Rice husk and Rice straw) in combination with supplementary mineral fertilizer N on yield components and grain yield of drought and *Striga* tolerant maize varirty “Wang Data”. It was a 3×3×3+1 experiment consisting of the 3 organic materials at 3 rates (2.5, 5 and 7.5 t ha-1 on dry matter basis) and 3 N fertilizer rates (0 kgN/ha, 45 kgN/ha and 90 kg/ha) plus a pure control laid out in a Randomized Complete Block Design with four replicates. Results showed increased maize growth and grain production on residual organic material nutrients required supplementary mineral N fertilization. Best growth parameters, early days to 50% flowering and highest cob length, cob weight and stover weight, 100 seed weight and grain yield were obtained with 2.5 to 7.5 t/ha Biochar + 45 - 90 kgN/ha; 5 to 7.5 t/ha Rice Husk + 45 - 90 kgN/ha and 7.5 t/ha Rice Straw + 90 kgN/ha. Biochar provided the least quantitative input of 2.5 t/ha + 45 kgN/ha for maximum maize production and most efficient soil fertility management system. Correlation analysis showed good relationship between grain yield and leaf count (r=0.5699), plant height (r=0.5340), and height of cob attachment (r=0.5164) and cob weight accounted for 69% of the grain yield. The best prediction model (Eqn. 4) for using Biochar was grain yield = -1414 + 177(Leaf Count at 9WAS) + 5.76 (Plant height at 9WAS).

Keywords: Biochar, rice husk, rice straw, mineral N fertilizer, maize.