

## **Efficiency of rice Husk biochar with poultry litter co-composts in oxisols for improving soil physico-chemical properties and enhancing maize performance**

### **ABSTRACT**

Efficient use of co-composted organic manure with biochar is one of the sustainable management practices in an agriculture system to increase soil fertility and crop yield. The objectives of this research are to evaluate the use of co-composted biochar, biochar in formulation with poultry litter (PL), and PL compost on soil properties and maize growth. Organic amendments were applied at 10 Mg ha<sup>-1</sup>, and synthetic fertilizer was applied at the recommended rate of maize (N: P<sub>2</sub>O<sub>5</sub>: K<sub>2</sub>O at 60:60:40 kg ha<sup>-1</sup>). The results showed that addition of organic amendment significantly increased the total biomass parameter compared to the control, which ranged from 23.2% to 988.5%. The pure biochar treatment yielded lower biomass than the control by 27.1%, which was attributed to its low nutrient content. Consequently, the application of the co-composted biochar achieved higher plant height and aerial portion, which ranged from 46.86% to 25.74% and 7.8% to 108.2%, respectively, in comparison to the recommended fertilizer rate. In addition, the soil amended with co-composted biochar had a significant increase in soil organic matter and had significantly higher chlorophyll and nutrient concentrations in plants, which increased with an increase in the biochar ratio of the co-composts. This was probably attributed to the release of the nutrients retained during composting, thereby possibly making the co-composted biochar act as a slow-release fertilizer. In conclusion, the addition of organic manure with biochar enhanced the nutrient supply by gradual release in comparison to the mineral fertilizer.

**Keyword:** Co-composted biochar; Rice husk biochar; Ratios of poultry litter or compost to biochar; Maize performance; Acidic tropical oxisols