

## Effect of corncob biochar on selected soil chemical properties and performance of maize

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### Introduction

A study was conducted to investigate the effect of corncob biochar or its combination with farmyard manure compost or NPK fertilizer on selected soil chemical properties and maize growth and yield on a ferralitic soil in Central Uganda.

### Methodology

A field experiment was carried out with biochar treatment at 10 tons/ha or co-applied with FYM compost at 10 tons/ha and NPK fertilizer. The test crop was maize variety DH 04. It involved six treatments (Control, Biochar, FYM compost, NPK, Biochar+ FYM compost and Biochar+ NPK) within a period of two seasons and used Complete Randomized Block (CBD) experimental design.

### Results & Discussion

In season 1, the soil pH was 5.2 at the control and 5.78 after biochar application. Solely applied corncob biochar increased the soil pH by 0.58 units compared with the control. In season 2, the pH ranged between 5.2 at control to 6.05 solely applied biochar. The solely applied biochar increased the soil pH by 0.85 units compared with the control. Biochar combined with farmyard manure compost recorded a soil pH of 5.97 while solely applied biochar recorded a soil pH of 6.05, a difference of 0.08 units. During season one, the soil organic carbon differed significantly ( $P < 0.01$ ) after the treatment application. The SOC varied from 1.58% at the control to 1.91% at solely applied biochar treatment. In the second season, the SOC ranged between 1.5% at the control to 1.98% at biochar treatment. This means that biochar addition increased the SOC by 0.48 units. Biochar combined with farmyard manure compost recorded a SOC of 2.31 while solely applied biochar recorded a SOC of 1.98. During the first season, the maize yield ranged from 4625 to 9475kg/ha. There was a significant ( $P < 0.01$ ) difference among the recorded average total weights within the treatments. Biochar combined with NPK treatment recorded the highest average total weight of 9475kgs while the control recorded the least average total weight of 4625kgs. During the second cropping season, the maize yield differed significantly ( $P < 0.001$ ) ranging from 3325 to 8550kgs/ha. Biochar combined with NPK treatment recorded the highest average total weight of 8550kgs while the control recorded the least weight of 3325kgs. The maize yield registered an increment in the two cropping seasons. This can be attributed to biochar's improvement of base cation retention in the rooting zone (Palansooriya *et al.*, 2019). Biochar also acts as a soil conditioner which improves water holding capacity and enhances soil nutrient retention (Mensah *et al.*, 2018).

### Conclusion

This study demonstrated that solely applied corncob biochar or in combination with farmyard manure compost or NPK avails the potential to enhance soil pH, soil organic carbon, available phosphorus, soil Nitrogen and exchangeable bases ( $K^+$ ,  $Mg^{2+}$ ,  $Ca^{2+}$  and  $Na^+$ ). Moreover, it improves the growth and yield of maize crop. These findings indicate that solely applied corncob biochar or in combination with farmyard manure compost or NPK can be used to improve maize yield which contributes to food security enhancement in the wake of climate change.