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ASSESSING THE BIOCHAR EFFECTS ON NUTRIENTS OF NYABUGOGO WETLAND IRRIGATION WATER

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ABSTRACT

Most people used wetland water for irrigating the vegetables, legumes and crops. The amount of nutrients varies depending on region and other factors. Nyabugogo wetland irrigation water also possesses those nutrients but amount is unbalanced and sometimes insufficient for plants growth. The amount of nutrients was measured for nitrate, nitrite, ammonium and phosphate and the amount was still below the standard values of irrigation water set by Rwanda Standards. *Eucalyptus Ceasia* biochar produced at temperature between 300 °C and 600 °C which is commercially available, was used as an alternative way of providing the nutrients by increasing phosphate and varying nitrogen form concentrations of the irrigating water of Nyabugogo wetland and tested the effect of Eucalyptus Ceasia biochar has on pH, TDS and conductivity. The experiment was performed by using column glasses at room temperature and involved measuring level of nitrate, nitrite, ammonium, phosphate, conductivity, TDS and pH of irrigating water before and after running column chromatography. By using UV VIS Spectrophotometer, the results showed that nitrate and nitrite amount decreased with increase in ammonium concentration. Phosphate amount was suddenly increased. pH, conductivity and TDS were also increased as time moved.

Introduction

Nyabugogo wetland holds water from different parts of Kigali city and hence composed by greatly metals which makes nutrients unavailable to plants. Biochar adsorbent play two great roles: removing pollutants and adding nutrients to plants and it can play those role at the same time. As biochar adsorbent is very cheap compared to fertilizers, the ideas came to rise to find a way of using it to provides nutrients to plants through irrigation water, a rarely method of adding nutrients to plants

Methodology

Results and Discussion

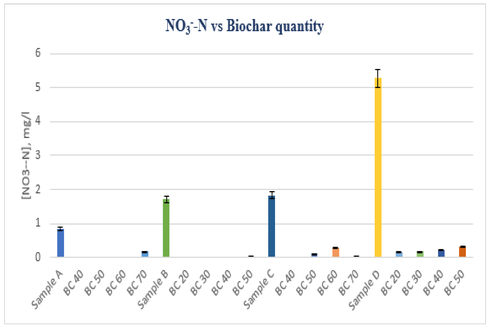


Figure 8. Nitrate variation with biochar quantity with (error values at 5%)

Figure 9. Nitrite variation with biochar quantity (error values at 5%)

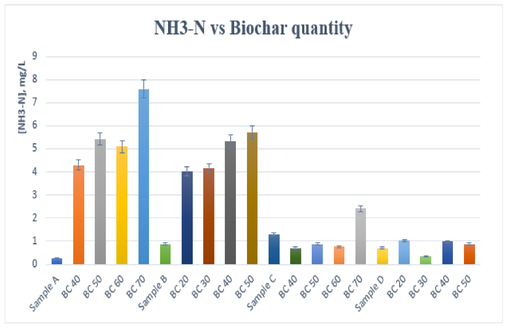


Figure 10. Ammonium variation with biochar quantity (error values at 5%)

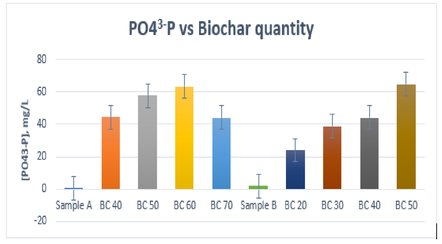
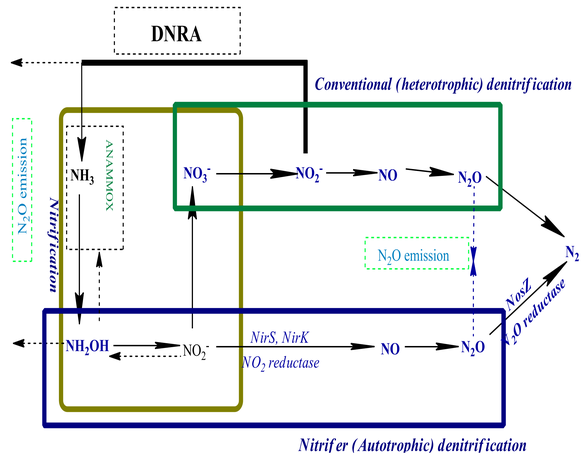


Figure 13. Phosphate variation in sample A and B with biochar quantity (error values at 5%)

Why do nitrate and nitrite values decreased and increased for ammonium?



Scheme 1. Nitrogen cycle by combining nitrification and DNRA (Morley et al., 2012)

Conclusion

:Biochar increases or decreased NO_3^--N, NO_2^--N and NH_4^+-N concentration depending on nature of water, through DNRA

- Biochar provided PO_4^{3-}-P to water
- Biochar increased pH, TDS and Conductivity values

Therefore, Biochar can be used to provide nutrients to plants through irrigation water

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