Poster Presentation

Poster 21 - The effect of biochar on mineral nitrogen dynamics in a highly SOM-depleted soil

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Abstract

Biochar may offer an important strategy for mitigation of climate change by storing plant-derived carbon. It has also been seen to affect the dynamics of soil N in laboratory experiments, decreasing leaching and gaseous emissions. As part of a wider field experiment we studied the dynamics and fate of mineral nitrogen (NH_4+ and $N0_{3-}$) in a soil initially very low in soil organic matter and amended with biochar at a rate of 30 t ha", Mineral nitrogen was added at a rate of 120 kg N ha" (20 kg N ha' to the seedbed and the remainder after emergence) in the form of ammonium sulphate and ammonium nitrate. The biochar contributed 153 Kg N ha" in stable form, in the amended plots. Mineral N was assessed monthly during the first cropping season having no significant difference in soil NH_4- concentration at either 0 to 25 cm or 25 to 50 cm depth whether the soil was planted or unplanted, with or without biochar amendment. Not surprisingly, $N0_3$- was significantly different between plots with and without maize, from the second month onward at both depths. However, with respect to biochar, the amended and non-amended plots, unplanted, showed, at the end of the season that the concentration of $N0_3$- significantly lower than the non-amended, indicating a biochar interaction specific to this ion. The effect was more pronounced in the topsoil but was also present in the subsoil. The yield of maize was 28.8 t ha" in unamended plots and 33.7 t ha" in amended soil, with the N taken up into plant being 264.6 kg and 292.84 kg ha" respectively. Soil N uptake represents 90% of the total nitrate under both condltlons - with and without biochar in soil - but the presence of biochar decreased $N0_3$- concentration by 36% in topsoil, although the biochar effect on N output represents around 10% more than the unamended maize yield. That difference can be due not only to the lower respiration. in these plots and consequently less N consumed by microorganisms, but also to chemical interactions between the soil solution and biochar matrix.

Acknowledgements: The authors are grateful to the Embrapa and Rothamsted Research for the financial support.