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Effect of amorphous silica (ASi) on N fertiliser induced ghg emissions for different, major agro-ecological zones of west Africa

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Abstract

Droughts and dry spells related stress on crops are becoming a common occurrence in sub-Saharan Africa due to a changing climate, the quest to increase the sustainable use of fertilisers to mitigate their effects on the environment, reduce drought stress and optimise profitability for farmers are of outmost priority to stakeholders in the agriculture sector.

Amorphous silica (ASi) has been proven to improve soil moisture, plant nutrient availability such as phosphorus potassium, increased resistance to pathological and environmental stress, it also improves grain quality and structural strength of cereals and enhances soil microbial activity thereby improving soil structure and therefore can be used as a soil amendment for improved cropping systems. However not much research has been done in this regard in West Africa.

Thus the objective of the soil incubation study is to assess the effects of amorphous silica (ASi) amendment on greenhouse gases emission and soil ecological processes of sustainable intensification cropping systems of rice and maize; important staple crops across four agro ecological zones(humid, sub-humid, semi-arid and arid) of West Africa.

Preliminary results show ASi treatments were able to reduce N O emissions by 40–60 % for mineral fertilised treatments and for the organic fertilised treatment contingent on the soil conditions, that is flooded conditions or not. Also, ASi also reduced water flux emissions by up to 20 %. This presents promising results that ASi amendment could be used as a strategy to reduce GHG emissions and water stress thereby leading to increase yield and enhance sustainability of the agriculture sector.

Keywords: Agroecological zones„ amorphous silica, drought, greenhouse gas emissions, soil incubation

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