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Farmers’ and academia’s views”

Combining mineral fertilisers with compost for sustainable maize production and reduction of greenhouse gas

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Abstract

Increasing crop production to supply the global food demand without harming the global environment is a major challenge for agricultural sectors in the world. The combined application of organic and inorganic fertilisers has been proposed as a tool for sustainable crop production and reducing greenhouse gas (GHG) emissions. However, interactive effects of fertilisers applied in different ratios on soil nitrous oxide (N₂O), carbon dioxide (CO₂), and methane (CH₄) emissions are site specific. The study aimed to analyse the effects of the combined application of compost and inorganic fertiliser (urea or NPS) in different ratios on maize yield and GHG emission from in Nitisol in Ethiopia at two moisture levels (40 % and 75 % water filled pore spaces) in a laboratory incubation experiment and a two-year field trial. The results showed that maize yield can be increased by about 12 to 18 % when combining organic and inorganic fertilisers compared to inorganic fertiliser application alone. The combinations are also suitable to reduce the emission of N₂O by about 22 to 80 % in comparison to the inorganic fertilisers, especially in wet soil, while CO₂ and CH₄ emissions were less affected. Based on our findings compost application accounting for 40 to 70 % of the N supply in the fertiliser mixtures could be a suitable combination to increase maize yield and reduce N₂O emissions in Nitisols in Ethiopia. Further investigations on farm level are recommended in order to cover a broader spectrum of environmental and management effects.

Keywords: Combined application, compost, greenhouse gases, inorganic fertiliser