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Nitrogen mineralization dynamics of different valuable organic amendments commonly used in agriculture

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Sustainable agriculture requires the careful optimization of the use of organic amendments to improve soil fertility while minimizing any harmful environmental effects. This study evaluated the nitrogen (N) mineralization dynamics in soil after adding different organic amendments. The four organic amendments were fresh dairy cattle manure, fresh white clover, vegetable, fruit and yard waste compost and poplar tree compost. The N mineralization potential of each organic amendment was determined by analyzing total mineral nitrogen during a 97 days laboratory incubation experiment. Soils amended with clover released 240 $\mu\text{g N g}^{-1}$ of soil during the 97 days incubation, more than twice as much as that released from soils amended with manure or composts (76-100 $\mu\text{g N g}^{-1}$ soil). At the end of the incubation, the net N mineralization in clover amended soils was 54%, more than five times higher than that in soils amended with composts or manure (4-9%). Nitrogen was mineralized faster in clover amended soil (1.056 $\mu\text{g N g}^{-1}$ soil day⁻¹) than in soil amended with composts (0.361-0.417 $\mu\text{g N g}^{-1}$ soil day⁻¹). The microbial biomass carbon content was higher in clover amended soil than in the soils amended with manure or composts. Bacteria (Gram positive and Gram negative), actinomycetes and fungi were more abundant in clover amended soils than soils amended with manure or composts. The N mineralization potential varied among the four organic amendments. Therefore, the timing of application and the type of organic amendment should be matched to the nutrient needs of the crop.

Biography

Veronica Uzokwe has received her MSc in Agronomy (1998) from the University of Ibadan and her PhD (2008) in Plant Breeding/Genetics from the International Institute of Tropical Agriculture (IITA), both in Nigeria. She has joined IITA, Dar es Salaam, Eastern African (EA) Hub in her current role as a System Agronomist in 2013 and currently the country project Coordinator for the Support to Agriculture for Research and Development of Strategic Crops in Africa (SARD-SC) project. Earlier, from 2011 to 2013, she was a Plant Breeder/Agronomist with the International Rice Research Institute (IRRI) at Los Banes, Philippines.

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