

The influence of Bomet red rock powder on composite organic fertilizers prepared from *Tithonia diversifolia* leaves and *Musa acuminata* (banana) stalks

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Abstract

Common organic composite fertilizers lack several bio-chemical and physical traits desirable in other fertilizers. This study aimed at investigating the role of Bomet red rock, BRR powder in improving green composite fertilizers from *Tithonia diversifolia* leaves and *Musa acuminata* stalks. The composite fertilizer without BRR powder was prepared by mixing the crude extracts of the two plants before addition of BRR powder (10% wt.) The composite fertilizer with and without the powder were analyzed for physical-chemicals, functional groups, surface, morphology, particle size, crystallinity and chemical composition. BRR powder was proven to boost the fertilizers pH, conductivity and solubility in water while reducing its loss on ignition value. Carboxylic and amide groups were sequestered while imprinting silica and ferric groups onto the fertilizer surface. BRR agglomerated the composite fertilizer particles, in the process smoothening the edges while reducing the particle sizes. The structure of the fertilizers changed from monoclinic to hexagonal with the dominant potassium alumino-silicate phase being replaced by silica upon addition of BRR. BRR powder was therefore found to positively affect the green composite fertilizer and should thus be used in preparation of quality and durable green compound fertilizers. This study seeks to address the national big 4 agenda on Food Security and SDG 2 on zero hunger.

Keywords: Bomet-red-rock; green composite fertilizer; *M. acuminata*; *T. diversifolia*