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"Resilience of agricultural systems against crises"

Maize, Soybean and Cassava Yield Response to Bat Manure in Congo Democratic Republic

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Abstract

The Democratic Republic of the Congo (DRC) had the highest increase of the hunger index over the last 10 years. The agricultural input sector is virtually absent and fertiliser costs are prohibitive. In Bas Congo province large deposits of bat guano remain largely unused. Insectivorous bats are abundant across the western lowlands and their droppings (manure) are easily collected from attics of houses. We investigated the effects of bat manure on maize, soybean and cassava, to assess if regular collection of the manure or exploitation of the deposits has the potential to increase crop production.

In 2009 and 2010, 0, 500 and 1000 kg ha^{-1} bat manure were applied to maize, followed by soybean or maize without manure application. In one site cassava received 0 or 500 kg ha^{-1}. Bat manure contained 6–10 % N, 0.7–1.5 % K and 0.9–1.8 % P. Bat manure was applied at seeding about 5–10 cm from the seed or planting stick and covered with soil.

In site 1 maize grain yield increased significantly from 3.14 to 3.85 Mg ha^{-1} by 500 and 1000 kg ha^{-1} of bat manure, without a difference between the rates. The following soybean grain yield in the 500 kg ha^{-1} manure treatments was 1.74 Mg ha^{-1} yet failed the significance level ($p = 0.052$) compared to the control (1.39 Mg ha^{-1}). In site 2 maize grain yield increased from 1.78 to 2.54 Mg ha^{-1} after 500 kg ha^{-1} manure application, yet did not further increase at 1000 kg ha^{-1}. The grain yield of the following maize crop was numerically higher when the previous maize had received manure but differences were not significant. In site 3, on alluvial clay soil maize grain yield was 2.0 Mg ha^{-1} across treatments without significant differences. Cassava produced 30.3 Mg ha^{-1} fresh roots with manure, significantly higher than the control (26.0 Mg ha^{-1}, $p = 0.039$).

Bat manure did not generally increase yields, but appears to have potential to increase agricultural production. Because the manure is free of charge and constantly replenished it appears worthwhile investing in research on conditions under which the effects are greatest and optimal application rates and techniques.

Keywords: Bat guano, cassava, insectivorous bats, nutrient supply, soybean

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