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Mycorrhization improves the mineral nutrition of *Sterculia setigera* plants growing on Zinc-contaminated soil

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ABSTRACT

Objective: This greenhouse study aimed to examine the effect of arbuscular mycorrhizal fungus (AMF), *Rhizophagus fasciculatus*, and soil zinc levels content on the mineral status of tropical gum tree *Sterculia setigera*.

Methodology and results: Plants were grown in soil under different Zn levels (0, 200, 400, 600 and 800 $mg{\cdot}kg^{-1}$). They were harvested after three months of cultivation, and growth, root symbiosis, and mineral nutrient concentrations were evaluated. Control plants (C) have not been colonized their survival rate was found to be 45% at 600 $mg.kg^{-1}$ Zn. Inoculated plants (T) were found to have a survival rate of 100% on Zn-contaminated soils up to 600 $mg{\cdot}kg^{-1}$ Zn. However, at 800 $mg.kg^{-1}$ Zn levels, 100% of the plants died. Root colonization rates (8.5%) were significantly lower at 600 mg/kg Zn. Higher mycorrhizal colonization was measured in contaminated soil at 0, 200, and 400 $mg{\cdot}kg^{-1}$ Cu addition levels in AMF-inoculated plants. AMF-inoculated plants had higher K, P, N, Ca, Mg, and Zn concentrations than control plants. In mycorrhized plants, nutrient concentrations increased with the increasing levels of Zn soil and were higher than those of the non-mycorrhized plants. Unlike Na, the uptake of K increased in the shoot tissues of mycorrhizal plants with increasing levels of Zn. Experiment results prove that *S. setigera* is associated with the AM fungus *Rhizophagus fasciculatus*, which increases the potential to survive and grow under a moderately Zn-contaminated soil system.

Conclusion and Application of results: symbiotic associations between AMF and tropical gum trees showed a promise for successful reforestation processes in areas contaminated by heavy metals.

Keywords: Arbuscular mycorrhiza, *Sterculia setigera*, Zinc, Soil, heavy metal