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“Filling gaps and removing traps
for sustainable resource management”

Reclaiming a Technosol Using *Ficus thonningii* and Domestic Wastes

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Abstract

The incorporation of native tree species in mine land reclamation has been promoted over the years. However, high-value multipurpose species for local people' livelihoods has received less attention. Also, human excreta (HE), comprising fecal matter (FM) and human urine fertiliser (HUF), a product of ecological sanitation and kitchen wood ash (WA) have been least explored in land reclamation. Yet, these could be indispensable in areas with limited amounts of organic plant nutrient sources coupled with a high demand for natural resources for livelihood support. This study evaluated the effects of HE and WA on the growth and establishment of *Ficus thonningii* Blume (called ficus) in a pegmatite-rich tantalum Technosol. Hardwood cuttings of ficus from homesteads in the Gatumba Mining District of Western Rwanda were planted in 20.4 × 19 cm diameter pots containing 5 kg forest soil (FS) and 6 kg Technosol. Five treatments including No amendment; HUF alone (100 mL/pot); HUF+WA (100 mL + 60 g/pot); FM (200 g/pot); and FM+WA (200 g + 60 g/pot) prepared in ten replicates each. After five and seven months of planting, plant height, number of leaves, shoot and root biomass were determined. The HE and WA treatments significantly increased ficus height ($P = 0.003$) ranging from 39 – 42 cm in the FS and 31 – 34 cm in the Technosol after seven months of planting. Shoot biomass weights ranged from 17 – 21 g in the FS and 10 – 16 g in the Technosol. Root: shoot ratios generally decreased with time in all the treatments except for the non-amended soils of both soils and ranged from 0.8 – 1.7 and 1.0 – 1.7 in the FS and Technosol, respectively. Ficus exhibited an efficient rooting system that stabilised the loose particles of the Technosol. This suggests the potential of using ficus, human excreta, and wood ash in degraded mine soil reclamation and provides an opportunity for further research in different conditions of soil degradation with low metal toxicity, different multipurpose tree species, and repeated applications throughout the period of growth and establishment.

Keywords: Ecological sanitation, fecal matter, human urine fertiliser, root and shoot biomass, wood ash