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Effects of plant litter decomposition on chemical and microbiological characteristics of artisanal zinc smelting slag using indigenous methods

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Abstract

This study aimed to evaluate the effect of plant litter input on the chemical and microbiological characteristics of zinc smelting slag. A laboratory microcosm experiment was conducted to evaluate the effect of litters from four specific plant species (*Trifolium repens* (TR), *Rumex acetosa* (RA), *Buddleia davidii* (BD), and *Neyraudia reynaudiana* (NR)) on slag quality after 90 days of litter decomposition. The nutrient and organic matter contents, enzyme activities, abundances of microbes, and availability of heavy metals were measured. The results showed that compared with the control treatment (CK), the four litter treatments significantly increased the concentrations of nutrients (N, P, K) and organic matter, enzyme activity (invertase, phosphatase, and urease), and the abundances of three dominant microbes (bacteria, fungi, and actinomycetes) in the substrate. RA and TR litters showed the highest improvement in the nutrient contents and microbiological characteristics of slag. The presence of plant litters strongly influenced the availability of heavy metals, and the effect varied among plant litter species and types of heavy metals. For example, both TR and RA litters

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