Goldschmidt 2024 Abstract
https://doi.org/10.46427/gold2024.22868

Harnessing the Power of Earthworms: Enhancing Soil Enzymatic Activity and Mitigating Heavy Metal Pollution with Vermicompost

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Vermicompost, derived from earthworm-mediated decomposition of organic waste, has emerged as a sustainable soil amendment with profound implications for soil health and agricultural productivity. This study explores the effects of vermicompost application on soil enzymatic activity and its potential in mitigating heavy metal pollution. The enzymatic activities of urease, alkaline phosphatase, acid phosphatase, and beta-glucosidase are crucial indicators of soil fertility and ecosystem functioning. Studies have consistently demonstrated that vermicompost supplementation enhances the activity of these enzymes, facilitating crucial biochemical processes such as nitrogen cycling, organic phosphorus mineralization, and organic matter decomposition. Furthermore, vermicompost has demonstrated remarkable capabilities in reducing the concentration of heavy metals in contaminated soils. Through processes such as microbial activity, organic matter binding, and nutrient transformation, vermicomposting effectively immobilizes heavy metals, thereby decreasing their bioavailability and mitigating their adverse effects on soil and plant health. The synergistic effects of enhanced enzymatic activity and reduced heavy metal pollution contribute to the overall improvement of soil health and fertility. Consequently, the application of vermicompost holds significant promise for promoting sustainable agricultural practices, enhancing crop productivity, and mitigating environmental pollution. This study highlights the multifaceted benefits of vermicompost application, emphasizing its potential as a cost-effective and environmentally friendly strategy for soil improvement and pollution remediation. Further research is also warranted to elucidate the mechanisms underlying vermicompost-mediated effects on soil enzymatic activity and heavy metal immobilization, thereby optimizing its application in diverse agricultural regime.

References:

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