Int J Environ Res (2023) 17:8
https://doi.org/10.1007/s41742-022-00496-5

RESEARCH PAPER

Phytoextraction Potential of Chrysanthemum and Cumbu Napier Hybrid Grass to Remediate Chromium-Contaminated Soils Using Bioamendments

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Received: 20 July 2022 / Revised: 5 October 2022 / Accepted: 26 November 2022

Abstract

Chromium is one of the most toxic heavy metals impacting soil quality and human health. However, remediating Cr from contaminated environments and soil by the chemical method is uneconomic and unsustainable. Phytoremediation is a potential, eco-friendly and cost-effective technique to decontaminate Cr from the soil. In this study, chrysanthemum and Cumbu Napier hybrid grass were grown with various amendments in the pots to evaluate their phytoextraction potential to remediate Cr-polluted soil. In the treatment (T_3-composted poultry manure), Cr concentration above 300 ppm was slightly toxic to the chrysanthemum, resulting in the reduction of flowers. Cumbu Napier grass had good growth in all the treatments. The productivity of Cumbu Napier grass was excellent, and 80% of Cr accumulation was in the T_4 treatment (Cr + 5 t ha^{-1} of press mud compost) compared to other treatments. Cr removal was maximum with Cumbu Napier, followed by chrysanthemum because of its higher biomass. According to Cr partitioning, a high concentration was found in the roots, followed by shoots and flowers. Thus, both crops with added bioamendments are excellent options for phytoremediation. Results suggest that plants grown with bioamendments pose a promising future for developing a sustainable, cost-effective methodology for chromium removal from the soil.

Highlights

- **Phytoremediation is a potential, eco-friendly and cost-effective technique to decontaminate Cr from the soil.**
- **Cr content ranged from 92.39 to 298.29 mg Kg^{-1}; a high concentration was found in the roots, followed by shoots and flowers.**
- **Poultry manure shows the highest reduction in total Cr content in chrysanthemum.**

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Published online: 14 December 2022