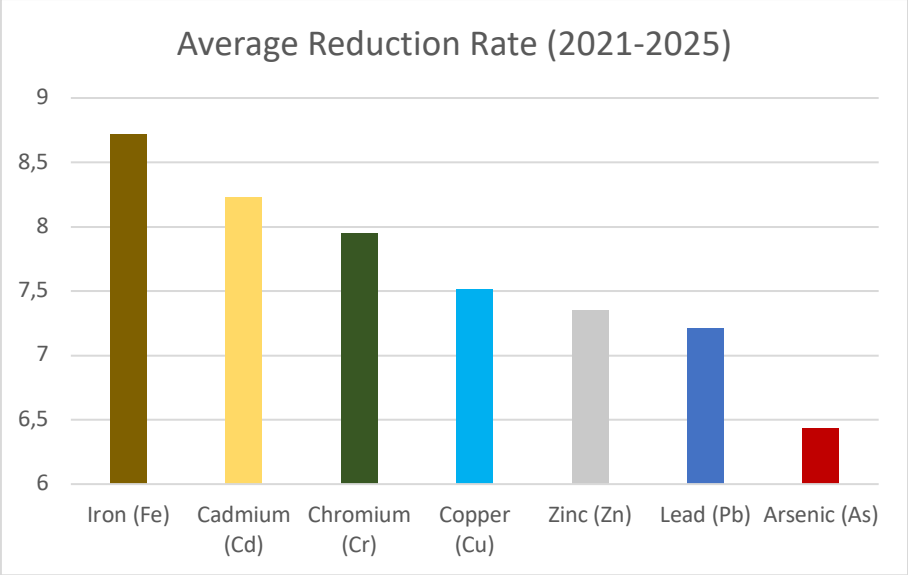
THE BAMBOO SOLUTION: HEALING GHANA'S TOXIC MINING LANDS

Dutch Foundation Barbarugo's Supported Research Confirms Bamboo's Potential to Naturally Extract Heavy Metals from Polluted Soil

Ghana successfully tested a low-cost, biological method of using common bamboo species to actively "clean" land polluted by illegal mining, a method scientifically known as phytoremediation. The study was led by Kwabena Akodwaa-Boadi a Researcher at the Regional Centre of Excellence in Energy and Environmental Sustainability of the University Energy and Natural Resources, Sunyani, Ghana, with funding support from the World Bamboo Organization and the Dutch Foundation Barbarugo. The breakthrough came from a lysimeter field experiment conducted in a mined-out test site at Pepedan in the Bekwai Municipality of the Ashanti Region. The results promise a sustainable path to restoring ecosystems and repurposing degraded mine sites to once again provide valuable services.

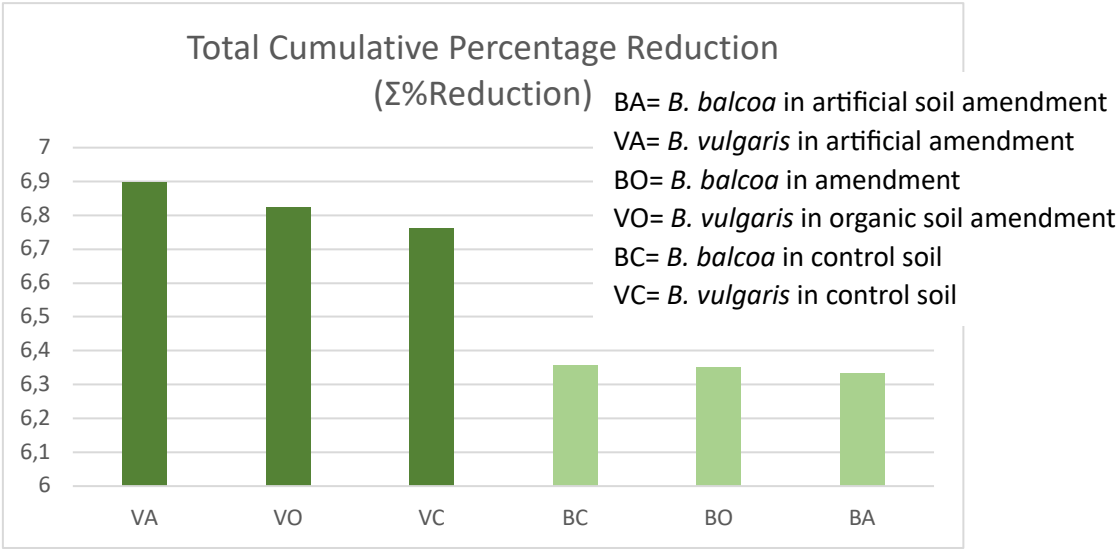
For the study, thirty-six (36) lysimeters were fabricated from 60 litre cylindrical steel drums with polyethylene container inserts and drainage devices fitted through the bottom of each container covered from both sides with geotechnical material. The drainage device empties into plastic receptacles concealed beneath the drums to catch percolated soil water for analysis. The object was to create a confined media in the lysimeters with mined out soils for bamboo growth where soil and percolated water quality data could be periodically collected and analyzed to study changes in selected heavy metal quantities. *Bambusa vulgaris* and *Bambusa balcoa* seedlings were procured from the Barbarugo Foundation nursery in Assin Kwata and planted in the lysimeters to monitor growth and heavy metal removal capabilities. Mined out soils were treated with organic (biochar, sawdust and chicken manure) and artificial amendments (NPK 20:10:10+35) with controls of agriculture soil.

The rate of removal heavy metals was achieved as the overall percentage change in the heavy metal concentration from September 2021 to February 2025. The figure below shows the average reduction rate for each heavy metal across all treatment and control group.



At the end of the experiment, results indicated that Iron (Fe) exhibited the highest average reduction rate at 8.2 suggesting it was the most readily sequestered or stabilized heavy metal, followed by Cadmium, Chromium, Copper, Zinc and Lead, while Arsenic (As) showed the lowest overall reduction rate.

The results indicate that *B. vulgaris* removed the most quantities of heavy metals combined, after the five-year experimental period. Combining *B. vulgaris* bamboo species with artificially amended soil demonstrated the best overall heavy metal removal rate of 6.898 for the period, followed by *B. vulgaris* in organic amended soils. This suggests that the chemical properties of the NPK amended soil, likely pH adjustment and nutrient supply may have provided a slightly better environment for overall metal uptake by the bamboo other than the biochar mixed with chicken manure and sawdust according to the study.



Additionally, *B vulgaris* bamboo species growing in all three treatments (VA, VO and VC) occupied the top spots compared with *B. balcoa* as the species with the highest heavy metal removal cumulatively confirming its dominance as the foremost candidate for phytoremediation. While species alone performed very well, the addition of amendments led to the highest total reductions, underscoring the importance of soil conditioning for maximizing remediation efficiency.

B. vulgaris is known for its fast growth rate yet comparatively lower total biomass compared to *B. balcoa* and many other bamboo species. Notwithstanding, the plant's physiological efficiency at handling the heavy metals, specifically its ability to hyperaccumulate and translocate the contaminants according to other studies may have account for its performance in the study.

It is recommended that *Bambusa vulgaris* be strategically prioritized for extensive use in forest and landscape reclamation programs in Ghana, especially across mined-out areas due to its demonstrated capacity for cost-efficient, optimal biomass production and contaminant sequestration.