

Phytoremediation of artisanal gold mine tailings - Potential of *Chrysopogon zizanioides* and *Andropogon gayanus* in the Sahelian climate

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Abstract : Soil pollution and, consequently, water resources by micropollutants from gold mine tailings constitute a major threat in developing countries due to the lack of waste treatment. Phytoremediation is an alternative for extracting or trapping micropollutants from contaminated soils by mining residues. The potentialities of *Chrysopogon zizanioides* (acclimated plant) and *Andropogon gayanus* (native plant) to accumulate arsenic (As), mercury (Hg), iron (Fe) and zinc (Zn) were studied in artisanal gold mine in Ouagadougou, Burkina Faso. The phytoremediation effectiveness of two plant species was studied in 75 pots of 30 liters each, containing mining residues from the artisanal gold processing site in the rural commune of Nimbogo. The experiments cover three modalities: Tn - planted unpolluted soils; To - unplanted mine tailings and Tp - planted mine tailings arranged in a randomized manner. The pots were amended quarterly with compost to provide nutrients to the plants. The phytoremediation assessment consists of comparing the growth, biomass and capacity of these two herbaceous plants to extract or to trap Hg, Fe, Zn and As in mining residues in a controlled environment. The analysis of plant species parameters cultivated in mine tailings shows indices of relative growth of *A. gayanus* very significantly high (34.38%) compared to 20.37% for *C. zizanioides*. While biomass analysis reveals that *C. zizanioides* has greater foliage and root system growth than *A. gayanus*. The results after a culture time of 6 months showed that *C. zizanioides* and *A. gayanus* have the potential to accumulate Hg, Fe, Zn and As. Root biomass has a more significant accumulation than aboveground biomass for both herbaceous species. Although the BCF bioaccumulation factor values for both plants together are low (<1), the removal efficiency of Hg, Fe, Zn and As is 45.13%, 42.26%, 21.5% and 2.87% respectively in 24 weeks of culture with *C. zizanioides*. However, pots grown with *A. gayanus* gives an effectiveness rate of 43.55%; 41.52%; 2.87% and 1.35% respectively for Fe, Zn, Hg and As. The results indicate that the plant species studied have a strong phytoremediation potential, although that of *A. gayanus* is relatively less than *C. zizanioides*.

Keywords : artisanal gold mine tailings, andropogon gayanus, chrysopogon zizanioides, phytoremediation

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