



The phytoattenuation of the soil metal contamination: the effects of plant growth regulators (GA₃ and IAA) by employing wetland macrophyte vetiver and energy plant sunflower

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ABSTRACT

The phytoattenuation, a novel green remediation concept, has been successfully demonstrated while employing vetiver and biostimulator (gibberellic acid GA₃ and indol-3-acetic acid IAA) to gradually mitigate the soil Cu levels. The effectiveness of stimulator GA₃ and IAA was in the descending sequence GA₃ > IAA. Biostimulator has been demonstrated plant growth enhancement and been employed for agricultural operation. The on-site tests demonstrated Cu levels were gradually decreasing during four months monitoring time periods. The soil metal level reduction achieved a satisfactory level which complied with local environmental standards. After more rounds of planting and harvesting, the soil metal concentration expected to be further dropped while on-site operation was executed. Green remediation concepts such as the phytoattenuation need to be taken as serious concern while the Earth has faced recent unprecedented damage Japan tsunami, Green house effect, unpredicted weather fluctuation worldwide, and serious endangered species issues.

Keywords: The phytoattenuation; Heavy metals; Vetiver (*Vetiveria zizanioides*); Sunflower; Biostimulator; Gibberellic acid (GA₃); Indol-3-acetic acid (IAA)

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